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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXIX. 1 APRIL, 1928. PART 4

Event and Comment.

Plant More Trees.

A STRONG plea for the planting of more trees throughout Queensland was made by his Excellency the Governor (Sir John Goodwin) recently, when he officially opened the additions to the Morningside State School. His Excellency said that he was pleased to hear the statement of the chairman of the school committee (Mr. A. H. Wright, M.L.A.) that in working for the beautification of the grounds they were paying attention to tree-planting. One wished, said His Excellency, that it was being done more extensively in Queensland. It was a pity to think that trees were being cut down, and that hardly sufficient was being done in some parts by way of replacement.

Bringing the Home Land Nearer—Another Epic of the Air.

ALL the possible first aeroplane flights from England to Australia have now been achieved by Australians. Ross and Keith Smith pioneered the airway home over four continents. Hinkler achieved the first solo flight in fastest time, and while Australia was still cheering that epic exploit, out of the blue came another tiny plane on the last lap of a sky ride from London to Canberra and bearing a smiling little lady, a young Australian, the first woman to fly from Britain to the Commonwealth. To Captain Lancaster, the intrepid and modest young Englishman, who piloted the machine, and Mrs. Keith Miller his passenger, all honour is due for accomplishing a flight that marks yet one more stage in man's conquest of the air. The record of hard luck that prolonged their aerial voyage from England intensifies popular appreciation of the high courage, remarkable endurance, and dour determination of both, to which is added everyone's admiration for the skill and resource of the indomitable pilot. The flights of the Smiths, Parer and Mackintosh, Hinkler, and now Lancaster and Mrs. Miller have made for Australia a high reputation in the air, a reputation which, no doubt, will serve as an inspiration as well as a tradition to young Australia in her progress towards complete mastership of the skies.

The Departmental Economic Committee.

THE conditions of the dairying industry in Queensland have been reviewed fully by the Departmental Economic Committee, and the results of its work are being set out by direction of the Minister of Agriculture and Stock, Mr. W. Forgan Smith, in a series of well-printed and illustrated bulletins covering every phase of dairy farming, and of which the first is about to be issued. The initial bulletin will be in the nature of a general survey of dairy practice and the economic facts governing it; and others, which will follow at regular intervals, will deal with such subjects as herd and pasture improvement; farm management; fodder crops, their cultivation and conservation; dairy farm machinery, equipment, buildings and storing; dairy hygiene; manufacturing, marketing, and transport. The Committee entered upon its job with a full realisation of its magnitude and an ample appreciation of all its complexities. Its task was attacked from every angle, full weight being given to every practical factor. The result produced is anything but an academical treatise; it is a plain straightforward statement of facts and findings, which should commend itself to every practical dairyman. The conclusions of the Committee were arrived at after very careful investigation and deliberation, and in its inquiry it invited the association of representatives of producers, producers direct, and of manufacturers, and in this way made their task as complete as possible.

The Dairying Industry of Queensland.

THE Committee recognised that dairy farming is a complex business and that many things influence the enterprise, situation and climatic conditions being not the least important of them. Nevertheless, success in dairying, as in other businesses, depends largely on efficient management to which there are many and varying contributing factors. Industrial changes alone have brought in their train many conditions which involve to-day, even more than yesterday, the application of exact business methods. For him to attain to a full measure of success it is essential that the dairy farmer should overhaul his business methods so that he may cut out the losing sections of his enterprise and concentrate on those that fill the bucket. Searching investigation by the farmer into his management may disclose to him that it is possible to reduce sectional losses and increase profitable activities. The dairy farmer who is most likely to come out a winner is he who has a practical knowledge of agriculture; the growing and rotation of crops; the conservation of fodder; stock feeding, breeding, and management; and who makes intelligent use of that knowledge.

Maxims for Maizegrowers.

THE following points may be taken as an epitome of Departmental advice to maizegrowers:—Practise rotation, maintain the soil in a state of fertility, prepare the land early and thoroughly. Trap the rain, and retain a maximum amount in the soil and subsoil for the benefit, ultimately, of the growing crop. Choose a suitable variety for the locality, and plant selected seed true to type, of good germinable quality, and of known high productivity. Use seed of a uniform size, sow it with a suitable drill, say, 12 to 15 inches apart at a regular depth of 3 inches to 4 inches in straight rows, preferably not less than 4 feet apart. Harrow the young plants with a light "lever" harrows at right angles to the line of drills. Cultivate the crop five or six times deeply, and close to the young plants at first, then gradually shallower, and a little farther away from the plants as they develop, so as not to damage the lateral roots. Use the cultivator as soon after each downpour of rain as possible. The soundness of this advice is evidenced by the experience of the most successful of growers in Queensland and other States. The chief requirements of a soil for the successful growth of maize are sufficient moisture and plant food material, and these are considerably increased by a thorough preparation of the land. The importance of a four or five months' winter fallow, especially where the rainfall during the growing period of the crop is insufficient for its requirements, or where the rainfall cannot be depended upon, is not as fully realised by many as it should be. This frequently results in the total or partial failure of the crop in a dry season, which would not occur if the amount of moisture that can be stored during a winter fallow

were better appreciated. The effect of good preparation in the "unlocking" or rendering available the large stores of plant food material that exist in most maize soils is also worth consideration. Much of this food material for the plant must be brought into a condition in which it becomes easily soluble in the soil moisture, and immediately available as plant food for the young seedlings. A good start "is half the battle" no matter what the subsequent conditions may be, and no amount of after-cultivation can make up for insufficient preparation of the land. Tests at the Grafton Experiment Farm (N.S.W.) last season showed that whereas the yield from April ploughed land was 104 bushels 44 lb. an acre, that from August ploughed land was 90 bushels 35 lb. an acre, an increase of 14 bushels 9 lb. an acre.

The Sugar Industry—Its National Value.

SPEAKING to a gathering of representative sugar producers in Brisbane recently the Premier, Mr. W. McCormack, said, in the course of a notable address, that there were very few agricultural industries in which there was such a wide distribution of the wealth produced as in the sugar industry. All sections of the community participated in the results of that great industry. It was a good wage payer. It affected transport. Of all agricultural products, sugar, though a very costly agricultural product, provided the greatest distribution of wealth in proportion to the value of the product. For that reason Queensland had very good reason to be proud of this industry. In the course of the last twelve months he had the opportunity of visiting some other sugar countries, and he found that outside of the Hawaiian Islands, the Queensland sugar industry, both on the agricultural and technical sides—particularly the latter—had very little to learn from other countries. He spent a week in Louisiana soon after the great flooding by the Mississippi, and found that if they had cane growing in Queensland under the same conditions as there, they would have much more industrial trouble than they had now. He found that there was in Australia a better control and a better organisation of this great industry from the production of cane to the selling of the sugar, than there was in any other country he had visited. They had something to be proud of in the organisation that had been created in Australia for the production, manufacture, and distribution of this commodity. The industry in Australia also served another great purpose, and that was that it helped Queensland to develop the tropical portion of the State. One of the greatest aids in maintaining a white population in the northern part of the State was the sugar industry. He had spent his early manhood in North Queensland, and he had seen the wonderful progress that had been made there as the result of the advance of the sugar industry. Outside of a small coterie of people in the South the great bulk of the population of the Commonwealth was satisfied with the propeople a first-class commodity, and the public for their part should see that the sugar growers obtained a price that would enable them to develop the northern part of the continent by white or British labour.

Sugar and Security.

CONTINUING, Mr. McCormack said that there was no doubt that in respect of the sugar embargo the placing of their case before the people of Australia required intense organisation. That job was not yet finished. He wanted to impress that fact upon them. The good work that had been done required to be followed up by more intense organisation and propaganda on behalf of the sugar industry. Their only safeguard against the withdrawal of the embargo upon foreign sugar was to spread throughout Australia knowledge about the industry. The need for the protection of the sugar industry was so apparent to people in Queensland that they were likely to forget that other people—especially those in the Southern States—did not realise the circumstances surrounding it. He took every opportunity that was presented of placing before the people in the South the need for the continued protection of the industry, and for the settlement of the northern part of Queensland. In the maintaining of settlement there was no other industry that could replace sugar growing. They had the natural conditions suitable for the production of sugar; they were paying high wages, and giving good conditions to the people engaged in the industry, and that should conduce to a healthy growth of settlement in the North. All they asked the people in the North to do was to see that the people who lived in the tropical part of Queensland received a "fair go."

Bureau of Sugar Experiment Stations.

SUGAR GROWING IN HAWAII.

Extract from Report of Mr. ARTHUR F. BELL, Travelling Research Scholar.

I arrived in Honolulu on 9th August and was met by Mr. H. Atherton Lee, the Chief Pathologist. Having previously made official arrangements with the Committee of the Experimental Station of the H.S.P.A. I was enabled to commence work immediately.

As far as possible I made myself conversant with the work of the Experimental Station as a whole, but devoted particular attention to the study of the root disease or growth failure complex. The study of root diseases has been very largely shirked during the past, but within the last three years the H.S.P.A. has instituted a co-operative study of this problem, the work being divided amongst the Departments of Chemistry, Agriculture, Entomology, and Pathology.

As a result of these combined investigations many hitherto obscure problems have been cleared up, and it has been shown that the so-called root disease consists of several quite distinct factors, any one or several of which may be dominant in any particular locality. At the present time the root disease problem in Hawaii is considered under the following headings:—(*a*) Root rots of active parasites, (*b*) root rots of weak parasites, (*c*) nematode injury, (*d*) injury by soil inhabiting animals other than nematodes, (*e*) aluminium toxicity, (*f*) unfavourable concentrations of total mineral salts in the soil solution, (*g*) an unfavourable base ratio in the soil solution, and (*h*) a chlorosis due to an absence of traces of manganese. I think I have now a quite comprehensive view of the laboratory and field work which has been done in this important division of investigations.

In addition to the study of root diseases, the Pathology Department has, during the past four years, carried out work on the problems of eye spot, tip burn, salt spray injury, red stripe, pokkah bong or twisted top, and stem gall disease. I had full access to the files containing complete details of these investigations.

Concerning field trips, I visited all five plantations on the island of Oahu several times, and also made trips to the islands of Mani, Hawaii, and Knai. These trips were made for the purpose of seeing the field experiments in, and the control of, the various phases of the root disease complex, together with eye spot and red stripe.

I was very fortunate in being able to attend the annual meeting of the Association of Hawaiian Sugar Technologists. This meeting is held in October and lasts one week. It is attended by the technical staffs of the Experimental Station and all plantations, as well as technical advisers employed by the sugar factors and the University. Numerous papers were presented both by field and laboratory men. In November I attended the annual meeting of the Hawaiian Sugar Planters' Association, and, by request, addressed the gathering on the question of foreign diseases and quarantine.

I have devoted a very considerable amount of time to the collection and preparation of the material for a manuscript on the question of the diagnosis of sugar-cane diseases. I have constructed a key for the identification of some forty parasitic and physiological diseases, followed by descriptions of the individual diseases. These descriptions average about 500 words each, and are mainly confined to a description of the symptoms of the disease, with short notes on the known means of control. Special attention has been given to the root disease complex, and a representative bibliography of some sixty titles has been appended. I am making a collection of photographs representative of various phases of the diseases, and propose that this manuscript should be issued as a Bulletin of the Bureau of Sugar Experiment Stations, upon my return to Queensland.

Shortly after my arrival in Honolulu, I constructed a chart showing the geographical distribution of all sugar-cane diseases, the original chart being compiled on the basis of my personal experience and such publications as were in the library of the H.S.P.A. The chart was then reproduced in printed form, and the H.S.P.A. has sent copies to all known sugar-cane pathologists for their correction and additions. By this means we expect to obtain a very valuable survey of the distribution of sugar-cane diseases which will be especially useful from the standpoint of quarantine.

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

The Entomologist at Meringa, near Cairns (Mr. E. Jarvis), has submitted the following report in connection with the control of various insects attacking sugar-cane—January to February, 1928—to the Director of Sugar Experiment Stations, Mr. H. T. Easterby:—

LEAF HOPPERS OF THE SUGAR-CANE.

Up to the present little or no damage to cane has been caused in the Cairns district by the various species of leaf hoppers belonging to such families as Fulgoridæ, Derbidæ, &c., which, although plentiful enough at times amongst the leaves of cane plants, appear to be effectually kept in check by their own natural enemies.

Perhaps our two best known species of leaf hoppers are *Perkinsiella saccharicida* Kirk. and *Tetigonia parthaon* Kirk., the former of which is found also in Hawaii, Fiji, and China. This rather attractive hopper (Figs. 1 to 5 on accompanying plate) occurs commonly in our canefields, where it is mainly responsible for the small red or whitish isolated blotches or scars of irregular outline noticed here and there on the stems or leaves of healthy stools. Such scars indicate the presence of eggs of this insect, which are deposited in a chamber cut by the ovipositer of the female hopper in the parenchyma or living plant tissue. (Fig. 3.)

Viewed with a pocket lens, one can sometimes plainly see the head end of these eggs showing through the epidermis of the leaf or midrib, and also notice on each two tiny red spots, the future eyes of the adult insect. (Fig. 2.) The fully grown winged hopper is able to fly well, its activities, however, being carried out during the hours of darkness.

In certain seasons a short-winged or flightless (Brachypterous) form of this insect sometimes appears, which is thought to be more prolific than the normal brood of fully-winged specimens.

We are indebted to Kirkcaldy of the Hawaiian Sugar Planters' Association for much valuable information regarding the natural control of *Perkinsiella saccharicida* in Queensland, who more than twenty years ago discovered that the eggs of this leaf hopper are destroyed by the Myrmarid and Eulophid parasites *Paranagrus optabilis* and *Ootetrastichus beatus*, respectively, while the nymphal and winged stages are parasitised by the Dryinid *Pseudogonatopus saccharorum*, by a Dipteron, viz., *Pipunculus Juvator*, and by larvæ of the Lepidopteron *Agamopsyche Thernodes*, a species of the family Epipyropidæ. It is little wonder that the above mentioned parasites, when aided by such predaceous enemies as lady-bird beetles, ants, earwigs, jumping-spiders, syrphid flies, reduviid and pentatomid bugs, and entomogenous fungi, are able collectively to prevent the leaf hopper in question from multiplying to an injurious extent.

Another species of Fulgorpidea which has been recorded from Cairns as frequenting grasses and casually the leaves of sugar-cane, is *Phacalastor pseudomaidis*. In this hopper "the tegmina" (according to Kirkcaldy) "are strongly granulate with dark brown, and the nymphs are whitish, banded and spotted with dark brown. Frons and antennæ dark smoky brown with a double (somewhat interrupted) line across the middle of the former. Femora smoky, apically black; tibiæ pale, annulated with black. Males macropterous (long-winged), genital segment black. Females dimorphic (existing in two forms), genital segment pale, a little infuscate. The short-winged form has hyaline tegmina with a large black spot apically. Length, 3¼ to 4 mill. (macropt.); 2½ mill. (brachypt.)."

A third species belonging to the same super-family is our attractive little leaf hopper *Astorga saccharicida*, which is frequently met with on cane leaves and grasses around Gordonvale and Meringa. (See Figs. 6, 11, 12, 13, on plate.)

The following brief description of this insect by Kirkcaldy will be useful to officers of the Division of Entomology of the Sugar Bureau for reference purposes:—"Brownish testaceous; head paler, abdomen mostly darker; frons laterally and dorsally marked with short brownish lines. Tegmina pale brownish-yellow, a brownish smudge on coastal membrane and coastal cell, also on apical margin (except extreme apex), with sub-parallel darker stripes, and the two longer ones near apex across tegmen, also one or two small irregular specks on disc or corium and clavus. Wings pale smoky, veins pale brown. Legs lined with brownish. Length, 7½ to 8¾ mill."

On the 27th of last month (January) specimens of an additional species of Fulgoroidea, closely related to *Perkinsiella*, were received at this Experiment Station from a grower at Mackay, where they were said to be damaging maize plants, and

to have injured sugar-cane about two years ago. This leaf hopper has a wing expanse of 9 mm., the apical veins of its tegmina and portions of the adjoining cells being clouded with dark brown.

Two interesting hoppers belonging to the family Derbidæ were collected some years ago near Cairns by Kirkcaldy from leaves of sugar-cane; and as these insects have not previously been recorded by our Sugar Bureau the following brief descriptions of same will not be out of place here.

Heronax sacchivora.—This species is allied to the type (*H. parnassius*), "but the apical veins are mostly sangineous, and the tegminal pattern is pale, and more broken. Lateral margins of frons contiguous throughout, and dorsally the head is much narrower, and but narrowly excavated. Length, $3\frac{1}{4}$ mill. to apex of abdomen, 7 to apex of tegmen."

Proutista lumholtzi Kirk.—"Head and pronotum testaceous, a speck at the base of the frons, and another on the clypeus, and some suffusions apically on the pronotum blackish brown. Mesonotum castaneous; a median keel, a rough W. in the middle, and the hind margin medianly, testaceous. Metanotum dark, whitish medianly. Legs testaceous; fore coxæ, apex of tibiæ, &c., blackish. Abdomen testaceous and blackish confused. Tegmina hyaline, marked with blackish-brown less closely than in *moesta*. Length, $7\frac{1}{2}$, expanse of tegmen, 15 mill." (See genatalia figured on accompanying plate, Figs. 7, 8, 9.)

The Tetigoniidæ (super-family Jassoidea), include two species known to attack sugar-cane in Queensland and elsewhere, viz.:—*Tetigonia parthaon* Kirk. and *T. albida* Walk. The former insect has been alluded to in Bulletin No. 3 (second edition revised) of Bureau of Sugar Experiment Stations, Division of Entomology, while Kirkcaldy collected specimens of the latter (*T. albida*) many years ago at Cairns, Gordonvale, and Bundaberg, on grasses and sugar-cane; and has also recorded its occurrence from Ceylon, Celebes, Philippines, West and South Africa, and Madagascar.

How to Combat Leaf Hoppers.

Advice having been recently sought from this Experiment Station regarding approved methods of controlling such cane insects, opportunity has been taken in the present monthly report of dealing with this important phase of the question.

The sprays usually employed against leaf hoppers are (1) Kerosene emulsion, tobacco decoction, or soap emulsions, &c.

If using kerosene emulsion, it should not be more than a 10 per cent. strength. To make the stock solution, dissolve 1 lb. of hard soap in 2 gallons of hot, soft water; then add 2 gallons of kerosene, and agitate vigorously by pumping it back into itself until a thick creamy liquid results. Dilute this before using to 10 per cent. strength, by adding $5\frac{2}{3}$ gallons of water to 1 gallon of the stock solution.

A good tobacco spray can be made by steeping 1 lb. of the leaves or stems in 4 gallons of hot water. This should be applied as soon as possible after preparation, and while still quite warm.

Another simple spraying solution is made from 1 lb. of whale oil soap in 5 gallons of water; or from 1 lb. of common laundry soap in about 3 gallons of water. Either of the above mentioned sprays (applied if needs be three or four times at intervals of six to eight days) have been found to destroy the nymphal forms of leaf hoppers. Such spraying should be followed up with some suitable trap of the sticky shield kind. This can be made by stretching a piece of canvas on a light frame of wood, measuring about 3 feet by 5 feet, which is painted over with tar or some other adhesive to catch the winged hoppers. A good painting mixture is made as follows:—Heat 20 oz. of resin over a gentle fire until fused, then add 5 oz. of linseed oil and 10 oz. of honey. When well mixed, remove from fire, cool, and add 20 oz. of 90 per cent. alcohol. This coating substance should be used cold, and kept out of contact with air.

Another formula is to melt together equal parts of resin, wax, and turpentine; this composition is applied hot.

These coated screens are taken along the cane rows at night time, together with a bright lamp or torch. One operator holds the screen in correct position (vertically, directly facing the cane stools on either side), while another walks slowly alongside gently beating or agitating the leaves. The adult hoppers fly hastily out, towards the lamp light, come into contact with the screen, and stick to the prepared surface in thousands.

CANE VARIETIES GROWN IN QUEENSLAND.

THEIR RESISTANCE TO DISEASE.

By E. J. FERGUSON WOOD, B.Sc.

The following notes are the result of observations made in the field during 1927, in all the sugar districts of Queensland. Farmers are continually inquiring about varieties, and this section is an endeavour to answer the question. In connection with varieties, it must be remembered that there are variations in soil, climate, &c., within a small area, which may affect the qualities of a variety of cane, and it so happens that a variety which does well in one situation may not do at all well on an adjacent farm. Another important fact that is continually cropping up in connection with disease resistance is the variation in the degree of resistance in the same cane in different districts. An example of this is shown by M.1900 Seedling and D.1135 at Childers and Bundaberg. In the former place, M.1900 Seedling is rather resistant to Gumming Disease, and D.1135 very susceptible and subject to great damage. In the latter D.1135 is on the whole rather tolerant to Gumming, and M.1900 Seedling is in many cases wiped out. Again, N.G.16 is considered on the Northern Rivers of New South Wales to be almost immune to Mosaic, while in Bundaberg it is rather susceptible to the disease. These are unaccountable phenomena, but are of the greatest importance. It is also strongly suspected that a resistant cane may, under certain conditions, lose some of its powers. A recognition of these local variations will show the farmer that data concerning resistance are not infallible, but in most cases the general position is clear, and a variety is not stated as resistant without strong evidence and the recognition of these facts.

The use of resistant canes is the easiest method of disease control, and continual experiment is necessary. On the other hand, promiscuous collections of doubtful varieties on a number of farms, such as occur in many of the areas south of Proserpine, are to be deplored. It is well for the farmer to allow the Experiment Stations to carry out the investigation of varieties, and to follow their recommendations, as it is cheaper for the farmer and better for the mill. Many farms are merely graveyards of discarded varieties, and, as such, are a curse to their owners and all connected with them. Successful canes are few and far between, as will be seen from the number of staple canes grown in Queensland when compared with the number of seedlings that have been raised, and the number of canes which have been imported from time to time.

Badila, or New Guinea 15.

This is by far the best variety grown in the North of Queensland, where it is an annual cropper, though the plant crop is usually sown before the winter. It is a good striker, excellent stooler and ratooner at almost any time. In the South it becomes a two-year cane, and for this reason does not find favour with the farmers, though it gives very good profits to the plantations around Bundaberg. One of its advantages is the fact that it covers the rows in very quickly. It needs a first class soil and a heavy rainfall, and does not do well on medium to poor land after the first few years. It gives a heavy crop with thick sticks, which are heavy and easy to cut and trash; is a favourite with the cutters, and a fair cane to mill. It has a high sugar content, though this is best between August and November. It is recommended to be planted wherever it will grow north of Townsville.

In North Queensland it is resistant to Gumming and Mosaic, rather susceptible to Leaf Scald, but tolerant (its susceptibility to this disease is probably due to deterioration of the cane stock grown at present), and very susceptible to Top Rot and Spindle Top. Grubs affect it badly at times. It resists Leaf Stripe.

In the South it has proved highly susceptible to Gumming, though on the Northern Rivers of New South Wales it is regarded as moderately resistant. It is therefore not recommended for the southern districts, except in such places as Hapsburg and Avondale, where it seems to be practically free of gum. Its reputed resistance to Fiji Disease in New South Wales would make it a useful cane at Maryborough on the river banks, if it were selected against gum.

At Tully, it forms 99 per cent. of the crop, and over 90 per cent. at Innisfail, and should form a larger part of the crop at Ingham. It often gives as heavy crops as other varieties on poorer lands, but appears lighter on account of its short thick sticks.

H.Q. 426 (Clark's Seedling).

This cane is an old favourite in the North for early cropping, but it loses its density towards the end of the year. In the beginningof the season it gives a higher density than any other cane commonly grown in Queensland except B.208. It is a fair striker and a quick-growing cane (though it needs a little nursing), and can thus be planted in August and cut the following June. On this account it is favoured for late planting. A rather lighter cropper than Badila, it is grown on second class land, where it does well. It is grown in all districts north of Bundaberg, to some extent, though it has gone out in Ingham and Goondi, owing to disease. It does not appear to grow so well south of Mackay.

Unfortunately, it is a cane very susceptible to disease, being badly attacked by Leaf Scald north of Ingham, and by Gumming in this district. At Mackay it is suffering from Red Rot, and unless care is taken will go out there also. It is moderately resistant to Mosaic, and apparently very resistant to Leaf Stripe—to judge by its appearance at Mossman and on the Burdekin. It lodges if allowed to grow too long, and the c.c.s. rapidly falls.

Q. 813.

This cane is rapidly becoming the staple variety in the Mackay district, and is coming into its own in other parts. In the tropics it is an early maturer and can be cut at any time during the season. It strikes excellently, ratoons well, and grows quickly. The Mackay climate is ideal for the cane, which grows too lank and lodges in the more nothern areas (unless planted after September). In this case it gives a good crop of high density, and its resistance to disease is a great advantage. It is used at Ingham as a Gum resister, and should be grown more exclusively wherever Leaf Scald is bad, as it possesses good powers of resistance. It requires more attention at Mossman and on the poorer soils in the Cairns district.

In the South it is a late maturer, and cannot be cut before September or it will not ratoon. It is probable that it will improve, as it has done at Mackay, for it needs acclimatisation. To ratoon well, it needs the trash burnt off early, and a lot of bad ratoons of this cane are due to neglect of this. As it is a shallow rooter it does not do well on very sandy soils nor on red soils of the Childers type. It does fairly well on the Woongarra, and gives good and payable crops at Qunaba, and on the Sugar Experiment Station at Bundaberg, where it has been grown for some years. The Station has planted it practically throughout in order to control Gumming.

Its resistance to disease is very great, and it is perhaps the most useful cane grown in Queensland from this point of view. It is, however, not immune to any of the diseases, and this fact is disappointing to many farmers. It is certainly one of our most resistant canes to Gumming, as has been shown on the Herbert, where it is rather extensively grown, and at Nambour and Bundaberg. It certainly shows the Leaf Streaks, but not to the same extent as the more susceptible varieties, but gum can rarely be got to ooze from the stick, except in severe cases. If, as is suspected, Gum is a leaf disease which affects the stem in certain conditions, this is an indication of resistance. At any rate, it gives a strike and a crop in Woongarra where M.1900 Seedling and D.1135 fail to do so. It is rather resistant to Mosaic, but not tolerant, succumbing easily when it becomes affected; appears to resist Leaf Scald, though this requires confirmation; is resistant to Fiji Disease, though this resistance does not approach immunity as nearly as was hoped from this cane. However, it is still useful, if rogued, as a variety to control Fiji Disease. It is more susceptible to Leaf Stripe and root rots than to other diseases, and shows grub attack easily owing to the fact that it is a shallow rooter. It is a cane worth a thorough trial, especially in the southern districts.

H.Q. 285.

(Milton, Early Maturer, Hambledon Seedling, Nerang, Sarina, Mackay, &c., are local names for this cane).

This variety is the staple early-maturing cane in the South of Queensland. It gives a very good c.c.s. in the early part of the season, but is usually a light cropper, and will not stand over. It ratoons and strikes well, and is at its best on alluvial and ti-tree swamp soils, such as the Burnett soils and those at Pialba and Beenleigh. It also does well in wet places at times. It is rather inclined to lodge if left to stand too long. It is not favoured in the North owing to its rank growth and light cropping, but might with advantage be tried at Mossman. It is still grown to some extent near Mackay, but is giving place to Q.813, which is a better cropper and more resistant to disease.

In the Bundaberg district it is badly attacked by Mosaic, and its susceptibility to this disease is a great drawback, as it is the only suitable early maturing cane. At Nambour it is gummed, and is useless on that account. In the Beenleigh area it seems to promise well as a resistant cane to Fiji disease, but does take the disease and requires rogueing. It is subject to Red Rot and to root diseases where these are bad.

D. 1135.

(Frost Proof, Frost Resister, Seedling at Beenleigh, Bundaberg, and Fairymead, are local names for this cane).

This old favourite is gradually going out of vogue, owing to the fact that it is susceptible to most diseases. It stands up to any amount of mechanical injury, though it does not live up to its name of Frost Proof, as it is about as susceptible to this as is Q.813. It strikes well when healthy, and gives a great number of ratoons, which, however, become spindly. For this reason it is often grown in stump country in the South and as far as Mackay, and is ratooned seven or eight times. Farmers have never been particular about the plants they have used, with the result that the cane has "gone off." It is, perhaps, the best cane known for grub resistance, owing to its deep-rooting capacity, and is a favourite on sandy soils for the same reason. There has been a popular fallacy that this cane was resistant to disease; but, in reality, it is susceptible, especially to Fiji disease and Gumming; moderately susceptible to Mosaic and to Leaf Stripe; also to root diseases such as Peg Leg and Knife Cut. I have also seen the cane affected with Iliau. It does, however, seem to resist Leaf Scald, and I have never seen this variety affected with this disease in North Queensland. Reports from New South Wals confirm this. The planting of this cane is discouraged in Beenleigh and Maryborough owing to Fiji disease, and in Bundaberg owing to Gum. In Mossman it is badly affected with Leaf Stripe.

M. 1900 Seedling.

Another old favourite in the South, which has succumbed to disease. It is always a late maturer and will not ratoon if cut early. Gives a high c.c.s. if it remains erect, and crops heavily. Owing to the weight of the sticks it is liable to fall, and the density immediately drops. It is not as sure a striker as Q.813, and for various reasons is being replaced by this variety in the Mackay area. Being a brittle cane, it requires more attention than D.1135 during the early stages.

Unfortunately, it is very susceptible to disease, and succumbs to Fiji disease at Beenleigh and Maryborough, Gum at Nambour and Bundaberg, root diseases at Childers (Iliau, Peg Leg, Marasmius, &c.), and Red Rot in the Mackay area. It is also subject to Top Rot on the Burdekin, though not to such an extent as Badila. Its planting is not recommended except in areas which are known to be free of disease.

It is not popular in the North owing to rank growth and consequent low density, and is hardly a commercial cane north of Mackay.

The Gorus.

(N.G.24, N.G.24 A, and N.G.24 B).

These canes are not popular in the South, and are rarely seen; on the Burdekin they come into prominence, and are practically free of disease. In the months of September and October they form fairly profitable canes in this district, but if not cut at this time they are not good. Farther North, Leaf Scald has practically caused their extermination.

They are not to be recommended north of Townsville, and in Leaf Scald areas they should be prohibited as they carry the disease, and do not give a crop. It would be safe to say that practically every field of Goru north of Ingham was affected with Leaf Scald.

They occur to some extent at Beenleigh, where they show Gum and Fiji disease.

7 R. 428 (Pompey).

This cane, which is a late maturer, and which gives a heavy crop of moderate or low c.c.s., is somewhat popular at Mackay, and is in danger of becoming so at Mossman. It is also popular at Goondi, on the poorer soils, but at Mourilyan it averaged under 10 c.c.s. during the last season, and is, fortunately, out of favour.

It is unpopular among pathologists, owing to the fact that it is very susceptible to Fiji disease, Mosaic, Leaf Stripe, Leaf Scald, and Gum, and moderately susceptible to Spindle Top and Top Rot. Extensive planting of this cane is not advised owing to the probability of its developing disease. It suffers from Leaf Scald in the Innisfail districts, and Leaf Stripe on the Burdekin.

Korpi.

This cane has been used extensively at Ingham in the control work of Gumming disease, and we are assured by officers of the Colonial Sugar Refining Company that it is pretty resistant. It requires a rich soil and a good rainfall. It arrows early, is a good striker and ratooner, and is erect in habit. Just now its distribution is confined to the Herbert River, Childers, and a few farms at Mossman and Ayr. The powers of resistance of this cane to other diseases than Gumming should be tested, and it is hoped that this will be done at an early date.

Orambo.

This variety also is grown almost exclusively in the Herbert River districts and resists Gumming. It is a heavy cropper of very good density, and seems from the few tests made in the North to mature early. If it retains this property in the South and proves resistant to Gum there also, it will be a boon to the pathologists and farmers. It is not so erect as Korpi, but does not arrow at all freely, nor does it require such good soil. It seems a better cane than Q.813 in the North, and more suited to the tropical climate. It also needs to be tried out in the South in controlled experiment plots, and to be brought into use in the control of Gumming in Bundaberg and Childers.

Nanemo (probably the same as Bogela).

Another cane of the series which may be used to combat Gumming in the South. It is a good cropper, but not such a good striker as Orambo, which rivals Q.813. It appears to be susceptible to Leaf Scald, and so will probably not come into general use in the Innisfail and Cairns areas, and is not recommended at Mossman.

E.K. 1.

This is a cane with rather a heavier stick than Q.813 but much of the same colour. It has a low density, and though it gives a heavy crop is, as a rule, disappointing. Moreover, it is very susceptible to Gum, Fiji disease, Mosaic, &c. It is not recommended to the farmer.

E.K. 2.

This variety has proved even less successful than E.K.1, and is not grown commercially in Queensland, except perhaps on a few isolated farms.

E.K. 28.

The best of the E.K. canes in this State is this variety, which gives a heavy crop with a few very heavy sticks in the stool, and a high density if cut late in the season. When cut early it will not ratoon, and is at its best in October, November, and December. It is a sure striker and ratooner when planted at the right time, especially on poorer soils. North of Ingham it is too rank a grower unless planted in September or October. It is always erect, and for this reason does not fill in the rows quickly. On the poorer soils at Bauple this cane is giving better returns than D.1135 on hillsides, also at Mackay and Ayr it gives heavy crops, approaching 60 tons per acre at times. When forced it has a tendency to become pithy and the density falls. It has not become a favourite at Mossman owing to this fact, and also, as it arrows early many farmers regard it as an early maturer.

It is, like the other E.K. canes, very susceptible to Gumming, Fiji disease, Mosaic, and Root Fungi. For this reason it can only be recommended in a limited area, including Bauple, Mackay, and the Burdekin, and also for further trial at Mossman.

M. 189 (Black Innis).

This cane has an erect habit, and is a good stooler and ratooner, giving a number of ratoon crops in the Mackay district. Here it is used to replace D.1135 in the stump country, and is an early maturer though its density does not seem to be dependable. It is rather similar to Q.813 except that it is more erect.

Farther south, it becomes a late maturer, as does Q.813, but is still widely grown. It also loses its power of giving numerous ratoon crops.

It is not extensively grown north of Proserpine, but occurs to some extent in all areas south of this, except at Beenleigh.

Unfortunately, it is very subject to Mosaic disease, and seems to defy control measures owing to its great susceptibility to the disease. In the Hampden area it is practically free, and is fairly clean in the Bingera section of Bundaberg, but is

becoming infected owing to the negligence of the farmers. In other parts it is very badly infected, which is a pity, as it is tolerant and moderately resistant to Gumming at Bundaberg and Childers, but is moderately susceptible to Fiji disease. It is attacked by the Red Rot fungus at Sarina, and has gone out of favour there for that reason.

M. 55 (Double Eye).

This cane is similar in habit to M.1900 Seedling, but is more erect, a better stooler, and has a double eye, by which it is characterised. The stick is heavy, but the density is on the low side as a rule, though the purity of the juice is high and the fibre low. It is grown in the Isis district, where it seems to be showing resistance to Gumming. As, however, the only field seen in Bundaberg was badly streaked, it seems that further resistance trials are necessary before placing reliance on this variety as a resister. It is highly susceptible to Mosaic, and plants should be carefully selected. Steps have been taken by Millaquin to introduce the cane to the Woongarra in the hope that it will resist Gum, and we hope that it will prove at least a moderately resistant cane.

B. 147.

A thin hard cane much after the erect habit of D.1135; as a young crop it stools out well and covers the rows, which should be about 4 feet 6 inches apart. It trashes easily, strikes and ratoons very well, and gives a moderate c.c.s. It is little grown in the southern districts, but comes into prominence on the Mulgrave and Mossman Rivers where it is much favoured.

It is very susceptible to Mosaic and Leaf Stripe, and is badly affected by the latter disease at Mossman. At Aloomba it has shown strong powers of resistance to Gum, and I have seen a field of first ratoons growing alongside a badly-gummed field of H.109 without showing any trace of the disease, even when cut up into plant lengths. For this reason, it should prove a useful cane in the Bundaberg district if the farmers could only keep it free from Mosaic.

Q. 855.

This is a late maturing cane somewhat similar in appearance to Q.813, but heavier and thicker in the stick and more brownish in colour. It is also more erect, and a deeper rooter. It stools and ratoons well, and is a favourite at Bingera, parts of the Mackay district, and Mossman.

Its powers of resistance to disease are less than those of Q.813, and it is only moderately resistant to Gum and Mosaic, and is susceptible to Leaf Stripe, being badly affected by the latter disease at Mosssman. It might be worth trying for resistance to Fiji disease.

Malagache.

This is an old variety which is still extensively grown in the Homebush district and elsewhere at Mackay, also at Bauple and Yerra. It crops heavily and ratoons well, giving a moderate but constant density. It is not a cane which would find favour in many places but suits poor soils.

At times it appears susceptible to Mosaic, and at others it shows surprising resistance. It is not, however, a cane which we could recommend for general use, and will, no doubt, be replaced by canes with a higher density.

H.Q. 458.

This variety is often thought to be a sport of Clark's Seedling, but is really a different cane with a rather similar stick. Its leaves are lighter in colour, and its habit more erect. There are a few heavy sticks to the stool, which covers the rows badly and allows weeds to grow. It occurs in many districts, but is not extensively grown owing to its requiring too much work in the early stages. It shares with Clark's Seedling the susceptibility to disease of that variety, and takes Mosaic and root diseases rather readily. It has not been thoroughly tested, but will probably never be a popular variety.

H. 227.

This is grown to a very limited extent at Nambour and Bundaberg, where it shows promise of resistance to Gumming. It is an early maturing cane, and as such is important, owing to the fact that H.Q.285 is susceptible to Gum. It is erect in habit, and somewhat resembles D.1135, though the sticks are heavier and the density better.

Unfortunately, it is highly susceptible to Mosaic, and for this reason was practically discarded from the Bundaberg Experiment Station. If kept free from this disease, it should be useful to farmers on the Woongarra and at Nambour. There is no record of the variety in an area free from Gum, and this is unfortunate. Endeavours are being made to keep a stock of the cane as clean as possible for the benefit of the Bundaberg farmers.

Mahona.

This cane is of high density and is a good cropper. It is confiend to the river soils at Bingera, and to a few farms at Nambour. Its susceptibility to Leaf Scald (which was found by Mr. Kelly in the variety at Nambour) makes it a risky cane to grow, and that fact that it is also susceptible to Gumming and Mosaic in Bundaberg makes it a variety which requires to be carefully watched. Strangely enough it is regarded as moderately resistant to Mosaic in New South Wales.

Petite Senneville or Brown Innis.

This variety is practically confined to the Maryborough and Bauple districts, and is a good cropper of fair density. It stools very well, and is popular in these parts. It is, however, susceptible to Gum, and very susceptible to Mosaic, but, from trials at Maryborough, it seemes to have a possibility of resistance to Fiji disease. Further trials, however, are necessary before this can be established. This cane does well on the red forest soils at Maryborough. It might with advantage be introduced into resistance trials at Beenleigh.

B. 156.

This cane is grown to a very small extent in Queensland at present, and is usually diseased where it is found, as it is especially susceptible to Mosaic and Leaf Stripe. It has lately been prohibited in the Mulgrave area owing to a serious infestation of Mosaic in an otherwise clean area. It still occurs to some extent at Proserpine and Mackay. It has little to recommend it, as it is a poor tester and not the best of croppers.

B. 208.

This is a variety which occurs in isolated places in the Bundaberg and other districts, where it is a harbour for disease, but is grown extensively on the Burdekin and Houghton Rivers. It has the advantage of giving an abnormally high density, even in the early part of the season, and a good crop, but it will not ratoon and requires annual planting.

It has been wiped out of most districts by Gumming, Mosaic, and Leaf Stripe, to all of which it is very highly susceptible. On the Burdekin and at Giru, the farmers still persist with it, despite the fact that it is badly infested with Leaf Stripe and Mosaic and often dies out as a result of these diseases. It would be more profitable to grow canes which would give, perhaps, a lower yield in the plant crop, and will ratoon well, as does Clark's Seedling, but the old idea held by most Burdekin farmers that ratoons do not pay dies hard. Those who do ratoon find that it is the most economical way of farming.

H. 109.

This variety has proved a great disappointment to farmers in Australia who have read of the results obtained with it in Hawaii. It does not yield the returns that our better varieties do, and is highly susceptible to Gumming, Mosaic, and other diseases. From the results that I have seen with this cane, I feel that it is an undesirable variety from the point of view of the Queensland farmer.

Uba.

The properties of this cane are well known to farmers, and the discussion of its merits and demerits is still open. It is immune to Mosaic, shows gum streaks, and takes Fiji disease rather readily in the few observed cases, so that it is not by any means immune to other diseases than Mosaic. I should recommend it in gullies in the South where the Wild Sorghum has got a hold, and is menacing the other varieties with Mosaic.

Shahjahanpur (stated to be identical with P.O.J.36).

This is a cane which should be condemned throughout Queensland, and farmers who plant it will no doubt be ordered to get rid of it under the new "Disease" gazettals, owing to the fact that it is in all cases 100 per cent. infected with Mosaic, and is a centre of infection for all varieties which surround it.

Striped Singapore (similar to "Imperial" on the Burdekin).

This is a heavy cropper with a moderate to low density. When healthy it is a good striker and ratooner, and is grown to some extent at Beenleigh, where it succumbs to Wilt fungi, and other diseases. It is also grown on the Burdekin where it is known as Imperial, and at Booyal and Dallarnil, where it is badly affected with Mosaic. In other places it is occasionally seen.

It is very susceptible to Gum, which caused it to be given up at Bundaberg, and also to Mosaic, but seems moderately resistant to Fiji disease at Beenleigh. Only light infections have been noticed in this variety.

Rappoe.

Another old timer which has gone out of favour owing to disease, but which still exists in the Beenleigh district, Booyal, and Dallarnil. It is highly susceptible to Gumming, Mosaic, and other diseases. In the last two districts mentioned it is badly affected by Mosaic.

Q. 116 (Purple Innis or Blue Innis).

This cane is not an Innis, but somewhat resembles Black Innis in habit. It is grown commercially only at Proserpine, but is a cane which matures very late, and is useful towards the end of the season. Unfortunately, it arrows early, and is therefore not much use as a two-year cropper in the South. At Broadwater, in New South Wales, it showed favourable resistance to Gumming, and should be tried again in the areas affected with this disease, where it should be at least a useful parent for seedlings. A cane, stated to be Purple Innis, is showing Fiji disease badly at Beenleigh, but there was no cane on the plants at the time of inspection so that its identity with Q.116 is not proved.

Q. 1098.

This cane gives a heavy stick and a fair stool, with fair density, and is erect. It is scattered in distribution, but is not generally grown. Its resistance to disease has not been tried out, but it is known to be rather susceptible to Mosaic. It might, with advantage, be given a further trial, under supervision.

Q. 812 A.

This cane seems to differ from Q.813 in some respects. It is hoped that its identity will be established in the near future. It is grown to some extent at Nambour, where the farmers assert that it is a different cane.

Q. 822.

This cane is confined to Bauple, and its identity is doubtful, the more so as the cane Q.822 has not been recorded as having been given out to farmers from the Bureau of Sugar Experiment Stations. It much resembles Q.813 and may prove identical.

Q. 903.

An erect cane of moderate to low density which is commercially grown only in the Jarvisfield and Rita Island sections of the Burdekin district. It seems to possess some powers of disease resistance.

Q. 970.

This cane does not give good results on the whole, and is only grown sporadically on a small number of farms scattered throughout the State. It is very susceptible to Gumming and Mosaic, and does not seem to be worth further trials.

H.Q. 5.

This cane is a good stooler but light cropper, with a very hard stick. It falls badly, and is unpopular with the cutters. It is confined to the Proserpine district, where it is still grown to some extent. According to the results obtained at Broadwater, it resists Gumming better than any other variety tried, and is almost immune to Mosaic, so that it merits a further trial in the Bundaberg and Nambour districts. It might be useful for seedling work. A few farmers grow the variety at Beenleigh. It is a slow striker but a great grower.

P.O.J. 2714.

According to some resistance trials, where this cane was planted alongside B.208 and corn, it is almost, if not quite, immune to Mosaic, but does take Leaf Stripe and Gum to some extent. It is a new variety to Queensland, and requires to be thoroughly tried out. It appears to be a heavy cropper but only moderate in density.

D. 109.

This variety is grown only at Sarina and Mackay to a limited extent. It falls badly, is a moderate stooler with a long rather thin stick, and does not seem worth extensive trials.

Malabar.

This is a very heavy cropper and prolific ratooner, but its cane is so difficult to treat in the mill that it is prohibited almost throughout Queensland. It is susceptible to Mosaic and Fiji disease, but is very resistant to Gumming, and for this reason it has been permitted at Nambour. It is a two-year cane, and is not recommended, as we have better canes to take its place.

Yellow Caledonia.

This is similar to Malabar in appearance. It is certainly very susceptible to Gum on the Bundaberg Station, and a selected plot of plants had to be ploughed out this year owing to this disease.

Cheribon.

An old cane which is almost universally prohibited. Its resistance to Gumming and other diseases is low, and it is not a desirable variety, though retained in the Bingera area as a very late cane.

Gingila and Gingor.

These canes are very susceptible to diseases and are not recommended; they are grown only on a few farms in the State.

Mavoe, or Mahoavu.

This is a heavy cane of the Badila type, but very susceptible to disease. Grown at Maryborough. It should not be planted.

N.G. 47, Green Baruma.

(Known in Beenleigh at Green Goru, which is also present).

This is almost 100 per cent. infected with Mosaic, and is a useless variety of very low density. It is susceptible to Fiji disease.

Meera.

This is an old cane of low density but fair stooling and cropping qualities, which is still grown at Maryborough and Beenleigh. It is susceptible to Fiji disease and Gum, and possibly to Mosaic, and is not worth a place among the commercial canes.

N.G. 64. (Purple Top).

This variety is grown only at Beenleigh and on Tinana Creek, Maryborough, where it is going out of cultivation. It is very susceptible to Mosaic and Gum, and also to Fiji disease. It falls badly, is light in tonnage and poor in density.

Kikarea (Striped New Guinea).

This variety is confined to Beenleigh, but is rapidly going out. It takes Gum badly, and is susceptible to Fiji disease. It is somewhat similar in appearance to Singapore, but has a striped leaf.

N.G. 16.

This is a heavy cane of the Badila type, with the same heavy stick and stool. It is grown in the South of Queensland, mainly on the plantations around Bundaberg. It matures late in the year, and is a two-year cropper. It is very susceptible to Fiji and Gum, and moderately so to Mosaic and Leaf Stripe.

NEW VARIETIES THAT ARE BEING PROPAGATED.

A series of new canes have been raised from seed at the South Johnstone Experiment Station. They are heavy croppers, and are of good density. Measures are being taken to try their resistance to disease, especially to Gumming and Top Rot, and it is hoped to try them in contact with Fiji disease in the near future. Hitherto the tests have been carried out in small plots at the Stations, and field trials are necessary before a true idea of their value can be obtained. The C.S.R. Company are also raising seedlings at Macknade.

Other varieties have been imported from overseas, and are being planted in trial plots.

Conclusion.

It will be seen that many canes which resist one disease are badly attacked by another, so that they cannot be used for control in many areas. This is especially the case with Gum and Mosaic in the Woongarra. It necessitates efficient control of both diseases.

My thanks are due to Mr. D. S. North, of the C.S.R. Company, for information concerning the behaviour of varieties in New South Wales.

TABLE OF RESISTANCE TO DISEASE, 1927.

Variety.	Fiji Disease.	Mosaic.	Leaf Stripe.	Leaf Scald.	Gum.	Top Rot.	Spindle Top.	Red Rot.	Root Disease.
Badila North ..	H.R.	H.R.	H.R.	M.S. & T.	H.R.	V.S.	V.S.	M.R.	M.R.
Badila South ..	H.R.	H.R.	H.R.	?	V.S.	?	?	M.R.	M.R.
H.Q. 426 ..	?	M.R.	H.R.	V.S.	V.S.	H.R.	M.R.	M.S.	M.R.
Q. 813	M.R.	H.R.	M.R.	H.R.	H.R.	M.S.	M.R.	M.R.	M.S.
H.Q. 285.. ..	H.R.–M.R.	M.S.	M.S.	?	M.S.	?	?	?	M.S.
D. 1135	V.S.	M.S.	V.S.	H.R.	V.S.	S.	?	M.?R.	V.S.
M. 1900 S. ..	V.S.	M.–V.S.	M.?S.	?	V.S.	M.S.	M.S.	V.S.	V.S.
Goru Canes ..	H.R.?	H.R.	H.R.	V.S.	?	M.R.	?	?	?
Pompey (7 R. 428)	V.S.	V.S.	V.S.	V.S.	V.S.	?	M.S.	?	?
Korpi	?	?	?	S.?	H.R.	?	?	?	?
Oramboo.. ..	?	?	?	?	H.R.	?	?	?	?
Nanemo	?	?	?	V.S.	H.R.	?	?	?	?
E.K. 1	V.S.	V.S.	V.S.	?	V.S.	?	?	M.S.	M.S.
E.K. 2	V.S.	S.V.S.	V.S.	?	V.S.	?	?	M.S.	M.S.
E.K. 28	V.S.	V.S.	V.S.	?	V.S.	M.S.	?	M.S.	M.S.
M. 189	M.S.	V.S.	M.S.	?	H.–M.R.	?	?	V.S.	M.S.
M. 55	?	M.–V.S.	?	?	H.R.?	?	?	?	V.S.
B. 147	?	V.S.	V.S.	M.R.?	H.R.	H.R.?	H.R.?	?	H.R.?
Q. 855	?	M.R.	M.R.	M.R.?	M.R.–S.	?	?	?	M.R.
Malagache ..	?	M.R.	?	?	?	?	?	M.S.	?
H.Q. 458.. ..	?	M.S.	?	?	M.S.	?	?	M.S.	V.S.
H. 227	H.R.?	V.S.	?	?	H.R.	?	?	?	?
Mahona	?	M.S.	?	V.S.	V.S.	M.S.	?	?	?
Petite Senneville	H.R.?	V.S.	?	?	V.S.	?	?	?	M.S.
B. 156	?	V.S.	V.S.	?	V.S.	?	?	?	?
B. 208	?	V.S.	V.S.	V.S.	V.S.	?	M.S.	?	M.S.
H. 109	?	V.S.	?	V.S.	?	?	?	?	?
Uba	M.S.	I.	?	?	M.R.	?	?	?	?
Shahjahanpur 10	?	100% S.	?	?	?	?	?	?	?
Striped Singapore	M.R.	V.S.	V.S.	?	V.S.	V.S.	?	V.S.	V.S.
Rappoe	M.R.	V.S.	V.S.	?	V.S.	V.S.	?	V.S.	V.S.
Q. 116	?	?	?	H.R. (N.S.W.)	?	?	?	?	?
Q. 1098	?	M.R.	?	?	?	?	?	?	?
Q. 970	?	V.S.	?	?	V.S.	?	?	?	?
H.Q. 5	M.S. (N.S.W.)	A.I.	?	?	A.I.	?	?	?	?
P.O.J. 2714 ..	?	I.	S.?	?	M.S.?	?	?	?	?
Malabar	M.S.	M.S.	M.?S.	M.R.	H.R.	?	?	?	?
Yellow Caledonia	?	V.S.	?	?	V.S.	?	?	?	?
Cheribon.. ..	?	V.S.	M.S.	?	V.S.	?	?	?	?
Gingila, &c. ..	?	V.S.	?	?	V.S.	?	?	?	?
Mahona	V.S.	V.S.	?	?	V.S.	?	?	?	?
N.G. 47	M.S.	V.S.	?	?	S.?	?	?	?	?
Meera	M.S.	M.S.	?	?	M.S.	?	?	?	?
N.G. 64	V.S.	V.S.	?	?	V.S.	?	?	?	?
Kikarea	M.S.	M.S.	?	?	M.S.	?	?	?	?
N.G. 16	V.S.	M.S.	M.S.	?	V.S.	?	?	?	M.S.

These resistance phenomena are those indicated by the field evidence in Queensland in 1927. There is some indication that a cane which has shown resistance for some years may unaccountably become susceptible to a given disease, so that this work should be supplemented often.

KEY TO TABLE OF RESISTANCE.

R.	Resistant to the disease concerned.
M.R.	Moderately resistant.
H.R.	Highly resistant.
M.S.	Moderately susceptible.
V.S.	Very susceptible.
S.?	Means that cane is susceptible, but degree of susceptibility is uncertain from available data.
H.S.?, &c.	Means that this needs confirmation.
?	No data of resistance to this disease obtainable.
I.	Immune.
A.I.	Almost immune.
H.R. (N.S.W.)	Highly resistant in New South Wales according to the C.S.R. investigations.

FINANCIAL RESULTS OF FERTILISING EXPERIMENTS.

THIRD SERIES.

The following results of fertilising trials are with mixed manures and single fertilisers. The use of mixed manures containing nitrogen, potash, and phosphoric acid in nearly every case gives the most payable results.

These trials should be of great interest to cane farmers, for they show conclusively that fertilising, combined with good cultivation, can be made to pay handsomely.

Results of experiments with single and mixed fertilisers, at the Sugar Experiment Station, Mackay. First ratoons, 1927. Cane value, £2 5s. per ton.

Manure Applied per Acre.	Tons of Cane per Acre.	Increased Yield due to Fertiliser, in Tons Cane per Acre.	Cost of Manure and Application.	Increase in Value of Crop due to Fertilisers.
			£ s. d.	£ s. d.
300 lb. Sulphate of Potash ..	36·3	1·7	2 12 0	1 4 6
500 lb. Meatworks Manure ..	41·4	6·8	2 17 0	12 9 0
No Manure	34·6	..	..	..
400 lb. Nitrate of Soda 100 lb. Sulphate of Potash 300 lb. Sulphate of Ammonia 400 lb. Meatworks Manure	50 5	15·9	9 5 0	26 10 6
400 lb. Nitrate of Soda ..	47·3	12·7	3 15 0	24 16 6
300 lb. Sulphate of Ammonia..	41·7	7·1	3 2 0	12 17 6
500 lb, Superphosphate ..	35·7	1·1	2 8 0	0 1 6

The above trials are remarkable for the high tonnage of cane per acre secured from the use of nitrate of soda alone. It perhaps need not be said that this would not always be the case, and mixed manures are the safest to use for general purposes.

Results from the use of fertilisers at the South Johnstone Sugar Experiment Station. First ratoons. Cane value, £1 18s. per ton.

Manure Applied per Acre.	Tons of Cane per Acre.	Increased Yield due to Fertilisers.	Cost of Manure and Application.	Increase in Value of Crop due to Fertilisers.
			£ s. d.	£ s. d.
300 lb. of Phosphates	46·80	9·16	2 10 0	14 18 0
No Manure	37·64	..	..	..

Results from the use of fertilisers at the Bundaberg Sugar Experiment Station. Second ratoon crop. Cane value, 30s. per ton.

Manure Applied per Acre.	Tons of Cane per Acre.	Increased Yield due to Fertilisers.	Cost of Manure and Application.	Increase in Value of Crop due to Fertilisers.
			£ s. d.	£ s. d
4 cwt. Mixed Fertilisers containing— Sulphate of Ammonia, 150 lb. Sulphate of Potash, 100 lb. .. Superphosphate, 150 lb.	29·75	7·58	3 0 0	8 7 4
No Manure	22·17	..	..	..

Results from the use of mixed fertilisers at the Sugar Experiment Station, Bundaberg. First ratoon crop, Badila—Fifteen months old. Cane value, 38s. per ton.

Manure Applied per Acre.	Tons of Cane per Acre.	Increased Yield due to Fertilieers, in Tons Cane per Acre.	Cost of Manure and Application.	Increase in Value of Crop due to Fertilisers.
			£ s. d.	
Mixed Manure consisting of— Sulphate of Ammonia, 150 lb. Nitrate of Soda, 100 lb. Sulphate of Potash, 150 lb. Meatworks Manure, 200 lb.	30·11	14·57	4 18 0	22 15 7
No Manure	15·54	..	..	..

Results from the use of mixed fertilisers at Sugar Experiment Station, Bundaberg. Second ratoon crop, Badila—age, 21 months. Cane value, £2 per ton.

Manure Applied per Acre.	Tons of Cane per Acre.	Increased Yield due to Fertilisers, in Tons Cane per Acre.	Cost of Manure and Application.	Increase in Value of Crop due to Fertilisers.
			£ s. d.	£ s. d.
Mixed Manure consisting of— Sulphate of Ammonia, 250 lb. Nitrate of Soda, 200 lb. Sulphate of Potash, 150 lb. Meatworks Manure, 200 lb.	25·78	12·94	6 6 0	19 11 7
No Manure	12·84	..	..	..

Results from the use of fertilisers at the Bundaberg Sugar Experiment Station. First ratoons, Q.813—Eleven months. Cane value, £2 per ton.

Manure Applied per Acre.	Tons of Cane per Acre.	Increased Yield due to Fertilisers.	Cost of Manure and Application.	Increase in Value of Crop due to Fertilisers.
			£ s. d.	£ s. d.
700 lb. Mixed Manure consisting of— Sulphate of Ammonia, 100 lb. Sulphate of Potash, 500 lb. Meatworks Manure, 100 lb.	27·30	15·53	5 12 0	25 9 2
500 lb. Sulphate of Potash ..	23·15	11·38	4 4 0	18 11 2
No Manure	11·77	..	..	..

Results from the use of mixed fertilisers at the Bundaberg Sugar Experiment Station. First ratoons, Q.813—Twelve months old. Cane value, £2 per ton.

Manure Applied per Acre.	Tons of Cane per Acre.	Increased Yield due to Fertilisers, in Tons per Acre.	Cost of Manure and Application.	Increase in Value of Crop due to Fertilisers.
			£ s. d.	£ s. d.
600 lb. Mixed Manure consisting of— Sulphate of Ammonia, 150 lb. Sulphate of Potash, 200 lb. Meatworks Manure, 250 lb.	34·21	12·12	4 9 0	19 15 9
No Manure	22·09	..	..	..

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Northern Assistant to Pathologist, Mr. N. L. Kelly, for the month ended 11th February.

CAIRNS AND GORDONVALE.

In various parts of this area are to be found Leaf Scald, Leaf Stripe, Mosaic, Gumming, and Top Rot. This latter is a most interesting disease which is much more extensive this season than ever before, and so some time was given to a special investigation of it, particulars of which will appear later.

Gumming.

Though this disease is present on only one farm at Aloomba, it is probably the most dangerous of all from the point of view of possible spreading and of the damage that it does. From first ratoon H.109 it has spread to the B.147 adjoining, in which it was definitely detected. Now some of this latter has been planted out, and though the cane shows no symptoms at present it must be considered a diseased plot, and must not be planted out. It is of the utmost importance that these three plots be ploughed out at least at the end of the year, and that cane knives after harvesting them be sterilised.

Mosaic.

This disease, which Mr. Wood had reported in B.156 at Highleigh, is present on four farms there, and on one of them has spread slightly to the H.Q.426 adjoining. While it is not spreading rapidly this at least shows the danger incurred by leaving Mosaic-infected cane in a field. The impoverishment of diseased stools was very obvious in the above variety. As regards the Mosaic which I found at Aloomba previously, this has now spread not only to other stools of H.109, but also to the B.147 adjoining. Practically all these fields will be ploughed out at the end of the current season.

Leaf Stripe.

Like Mosaic, this disease can be economically controlled—when the infection is light—by "rogueing" (digging out diseased stools). The three farmers in Sawmill Pocket whose cane is affected all intend to do this, so that very soon the disease should be eradicated from this centre. It is mainly in 7 R.428, but also in D.1135.

Farmers near Meringa Railway Station must also beware as a small field of second ratoon N.G.15 was found to be infected. Its history could not be ascertained. It will, of course, be ploughed out, but the fields adjoining may easily contract this infectious disease between now and November.

Leaf Scald.

This is epidemic, except in parts of Hambledon, Wright's Creek, Sawmill Pocket, and Meringa. As the disease is not always manifest, however, for absolute safety the history of blocks should be known. For the whole district the best control measure is the slow one—the introduction of guaranteed healthy seed from the Tableland or other isolated nurseries. To this end the Farmers' Association has been engaged in negotiations with certain Tableland growers, and by 1930 a considerable influx of clean and vigorous N.G.15 and H.Q.426 should be assured.

Top Rot.

This disease is widespread in N.G.15 in the lower parts of the Freshwater area, Highleigh, and Meerawa; and at Aloomba well above flood-level. It also occurs heavily on the Lower Burdekin. A similar disease occurs in Hawaii, Tucuman, Louisiana, and other countries.

Symptoms.—The presence on one or more leaf blades of one or more watery green streaks visible from both above and below, except when under the midrib. These become watery brown and finally bright red, and the tissues composing them die. The disease may then suffer a check, or further active streaks may form on the same or on younger leaves, and finally, in many cases the young folded leaves become yellow and can be pulled out when the growing point is seen to have decomposed. The disease usually first appears in young cane in November, and has done its damage by the middle of February.

Etiology.—An actively motile bacterium was observed in sections of the diseased tissues. This was isolated with suitable aseptic methods on tubes of nutrient agar, and formed round convex glistening yellow colonies of about 1 mm. diameter in thirty-six hours. A preliminary batch of inoculations with this organism into the immature tissues of the stem tip was attempted on 1st February, with colonies one week old. It failed, possibly because of the age and thus lack of vigour of the colonies; possibly because rain, which may have washed the bacteria from the leaves, followed within twelve hours. Time did not permit of another attempt, which must be deferred until next year. However, the following facts may be noted:—

(1) The disease is not hereditary and is very infectious, as (*a*) Last year a certain corner of a young plant crop alone was infected. This year that portion was unaffected, and a large part of the remainder of the field was infected. (*b*) From a certain field of sloping soil at Hambledon (now healthy, as first ratoons) cane was planted, some in the field adjoining (now healthy) and some in low-lying alluvial land at Meerawa which is now in parts heavily infected.

(2) The cane adjoining this, which was planted earlier, and was thus "out of hand" earlier, is almost entirely healthy.

(3) In every infected field investigated, the roots had been interfered with to some extent, either because the land had a very variable water level, being ineffectively drained or cultivated, or because roots had been cut by cultivating deeply in November or later. The result of this is that in the hot dry spells, the growing point was weakened and made susceptible to the attacks of comparatively weak bacteria, as this species probably is.

BABINDA.

A very short stay only was made in this locality, every day of which was wet, and for facilities in transport I am much indebted to the mill management.

Leaf Scald is the only major cane disease to be found, and it occurs in every locality visited, though certain farmers have been making a determined attempt to check it. In fact it would be wise for those who desire clean seed to purchase from these farms, whose names have been left with the manager of the mill.

This applies especially to the farmers in the northern end of the area, whose fields are generally more heavily infected than elsewhere. The management will doubtless facilitate and supervise the transfer of this seed through the mill yard.

If, despite these facilities, a farmer decides to plant his own cane, he should at least discard every stool showing any suspicious sticks. This minimises the risk of planting diseased cane.

Spindle Top.

Many examples of checked growth resulting in the binding of the young heart leaves by the outer ones were noted throughout the Cairns-Babinda area. In several cases these were entirely unassociated with fungus diseases of the leaf or leaf sheath, and it appears that only when the check has been prolonged secondary fungus infections are to be found. This disease, however, needs further investigation.

Summed up, the disease problem will be most effectively controlled by the introduction of clean cane to every diseased farm, and the planting of it in a special nursery plot for seed purposes.

The Assistant to Pathologist, Mr. George Wilson, has submitted the following report, covering the period 23rd January to 13th February, on the Mount Bauple cane areas, to the Director of Sugar Experiment Stations, Mr. H. T. Easterby:—

MOUNT BAUPLE.

Bauple and the surrounding cane areas have been and still are greatly handicapped by continuous wet weather. Frequent showers prevent horse work being carried on in many fields, and chipped weeds readily grow again. Many fields which would have been planted in late spring or in February have been too wet to be cultivated, and now bear heavy crops of Natal grass. In consequence the area under cane is less than it might be.

The heavy infestation of weeds has been responsible for increasing the amount of damage done by moth borers to shoots of young ratoon and plant cane. This is especially noticeable near headlands where Natal grass is plentiful.

The dead hearts of plant and young ratoons contain two types of larvæ. The large boring larva about 1½ inches long is responsible for the death of the shoot, and is developed from the egg laid by *Phragmatiphila truncata*, a greyish brown moth about three-quarters of an inch long, covered with long silky hairs. The small larvæ are developed at a later stage from eggs laid by species of Anthromyidæ, small flies attracted by the rotting shoot.

Farmers would benefit by employing more labour in chipping early in summer so as to have weed-free cane before rains set in, with consequent insect damage.

Millet grass thrives on creek sides and in wet patches, and an alarming amount of secondary infection of cane by Mosaic is seen in the neighbourhood of millet grass. Since Mosaic is the only disease which is generally present in the district, the problem of dealing with millet grass is of supreme importance. Many farmers have planted small fields of Uba, and it is suggested that the value of Uba lies in the fact that it might be planted along creek sides to protect superior but less resistant sugar-canes from direct contact with millet.

Another situation where secondary infection of cane by Mosaic is very heavy is on the spurs of the mountain, especially those with a southerly exposure. Compared with the amount of secondary infection seen on the more or less level fields such as occur along the Gootchie road, the infection on these spurs is high, up to 50 per cent., and unavoidable as long as Mosaic is present in quantity in the district. The heavy infection of hillsides has been explained by the fact that the insect carriers of Mosaic disease are carried by wind for long distances, as they are very small and light, and descend amongst the cane when they are blown on a mountain side, comparatively few dropping en route on level country.

Farmers are advised never to go to these spurs for sets, and in this district always to plant cane from lower fields. It is also advisable to plant Q.813 as extensively as possible on these situations, as this cane is much more resistant to Mosaic than any other variety in common use. It is only to be expected that a certain amount of Mosaic will occur in Q.813 where this is planted on infested farms, but the number of stools affected will be fewer and the rogueing lighter than with any other variety, and as the farm becomes cleaner less and less infection will be seen. Resistance to disease is affected by general health of the cane, and this can be increased by frequent cultivation and drainage where necessary. Although most farmers readily concede the necessity for green manuring, it is surprising how little and how irregularly this is done.

A more systematic rotation of fields with regular crops of cowpea or Mauritius bean would increase efficiency of farms by giving greater tonnage and eliminating the heavy infestation of Mosaic which occurs in old ratoons of D.1135, which are left in too long in many cases.

Gum was seen in several fields of E.K.28 in one locality, all the crops affected being derived from the same source.

This variety should be got rid of entirely in the small area infected, as it is quite impossible to select plants in a field affected in parts with gum. D.1135 and M.1900 Seedling should also be avoided in the gummed area, as these canes are highly susceptible.

The high resistance of Q.813 to gum is well demonstrated in one affected field of E.K.28, which was so bad that it was partly ploughed out and replanted with Q.813. The Q.813 is so far quite healthy, although badly gummed stools of E.K.28 are on both sides of it.

On several farms complaints were heard that on certain knolls ratoons had completely died out. One farmer, more observant than others, reported a white mildew on the young shoots, which appeared after cutting, but later died out. A couple of dead stools were examined and signs of fungal attack on the roots were seen, but it is not certain that this was the primary cause of death. This matter is one that will be given further study.

Mosaic disease is the most outstanding problem in the district, and I am glad to say that it is receiving proper appreciation and treatment on many farms, but on occasional places indifference or ignorance of its importance is shown by the state of the fields.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has received from the Entomologist, at Meringa, the following report (6th March, 1928) made by the Assistant, Mr. J. H. Buzacott:—

LOWER BURDEKIN.

Ten days were spent in the Ayr district during January, and observations were made on the flighting habits of beetles in that district, and also investigations on the giant termite were continued, whilst minor cane pests were studied in general.

Beetles were being collected, and paid for at the rate of 2s. 6d. per quart, by the Lower Burdekin Pest Destruction Board, and, in order to do this, farmers in different parts of the district were appointed as receivers for measuring the quantities of beetles and destroying them as they were brought in by collectors. In all about £300 was paid out during the flight, and this represents over 2,000 quarts of the beetles.

On examining the morning's catch at a receiving depot on several occasions, it was noted that at first practically only greybacks were being brought in, but towards the end of the flight specimens of *Anoplognathus frenchi* were becoming frequent, and finally there was a predominance of *Calloodes grayanus*. The latter genus of beetles have never been recorded as cane pests, and these specimens probably bred in the forest.

Collecting from the feeding trees, the figs yielded most greybacks, and Moreton Bay ash was also favoured. *Calloodes grayanus* and *C. rayneri* were taken solely on bloodwoods, *Anomala australasiæ* from flowers not yet identified, and *Anoplognathus frenchi* mainly from a large soft-leaved weed.

No grubs, unfortunately, were examined, because, owing to the wet weather, ploughing operations were not being carried out.

Specimens of the beetle-feeding trees were brought back for the collection, and series of the various beetles were also obtained for comparison with far northern species.

Termites.

Further investigations were made into the habits of the Giant Termite (*Mastotermes darwiniensis*), but the queen still remains undiscovered. However, further knowledge was obtained as regards the nesting of the species, and it was ascertained that communication tunnels might be at a depth of 6 feet or even more from the surface of the ground. This termite has not caused so much damage in the district this year as last, probably owing to the good rains experienced throughout the year. It has thus not been necessary for the pests to turn their attention to cane for moisture. Keeping the land surrounding cane fields bare of timber, logs and stumps, is undoubtedly the best method of safeguarding the crops from attack by termites.

Moth Borers.

A search was made for the large moth borer (*P. truncata*) with a view to obtaining its Braconid parasite (*Apanteles monagriæ*). A few "dead-hearts" were found, but no borers, even at Rita Island, which used to be fairly badly infested with them.

Minor Pests.

Chief among the minor pests observed was a small green grasshopper (*Atractomorpha* sp.). This was occurring in large numbers in the cane and doing a fair amount of damage. A large grasshopper (*Cyrtocanthacris* sp.) was also very commonly found feeding on cane, whilst at the roots a large black cricket was operating. About 2,000 living specimens of termites were transported to Meringa for experiments, and these are still alive. Specimens of the winged form were also brought back, but these died shortly after arrival.

FIELD REPORTS.

Mr. E. H. Osborn, Central Field Officer, reports for the period ending 13th February:—

Bloomsbury.

This district has progressed rapidly. With its altitude of 142 feet above sea level, its beautifully running river (the O'Connell), along the banks of which are the rich alluvial flats so favourable to cane growth, it is a favoured area. Last year some 8,668 tons of cane were sent to Proserpine from the three sidings of Mikaloo, Bloomsbury, and Morvo.

All the cane seen looked well—Badila, Clark's Seedling, M. 1900, and Q. 813 looking superior to any cane inspected in the Proserpine area, and in most cases in a very good state of cultivation.

So far no losses have been caused through pests or diseases, and growers are advised to be very careful in bringing seed cane in from any other area unless after careful inspection by a competent person.

Bowen.

Very little cane is now grown hereabouts, fruit being the principal product.

Ayr.

Although only some 3½ inches of rain had been registered for the month, the crops were looking wonderfully well. Fine crops of plant cane and also ratoons were seen, the latter being especially good upon Rita Island.

Cane Varieties.—The c.c.s. of four principal varieties (1927 season) were—

	H.Q. 426.	Goru.	B. 208.	N.G. 15.
June ..	15.3	13.9	15.6	15.05
July ..	15.6	14.7	15.8	15.00
August ..	16.0	15.7	16.4	15.20
September ..	16.7	15.9	16.9	16.30
October ..	16.7	15.6	17.1	16.80
November ..	15.8	14.6	17.2	16.40
December ..	14.8	—	—	15.60
Average ..	15.8	15.0	16.3	15.76

These figures were kindly supplied by the Pioneer Mill management as a sample of the high density figures ruling. The average density of E.K. 28 was not worked

out, but it must have averaged over 16.0, for odd samples went 17.4 during the second week in December. So satisfied are growers with this cane that nearly every one on the Burdekin has an area planted. Probably the best returns from E.K. 28 were those of Cameron and Irving—*i.e.*, 5 acres April plant, cut in October, yielded 51 tons per acre, with an average c.c.s. of 16.4.

Diseases and Pests.—Very little disease was apparent. Leaf Stripe was the most noticeable, as it was found in nearly every patch of B. 208 ratoons, and in many cases in the plant. Top Rot so far is only noticeable to a very slight degree in N.G. 15 (Badila). Mosaic was seen only in a few stools of B. 208 ratoons. Pests are mainly cane grubs and white ants. One well-known grower near Plantation Creek, whose cane formerly suffered from grubs, now claims that his losses are negligible since he cleaned away the feeding trees between the creek and his cane area. White ants do not seem to be as bad as in past years, but according to local growers they seem to be spreading to farms which were formerly regarded as free.

Fertilising.—One Jarvisfield grower mentioned that his plant cane got such a start aided by fertilisers that so far he has not irrigated it, while the unmanured portions nearby have already been watered twice. The stooling, too, of the fertilised cane is far ahead of the other. Green manuring is probably carried out to a larger extent upon the Kalamia mill's estate than elsewhere in this district, and its benefits are quite noticeable. Many other growers were also seen to be growing green crops in the Kalamia area. One or two growers are still using corn for a green crop, despite the fact that with its relation to Mosaic disease such practice is condemned.

Home Hill.

On the river areas some fine crops were noticed, some third and fourth ratoons (Badila) being much admired, but away from there, upon the poorer forest areas, some of the cane was very backward, bad cultivation and lack of watering being no doubt responsible. Here, as in many cane areas, many growers will persist in trying to handle too large an area, with the result that the yield per acre suffers.

Earlier mill estimates for 1928 were in the vicinity of 160,000 tons.

Cane varieties are practically the same as upon the Ayr side of the river.

Fertilising and green manuring are only carried out to a limited degree, but where the plant crop has been fertilised the stand of cane is markedly superior, both in the greater number of sticks to the stool and its healthier aspect.

Top Rot, Leaf Stripe, &c., were only noticed to a slight degree, and the same can be said of pests, as only a few stools of white ant eaten cane were observed.

The Southern Field Officer, Mr. J. C. Murray, reports for the period 14th January to 14th February:—

Goodwood.

The cane here is making good growth. Grubs are causing considerable loss. Growers are asked to consider the possibilities of (*a*) wire-netting their farms, (*b*) establishing a poultry farm with the important objective in view of using the birds as grub destroyers, (*c*) having the run on the corner of the farm where the birds could be readily released, and (*d*) studying the habit of the pest, so that ploughing could be carried out when the grubs were near the surface. These suggestions are in no way intended to encroach on the entomological domain, but with the thought that any practical suggestion may be of some use in overcoming what is at present a very serious pest.

Cane varieties doing well here are Q. 1121, Q. 813, M. 1900 Seedling, D. 1135, and Uba. The last mentioned is grown largely by the Fairymead Sugar Milling Company, who are obtaining excellent results from this variety.

Considerable loss is being caused, excepting in Uba, by root rot, or "peg-leg" disease. It is one of many root-destroying fungi, and the only remedy is extensive fallowing of the land. Careful plant selection from non-infected fields should follow. Most farms cleared and planted within the last seven years could, for practical

purposes, be termed non-infected. Almost all the old red-soil farms are infected with root-rot disease. The writer has not observed one case where Q. 813 has followed M. 1900 Seedling in old soils but what the Q. 813 was infected. Canes with light root systems should never be planted in farms where root rot is present. As pointed out in a previous report, there is good reason to believe that root-rot disease is the main reason why most of our old soils will not produce as they should. A field of cane stubble, ploughed out on the Goodwood area, showed evidence of 100 per cent. infection by root-destroying fungi. The variety was M. 1900 Seedling. This state of affairs must also be a fruitful cause why cane will not ratoon. The following recommendations, if applied, will help in dealing with it:—Fallow for twelve months; totally destroy all cane debris by burning; select plants from new land.

Childers.

Much rain has fallen in this district since the new year. The cane, however, is not as forward as might be expected. This may be due to the long, cool summer preceding the middle of January, or (in this particular area) may be owing to root disease on the older soils due probably to some particular plant food shortage in the soil. The writer is of the opinion that the reason why the variety Q. 813 will not do well on the older soil in the Childers district is that its light root system almost immediately suffers from an attack of root-rot disease.

In manuring, the most important thing for the farmer to have is a thorough knowledge of peculiar conditions on his own farm. For instance, a grower may take the advice of a neighbour who has grown good crops with a certain artificial manure and find it is a complete failure on his own land. Perhaps his friend's land may have required those particular ingredients in the manure used, and his own land may have had abundance of them with the exception, maybe, of one ingredient. Therefore it must appear to the intelligent farmer that, for a rational and economical system of farming, he must thoroughly known his own soil.

Cane varieties growing in the Childers district include H.Q. 285, M. 1900 Seedling, D. 1135, Q. 813, E.K. 28, and M. 55. The first named and the two last are making a very fine showing. Growers appear to be confident that these three varieties will be good commercial canes for the Isis district. However, the growers supplying the Childers mill are recommended to get in touch with the mill investigator (Mr. Richardson) on the question of varieties for local mill supply, as gumming disease may at any time reach epidemic proportions here, and the matter of varietal resistance is very important.

CROP PROSPECTS.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, who returned recently from a short visit to the Bundaberg and Mackay cane area, informs us that the continued rain, while ensuring a good season, has prevented a good deal of cultivation from being carried out. Farmers have been unable to get on the land and clean up weed growth for some considerable time past. The cane is not quite so forward as it should be at this time of year, due to absence of hot sunny spells between the rains and the long cool period up to the middle of January.

At Bundaberg, the Burnett River was in high flood, the wharves were covered and low-lying places inundated.

Up to 27th February, the rainfall at Mackay had amounted to 65 inches since the 1st December; this is equal to the annual average rainfall at that place. Since that date further heavy rains have been experienced.

Nevertheless, the mills in both districts are anticipating good to excellent crushings, though it is thought by many that the tonnage may not be quite equal to that of last year. On the other hand, there has been an increased area put under cane at Mackay.

The whole of the country between Brisbane and Mackay presents a beautiful green appearance, with a splendid growth of grass. On the trip up, water was seen in sheets on both sides of the line. Such a wet season has not been experienced for many years on the coast.

SOIL SCIENCE.

Extract from the Report of the Travelling Soils Scholar, Dr. H. W. KERR, for year ending 23rd January, 1928.

With the second semester of the University year commencing during the first week of February, 1927, I continued my studies in soils and allied subjects at the University of Wisconsin. I took courses in Soils Physics, Soils Bacteriology, and Colloidal Chemistry, while working intensively on a research problem regarding the nature of soil acidity. Rather late in the year I came upon what appeared to be a useful clue in the elucidation of this problem, and in following it up, found that it yielded much useful information regarding our knowledge of the mechanism of the acidic condition of the soil.

The results of these researches were embodied in a thesis which I presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy, which was awarded me in June, 1927. I regret that I am unable to forward a copy of this dissertation at present, but I expect it to appear in an early number of the Journal of the American Society of Agronomy. I will forward reprints of this paper as soon as they appear.

Following instructions, I left Madison early in June to attend the International Congress of Soil Science in Washington, D.C. A brief report of the proceedings of these meetings, and of the subsequent field tour through the U.S.A. and Canada, I have already forwarded. The printed volumes of the proceedings are not available as yet, though they were to have been ready by the end of last year. A copy of these I will forward when they are distributed.

Early in August I sailed for England. At Rothamsted Experiment Station I spent about six weeks in studying the work in progress, and the results of previous researches on agricultural problems. The staff at this Station are a very able and congenial group, and, of course, the reputation enjoyed by the Institution is world-wide. Sir John Russell, the Director of the Station, I had met at the Soils Congress in America, and I found him very sympathetic and willing to assist me in all my demands. He remarked, incidentally, that Queensland was one part of the Empire from which they had heard but little at Rothamsted, and he expressed the hope that we might avail ourselves of the information and service which they would only too gladly place at our command.

I would have liked to have spent a little further time at Rothamsted, but the opening of the Imperial Research Conference on 4th October, drew me to London. A short report of my experiences at this Conference, I enclose herewith. It was an inspiration to find there all of the notable workers in the home countries, met together to confer with those from overseas, and to give freely of their aid in the elucidation of the difficulties confronting the dominion and colonial workers. Their presence seemed to impart some of the enthusiasm and determination through which they have overcome seemingly insurmountable difficulties in the past, and filled those from far distant parts with the firm resolve that their future efforts should be redoubled in an attempt to emulate these leaders.

At the conclusion of the Conference, it was necessary for me to sail once more for America, to continue with my researches on soil acidity, as you had instructed me. Arriving in Madison on 26th November, I assumed my duties as Research Assistant at the University. I feel that my time has been very profitably spent in this work, but I cannot say at present, what these investigations will reveal. I feel optimistic regarding the ultimate isolation of these soil compounds which play so important a part in the agriculture of humid Queensland, but perhaps the time available for these present studies may be insufficient for the task.

I propose leaving Madison about the first day of March, and continue my itinerary as previously outlined—to spend about two months in Hawaii, proceeding thence to Java, and arriving in Brisbane in August next.

IMPERIAL AGRICULTURAL RESEARCH CONFERENCE.

The Imperial Agricultural Research Conference opened in London on 4th October, 1927. It was an historic occasion; for it marked the first successful attempt of the agricultural workers to meet and seek a solution for the various problems with which research officers in all parts of the Empire are confronted. In response to the invitation of the British Government about 100 overseas delegates attended. These included representatives from all the Dominions and most of the Crown colonies and dependencies. With London as the meeting centre, the overseas workers were able to benefit from the able advice and assistance so generously given by eminent workers in the home countries.

More than 200 delegates were present when Lord Bledisloe, as chairman, formally opened the Conference. At this, the first conference of its kind, it was felt desirable to discuss rather those questions involving administrative considerations than the more purely technical aspects of the work. It was with this object in view that the majority of the overseas delegates had been chosen. The first five days of the Conference were devoted to the plenary sessions, and such questions as—Establishment of Information Bureaux and Research Centres, Recruitment and Training of Officers, Interchange of Workers—were fully debated. The framing of definite resolutions was, however, wisely deferred until the final sessions. This enabled the officers to discuss their points of variance and crystallise their views during the days of the committee meetings and those spent on the tour of the country by the entire Conference.

Following the plenary sessions, the Conference was divided into committees, which grouped together the workers interested in each of ten or more specialised branches of agricultural research. Four days of meetings gave the officers an opportunity to discuss the particular difficulties which have confronted them, and to formulate plans for greater efficiency and harmony in their future efforts. I attended the meetings of the Soil Workers, who numbered about twenty, including the local delegates. Under the able chairmanship of Sir John Russell, Director of Rothamsted Experiment Station, a number of important resolutions and suggestions were drafted by the committee. These, together with the reports from other specialist committees, were presented at the final plenary sessions for ratification by the full conference.

At the conclusion of the preliminary plenary and committee meetings, the Conference adjourned on 13th October, to enable the delegates to visit the agricultural research institutions in Cambridge, Edinburgh, and Aberdeen. They were thus afforded an opportunity to acquaint themselves with the work in progress at these centres, the methods by which various problems are attacked, and the facilities offered for specialised research. Four days were very profitably employed at the Cambridge laboratories and experiment stations; three days in Edinburgh in visiting similar institutions there; and one day at the Rowett Institute in Aberdeen. At the invitation of Imperial Chemicals Limited, the Conference was privileged to inspect the nitrogen-fixation plant at Stockton-on-Tees. The company has a very ambitious programme under way, for they are nearing the completion of sufficient new units to enable the production of 700 tons of sulphate of ammonia per day. They hope also to begin shortly the manufacture of concentrated fertilisers similar to those of the German manufacturers.

As the result of the observations made during the tour, one cannot but be impressed by the good quality of the work which is carried out at these research centres—and, equally, by the fewness of the institutions and workers employed in furthering the progress of a more efficient agriculture. The latter aspect is particularly noticeable after the experiences of the International Soils Congress held in the United States of America during June and July last, when an opportunity was given the visitors to see the corresponding institutions in America. But the fact that many of the centres are the fruits of the post-war period gives hope for a stouter army of agricultural scientists in the forward march of British agriculture.

On the return of the Conference to London, the concluding plenary sessions were held. The final resolutions and recommendations were endorsed by the delegates, after further discussion, and the remainder of the time was spent in short excursions to the agricultural research centres within easy access of London. The Conference finally adjourned during the second week of November.

It was decided by the Conference that their next meeting place be Australia, in five years' time. This should be of particular interest to us in the more distant outposts of the Empire, for a visit from outstanding workers will doubtless lend a stimulus and an impulse to our future research. The conference just concluded in London must be regarded as an unqualified success; and it was felt by all who attended that much benefit will result from this and future meetings of a similar nature. The delegates were enabled to gather specific data relevant to the particular phases of their research problems; but perhaps the greatest value of such conferences lies in the personal contacts established in the short time that the workers were privileged to spend together. This is an accomplishment which makes for better understanding, closer co-operation, and keener appreciation between the individual workers.

The conclusions of the Conference should prove of considerable interest to those who were not so fortunate as to be present at the meetings. To convey these accurately and concisely, I think it best to forward the verbatim reports of the concluding sessions; these contain the reports of the committees and the recommendations of the full conference. I have awaited the final report, which was to have been available by the end of December, but this has not arrived as yet. In presenting this brief personal report, I trust that I may be able to supplement it in the near future by forwarding the official publication.

STANDARDISATION OF PRIMARY PRODUCTS.

One of the suggested means to relieve the depressed agricultural industry in Great Britain that has lately received a good deal of publicity is pre-market standardisation of farm products. The latter term is used in its fullest sense and includes meat, fruit, and vegetables, as well as dairy goods, grains, &c. While it is recognised that the enforcement of rigid grades would hardly be possible to all of the foregoing, many leaders of thought in agricultural and marketing circles hold that the principle is capable of very wide application. To-day, apparently, little or nothing is done in the direction of standardisation, either in respect of grading, packing, or containers. As a result British-grown produce has to compete with imported goods, that are generally carefully graded and branded, at a considerable disadvantage. It is acknowledged that the problem of introducing an at all adequate system bristles with difficulties, but it is believed these are not impossible of solution.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1928 AND 1927, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of Years' Records.	Feb., 1928.	Feb., 1927.		Feb.	No. of Years' Records.	Feb., 1928.	Feb., 1927.
North Coast.					*South Coast*—continued:				
	In.		In.	In.		In.		In.	In.
Atherton	8·98	26	18·11	21·42	Nambour	8·47	31	42·58	8·78
Cairns	14·75	45	16·12	37·38	Nanango	4·10	45	10·10	2·44
Cardwell	16·53	55	22·36	44·99	Rockhampton ...	7·14	40	18·01	3·67
Cooktown	13·01	51	23·42	14·89	Woodford ...	8·28	40	24·03	2·76
Herberton	7·29	40	13·60	10·30					
Ingham	15·47	35	31·45	36·27					
Innisfail	21·67	46	26·25	45·42	*Darling Downs.*				
Mossman	14·37	14	36·73	26·56					
Townsville	11·45	56	9·66	20·10	Dalby	2·76	57	8·47	3·59
					Emu Vale ...	2·24	31	11·33	2·25
					Jimbour	2·67	39	3·65	1·87
Central Coast.					Miles	2·66	42	7·32	3·30
					Stanthorpe ...	3·21	54	8·36	1·38
Ayr	8·92	40	20·64	14·80	Toowoomba ...	4·22	55	15·17	4·36
Bowen	8·90	56	13·07	7·09	Warwick	3·03	62	8·65	1·67
Charters Towers ...	4·51	45	5·14	3·41					
Mackay	11·36	56	25·51	8·47					
Proserpine	11·65	24	24·11	10·55					
St. Lawrence ...	7·74	56	26·53	3·94	*Maranoa.*				
					Roma	3·05	53	4·09	1·74
South Coast.									
Biggenden	3·74	28	19·88	2·90					
Bundaberg	5·98	44	13·18	5·30	*State Farms, &c.*				
Brisbane	6·31	76	16·12	5·37					
Caboolture	7·15	40	23·35	3·51	Bungeworgorai ...	2·68	12	1·70	1·71
Childers	5·77	32	29·57	5·12	Gatton College ...	3·16	27	12·09	2·43
Crohamhurst ...	12·53	35	38·01	4·25	Gindie	3·03	27	3·28	1·68
Esk	5·15	40	13·69	5·17	Hermitage ...	2·29	20	...	2·15
Gayndah	4·12	56	12·14	3·58	Kairi	8·51	12	16·61	22·76
Gympie	6·44	57	18·20	3·38	Sugar Experiment Station, Mackay	10·31	29	28·49	7·68
Kilkivan	4·77	48	14·86	6·17					
Maryborough ...	6·30	55	17·37	6·14	Warren	3·93	12	10·62	4·81

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for February this year, and for the same period of 1927, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

BAITING FOR BANANA WEEVIL BORER CONTROL.

By JOHN L. FROGGATT, B.Sc., Entomological Branch.

The seriousness of the menace of this pest to the continued prosperity of the banana industry is now being generally recognised, resulting in a considerable amount of attention being paid to the requisite measures for bringing the pest under control. A brief review of the various methods of baiting should, therefore, be of some interest to those engaged in banana-growing. The following notes are in no way an exhaustive account of the control measures that have to be undertaken, because these have been dealt with in detail in other publications; for the same reason, the life history and habits of this weevil will only be briefly considered, giving a few of the salient features which have a direct bearing on baiting.

In the life cycle of the banana weevil borer the beetle is the reproductive stage, and the grub, or larva, is that in which the damage is done to the plants. The developmental stages are passed entirely within the plant, while the adult lives the major part of its life in the soil. It is therefore obvious that the egg, larva, pupa, and newly-emerged adult are not vulnerable to attack by spraying or fumigation. The adult weevil, living outside the plant, is, therefore, the stage against which any attack must be launched. As the beetles are never completely inactive, that attack should be maintained throughout the whole year. As, however, they are most active during the spring and autumn, the work of carrying out the required control measures should be intensified from late in February to the end of April, and from late in August to the end of November. By this procedure a large number of beetles will be killed at the beginning of these seasons, resulting in the reduction of the numbers of the subsequent generations.

Material for Bait.

In order to gather the beetles together, some form of attractive bait is necessary; portions of the plant are quite satisfactory for this purpose, the corm being preferable to the stem. If baits are laid in or around the stools, large numbers of beetles come to them, and at periodic examinations the beetle population can be very markedly reduced by collecting and destroying the borer weevils found. This, however, entails a considerable expenditure of time and labour, which would be obviated by treating the bait with poison.

Poison Employed.

As a result of a large series of trials it was found that several chemicals killed an appreciable percentage of the weevils after they had fed on the treated corm, but that Paris green was the most efficient, in that it killed the highest percentage in the shortest time. In practice one part of Paris green is mixed with six parts of flour; this should be done by shaking together the measured amounts of Paris green and flour in a large tin, while a smaller tin with a finely punctured lid can be used for dusting the baits in the plantation.

Method of Application.

There are several ways of applying this poison mixture, a summary of which should be of interest. It may be stated that all the methods enumerated have been tested out under plantation conditions, and have proved to be practicable.

In Young Plantations.

In young plantations in which the first bunch has not been cut the best procedure is as follows:—From an old patch of banana plants anywhere within a reasonable distance obtain some old corms and split each one into four or six pieces; if the corms are large, they may be cut into more pieces than this. Dust the freshly-cut surfaces of each piece with the poison-mixture, and lay the bait cut (surface downwards) on the ground close to the stool. Then cover it with a thick layer of dry trash, with the object not only of preventing too rapid drying-out of the bait but also of rendering the immediate vicinity of the bait darker, a condition favouring the approach of the beetles to the bait. Baits made in the above manner need to be renewed periodically, as they become too dry to be attractive. Portions of cut stem, split in half, can also be used, but these have to be renewed much more often.

In Older Plantations.

In older plantations, after the bunch is cut, the stem should be cut off low onto the ground; the top of the butt then offers an excellent means of utilising the poison mixture for the destruction of the adult beetles. Any one of the following methods of application can be practised:—

The top of the freshly-cut butt is dusted with the powder and covered over with trash. In this method the surface is liable to dry after a time, and to very largely lose its attractive powers. If a thin slice is then taken off the top and a fresh application of the powder made, its function as a poison bait is restored. The drying-out can be minimised by covering the top of the butt after dusting with a slice cut from the base of the stem, a small stick or pebble being inserted between the two faces; if this is done the bait should still be covered with trash, and it is also advisable to dust the "cover" with the poison mixture.

An alternative method may be employed wherever the sucker-pruning gouge is used, a cone-shaped piece being taken out of the top of the butt; the poison is then dusted into the hollow and over the plug, the latter being dropped back again, first inserting a pebble or small piece of stick to prevent the plug fitting in too tightly. The top of the butt should then be dusted and covered over with trash. When suckering with this tool, every hole made can be dusted with the poison-mixture with excellent effect.

In a third method of preparing the bait, a V-shaped portion is cut out of the top of the butt right across the corm. Dust the powder into the groove so formed and also over the portion cut out; this latter is then put back into position, first inserting a small pebble or piece of stick. Dust the top of the butt and cover it over with trash.

Of the above methods the last mentioned has the advantage over that in which the sucker-pruning tool is used of having a direct opening to the soil on either side of the bulb, thus permitting the beetles to gain more ready entrance to the surfaces carrying the poison than if they have to come up out of the soil and climb over the bulb. Both systems have, however, given highly satisfactory results in the field.

THE MINISTER IN NEW ZEALAND.

IMPRESSIONS OF A DOMINION TOUR.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, who, accompanied by Mrs. Smith and Mr. T. G. Hope (Private Secretary), recently toured New Zealand, has favoured the Journal with some impressions of his visit to our sister Dominion. His mission was primarily one of health, but, through the courtesy of the New Zealand Government and other authorities, he was brought into touch with many facets of Dominion life and industry, and found much that was both interesting and informative. Mr. Smith had a most enjoyable time in the Dominion and had benefited much in health by the change. New Zealand, the Minister informed us, is a country that has been very well developed, and the standard of living of the people is fairly high, although wages and working conditions are not of such a high standard as prevail in Queensland. Much speculation in land had taken place during recent years, and the change of land policy from that laid down by the Seddon Government had resulted in a serious over-capitalisation of land, with the inevitable consequence that the farmers are carrying a larger burden of interest than the present-day prices for primary products warrant. "That is recognised generally," added Mr. Smith, "and is a tremendously difficult problem for solution."

New Zealand Farming Methods.

Commenting on his impressions of agriculture, Mr. Smith said that the standard of agriculture was good, and farming methods generally were conducted on up-to-date lines. He had visited the State Farm at Ruakura, in the Waikato district, North Island, where purebred stock were raised and sold to the dairymen. That institution was very well managed by Mr. Munro, the officer in charge, and its activities had a good influence in raising the standard of dairy stock. Mr. Smith also visited the Lincoln Agricultural College, in the Canterbury Province, where large numbers of potential farmers are trained in scientific methods. The Canterbury district is an exceedingly fertile one, and farmers there have excellent crop yields owing to the natural fertility of the soil and to the scientific methods of cultivation adopted.

Industrial Conditions.

Mr. Smith also visited a number of industrial undertakings in the Dominion, and found the operations being conducted very efficiently, the articles produced being of a first-class quality. It appeared to him, however, that the people did not give that patronage to the locally manufactured article that they should, preference being shown for the imported goods. There was considerable unemployment and resultant distress in New Zealand at the present time, particularly in the Auckland Province, and as this is unusual in the summer time, the outlook was not very promising. As a result of that certain individuals were making an attack on the arbitration system, having for their purpose a general attack on wages standards.

A Municipal Milk Supply.

While in Wellington the Minister took the opportunity of going very fully into that city's municipal milk supply, and found the scheme to be very efficiently conducted. The Wellington City Council have an agreement with their farmer-suppliers, receive the milk at certain depôts, pasteurise it, and deliver it in sealed bottles to the people. As a consequence of this the milk available to the people is of a very high quality, its hygenic standard being the prime consideration, and there is no doubt that it has an important bearing on the health of the community. The elimination of waste by a centralised and organised system such as in Wellington enables the people to obtain their milk and cream at reasonable prices, the farmer also securing a fair price for his product.

Civic Enterprise.

Owing to the fact that for many years the municipal franchise had been on the same basis as that for the election of Parliament, Mr. Smith said that practically all of the essential public services in the Dominion were owned and controlled by the municipality in most of the larger centres of population. The supply of

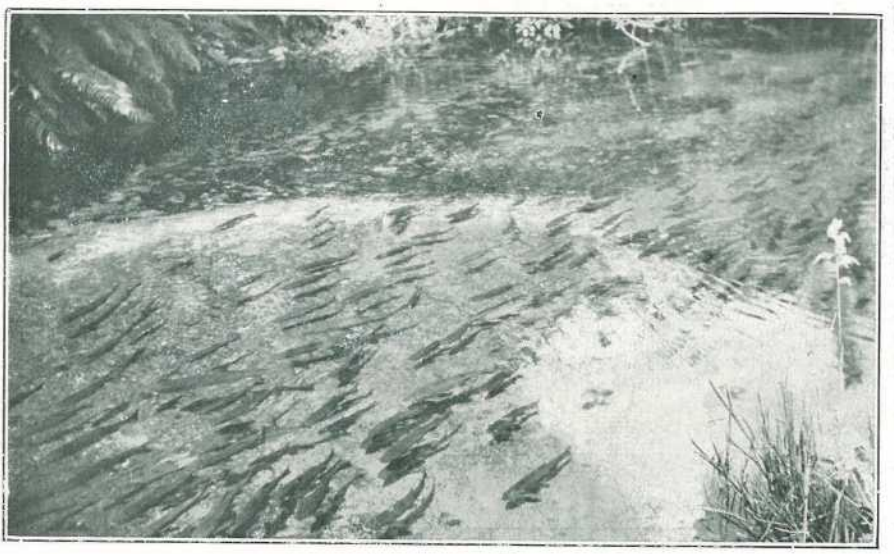


PLATE 67.—TROUT IN FAIRY SPRINGS, ROTORUA.

New Zealand rivers and streams abound in fish, many of which have been introduced. The water in the picture is of crystal clearness and the fish are swimming against a swift current.

PLATE 68.—STACKING PASPALUM HAY AT THE RUAKURA STATE FARM, N.Z.

Mr. Forgan Smith and his two small sons are with the Manager, Mr. H. Munro, in the foreground.

PLATE 69.—THE MINISTER AT THE CANTERBURY AGRICULTURAL COLLEGE, LINCOLN, CHRISTCHURCH, N.Z.

In the group with Mr. and Mrs. Smith are the Director of the College, Mr. R. E. Alexander and Mrs. Alexander, Dr. F. W. Hilgendorf (Professor of Biology), Mr. P. R. Climie (Secretary, Canterbury Progress League), and Mr. T. G. Hope (Private Secretary to the Minister).

PLATE 70.—SOME OF THE YOUNGER OF THE PRESENT SEASON'S PEDIGREED HEIFERS REPRESENTING THE FOUR DISTINCT BREEDS AT RUAKURA STATE FARM PARADED FOR THE MINISTER'S INSPECTION.

electricity and gas and public abattoirs were controlled by the local authorities, and were conducted in a very efficient manner with corresponding advantage to the people generally.

In the city of Dunedin, the profits from municipal undertakings amounted to a considerable sum per annum, notwithstanding the cost to the general public for such services was kept very low. As a matter of fact, Dunedin is to have a new town hall, to cost approximately £120,000, the cost of which is to be defrayed from accumulated profits of municipal undertakings. In many parts of the Dominion facilities for the storage of water and the generation of electrical power were available, the water supplies being fed by mountain streams, and as a consequence hydro-electrical energy could be secured at a comparatively low price.

The Citizen of To-morrow—Infant Welfare.

Mr. Smith said that he had also the opportunity of visiting some of the Plunkett institutions, and investigated there the policy of child welfare that was being carried

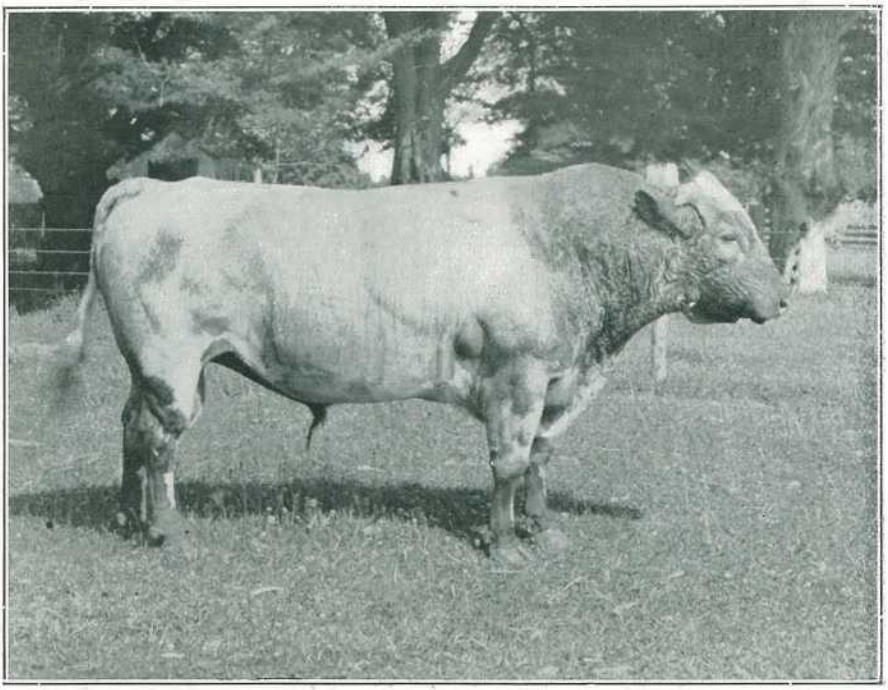


Plate 71.—"Dominion Director," another of the Shorthorn Sires at the Hamilton Farm of Instruction at Ruakura.

out. There can be no doubt that the activities of such institutions had resulted in placing New Zealand in the proud position of having the lowest infantile mortality rate in the world. "What I saw in New Zealand," added the Minister, "is another indication that the policy pursued by the Labour Government in Queensland in regard to the establishment of baby clinics, maternity hospitals, &c., is proceeding on sound lines."

Social Service.

The hospital system of the Dominion is also very efficient, and is conducted by hospital boards subsidised on the rates. Large sums of money had been spent in recent years in bringing hospital buildings up to requirements and in providing modern facilities for the treatment of accident and disease. Mr. Smith met and

exchanged views with Sir Truby King, whose genius is largely responsible for putting into operation the general public health policy now in existence in the Dominion, and there was no doubt that New Zealand owed a great deal to Sir Truby King's services.

High Educational Standards.

The University system in New Zealand provides splendid facilities for students, and maintains a very high standard. Mr. Smith had the opportunity of visiting the Dunedin University with the Chancellor (Mr. T. K. Sidey, M.P.), who gave him much valuable information concerning the activities of that institution.

In all centres which he visited, the Minister met prominent representatives of the Labour movement, and discussed with them matters of mutual interest. The Labour

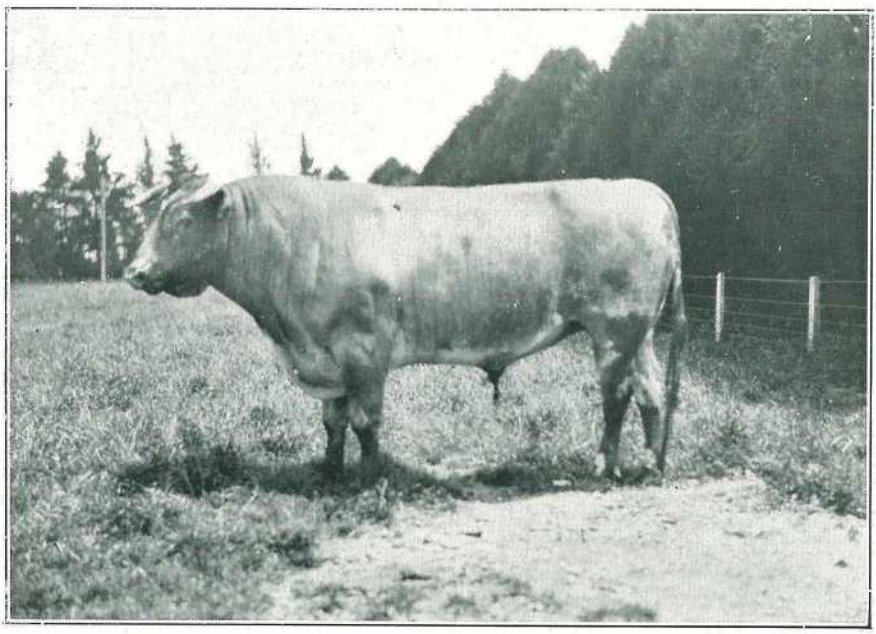


PLATE 72.—"PUKERIMU DAUNTLESS," ONE OF THE SHORTHORN SIRES ON THE RUAKURA FARM OF INSTRUCTION, HAMILTON, NEW ZEALAND.

Party have fourteen members in the New Zealand Parliament, and the general opinion is that they will at least gain a large accession to their numbers at the next election.

Mr. Smith expressed his keen and warm appreciation of the courtesy extended to him at the hands of the Prime Minister (Mr. Coates), and of Dominion hospitality generally. He had the pleasure of meeting most of the Cabinet Ministers, and added that every kindness was extended to him and that everything possible was done for him by the Government and other authorities to make his stay instructive and enjoyable.

Mr. Smith's secretary (Mr. Hope) made a pictorial record of the tour, especially of their travels in the agricultural districts of the Dominion, and he has made a series of photographs available to us which are of particular interest to Journal readers. A set of them is published in this issue, and others will appear in following numbers.

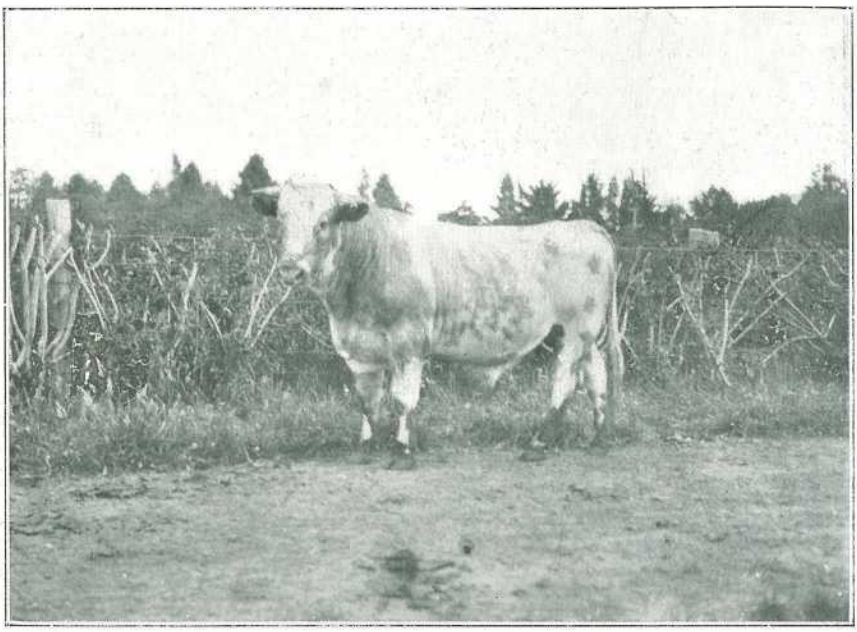


Plate 73.—"Dominion Sis's Prince," another Sire in the Shorthorn Herd at Ruakura.

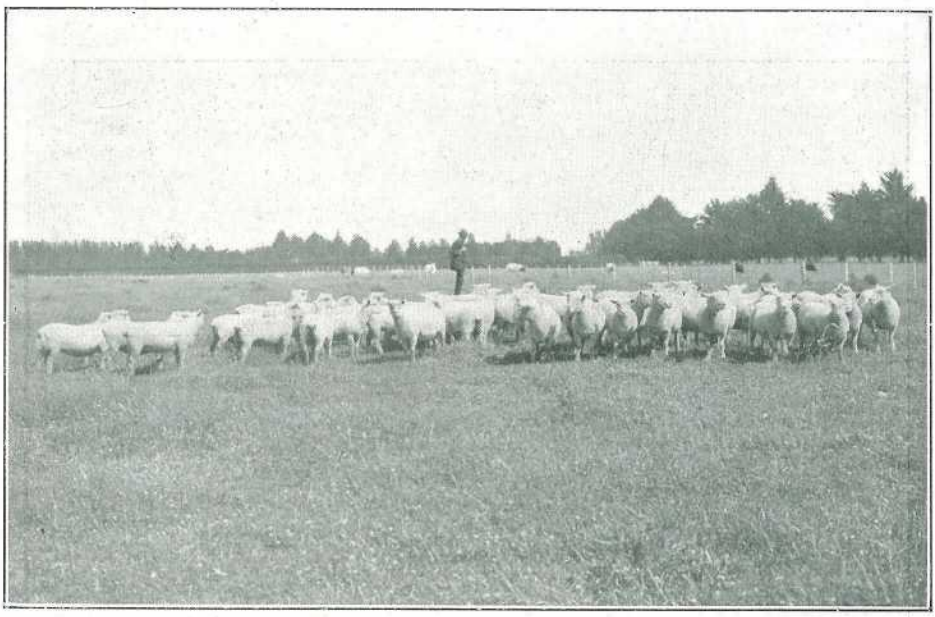


Plate 74.—Shearing Southdown Ewes on the Ruakura Farm of Instruction, Hamilton, New Zealand.

These ewes have been culled and are ready for mating with the different stud rams. The rams, which will be the progeny of these ewes, will be mated to long-wool ewes (mostly Romney). The ultimate resultant male from this cross is considered the right type of sire for the fat lamb trade.

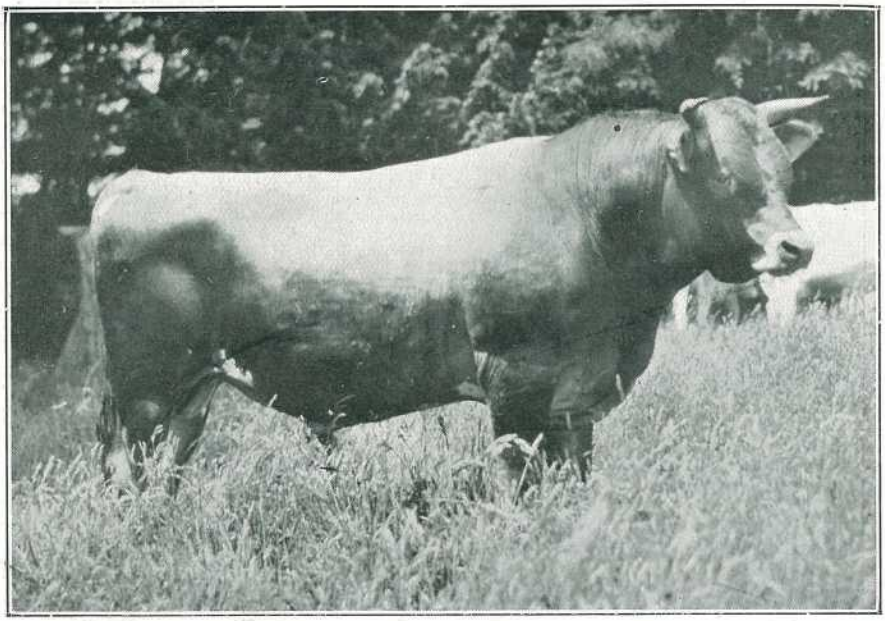


PLATE 75.—JERSEY BULL "HOLLY OAK BEAUTY KNIGHT" (19 MONTHS OLD).

Bred at the Ruakura State Farm from the highest producing strain in New Zealand. A very fine type of the breed, which finds favour among New Zealand dairymen.

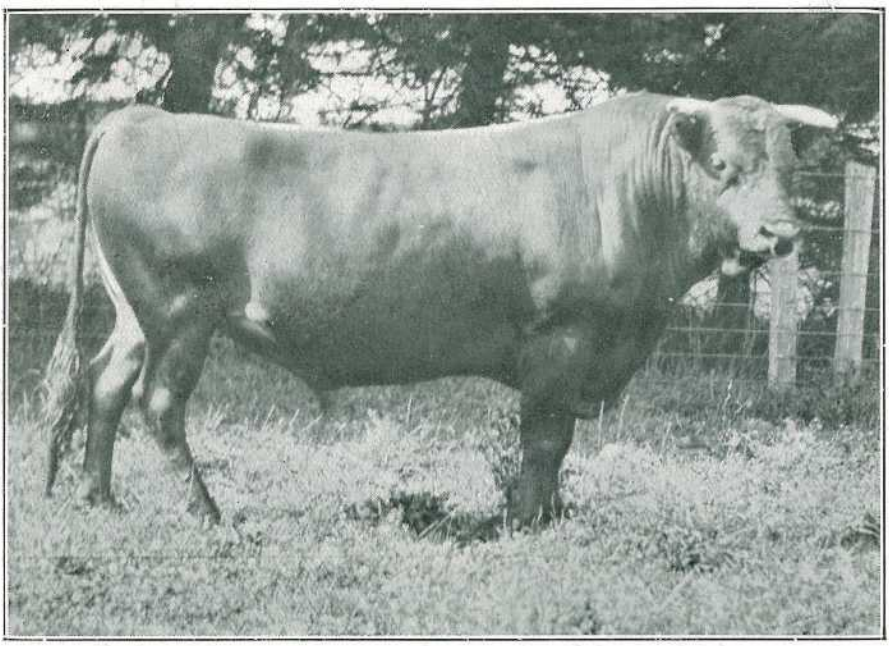


PLATE 76.—"DALETHORPE PRINCE," ANOTHER HIGH-CLASS NEW ZEALAND DAIRY SIRE IN THE HERD AT RUAKURA

FEEDING THE PIG.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

To correctly understand this important aspect of pig raising, it is necessary first that we should get right down to bedrock, as it were, and to begin at the beginning by studying the objects aimed at in feeding stock. All life requires food (and also warmth and moisture) and water, whether it be the minutest form of germ or animal life, or whether it be the fully developed male or female plant or animal; indeed, this is not only true of the physical, but of every other part of our bodies, and though in stock raising we aim mainly at developing the body, we also aim at the reproduction of bodies equally as well prepared as are the parents for the battle of life. We understand, therefore, that the animal body requires food to supply the material necessary for its growth. The animal stomach might, for purpose of comparison, be likened to a locomotive boiler and engine, in which both water and fire operate towards the production of the steam and power which represent the driving force. As the steam is required in considerable quantities constantly, it is necessary to continually stoke the fire, to keep the ashes and cinders well raked out and a sufficient draught of air passing under and through the fire, and to keep up the water supply in order that pressure may be retained, or as it is commonly referred to, "that there may be a sufficient 'head' of steam to do the necessary work." Thus there is not only a constant pressure or production of steam in building up, but there is also a constant waste going on in the utilisation of both the fuel and water, and these losses need to be made good by the addition of fresh supplies which must be at hand all the time. The animal body is constantly being built up as a result of the strength generated from the food, as it is absorbed in the form of "digestible nutrients" from the food stream as it passes through the stomach and bowels, and there is also a constant breaking down of tissue or waste as it has been referred to above; so it is equally necessary that fresh supplies of nutritious, succulent, and appetising food be at hand to feed the body as occasion requires.

In stock feeding, certain specific objects must be kept in view, and we must thoroughly understand each of these objectives in order to gain the maximum benefit from a study of our feeding problems.

The Objects of Feeding.

Technically speaking, the objects of feedings are—

(1) To maintain bodily heat and strength.
(2) To repair waste of tissue (muscle, flesh, fat, bone, sinew, blood, &c.).
(3) To prepare for the reproduction of young.
(4) To form new tissues and organs.
(5) To enable the animal to perform muscular labour, or to fatten in preparation for slaughter for the purpose of converting the carcase into bacon, &c.
(6) To allow of the secretion of various products, such as milk, blood, digestive juices, &c.
(7) To allow of a reserve of stores being laid by in the form of fat, &c.

To Maintain Bodily Heat and Strength.—In a normal state the bodily temperature of various animals differs somewhat, though all reach the century mark. The normal temperatures of domestic stock are as follows:—

Horse	.. .. ..	100	to	101	degrees	Fahr.
Cow	.. .. ..	101	to	102	„	„
Dog	.. .. ..	101	to	102	„	„
Pig	.. .. ..	102.6	to	103	„	„
Sheep	.. .. ..	103	to	104	„	„
Fowl	.. .. ..	105	to	107	„	„

The cat has about the same temperature as the horse. The temperature of the healthy animal body does not fluctuate, however, to more than a very slight extent. The heat required to maintain temperature is provided from the food. Thus it is important that the food supply should be of sufficiently good quality and quantity at all times.

To Repair Waste of Tissue, &c.—As with the locomotive, so with the body there is a constant wear and tear. Bodily activity involves the destruction of the various elements of which the body is composed. No sooner is this destroyed than it needs replacing, hence the food supply must not only be sufficient and of good quality, but it must be given at regular periods and in sufficient bulk to enable the digestive organs to handle it to advantage, for some bulk is necessary, though the pig does not require the same bulky food as does the cow and the horse.

It matters not whether an animal such as the horse is at regular and at hard work or is at rest, there is still a waste of tissue going on; it cannot stop, and when there is a greater supply of fuel than is actually needed at the moment the energy is produced, the balance is stored in the form of fat for future use.

Even where an animal is at rest a certain amount of energy is needed for the performance of the internal work of the body. The heart is constantly beating, the acts of inspiration and respiration keep the lungs in regular movement; these, in company with the labour involved by the action of the stomach and intestines in the process of digestion, are a constant drain on the energy thus stored. All this energy thus required and stored comes from the food.

To Prepare for the Reproduction of Young, &c.—It stands to reason that a brood sow carrying a litter of, say, a dozen young pigs, must require more food than a sow not in pig, for not only must the sow's own body be kept going, but the development of the young pigs in her breeding sac must be kept provided for; these absorb large quantities of nutrients as they develop and mature.

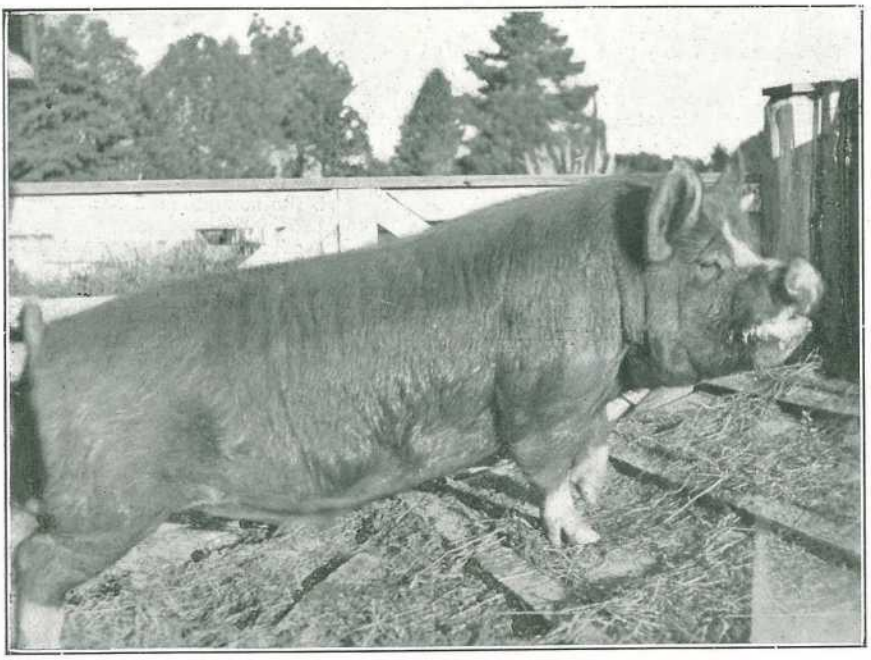


PLATE 77.—STUD BOAR "DOMINION GOOD HOPE," AGED 14 MONTHS.
Ruakura Farm of Instruction, Hamilton, New Zealand.

Winner of first prize for boars under that age, and also reserve championship at the last New Zealand Royal Show. This boar was paraded for inspection, with others (as typical of the requirements of New Zealand pig raisers), before Mr. Forgan Smith (Minister for Agriculture) in the course of his recent New Zealand tour.

Nature will even provide for their maintenance at the expense of the sow's own body if the food supply of the sow is insufficient or of poor quality. Breeding sows require abundant supplies of succulent green foods in preference to more limited supplies of concentrated food, such as maize, wheat, or barley, &c.

To Form New Tissues and Organs and to Enable the Animal to Perform Muscular Labour, &c.—It is not difficult to understand why the horse requires food when he is regularly occupied in farm or team work, or to understand why it is that an in-pig sow should have additional food, but many farmers find it difficult to realise that when the pig is fattening or even when he is growing it is performing something of the same muscular labour (though certainly the strain is not so severe) as is being performed by the horse. Here it is then that we see again the urgency of providing for an abundant supply of succulent, nutritious food of an appetising nature and sufficiently laxative in its action to keep the bowels working freely.

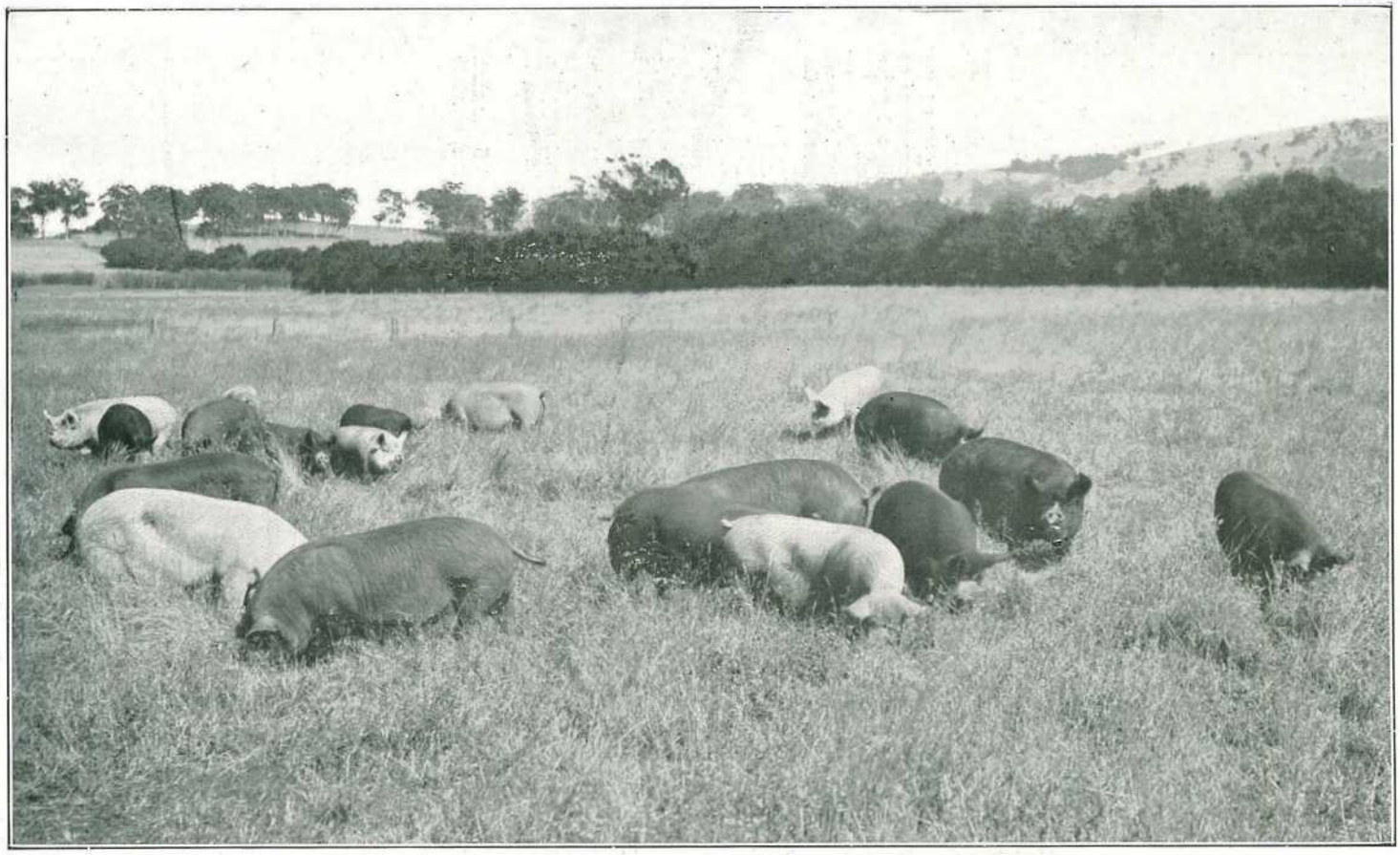


PLATE 78 (Fig. 1).

There is nothing pigs like better than grazing over sweet succulent pasture, nor is there any "supplementary" food that can be utilised to more advantage in the production of pigs the progeny of brood sows that have lived in the open and have had the benefit of sunshine, exercise, and fresh succulent nutritious pasture. [This photograph by courtesy of the Principal of Dookie Agricultural College, Victoria.]

To Provide for the Secretion of Various Products.—The brood sow once relieved, internally, of her young pigs at birth, then takes on their feeding by way of the teat, and as young pigs usually have very vigorous appetites, the sow requires suitable milk-producing foods in liberal quantities in order to be able to secrete sufficient milk to maintain her growing litter. The milch cow, the brood mare, the lambing ewe, &c., all require similar study, nor are these the only ones, for the young pigs require careful tending even when they have reached a stage when they can be removed from the care of the sow and be weaned.

The young pigs and the pigs that are fattening in preparation for sale to the butchers and bacon curers are secreting and laying up stores both of flesh and fat. The horse stores his energy in the form of strong muscular tissue, capable of standing a heavy strain during the day's work. Animals fatten readily on good food, and the fat animal can be maintained for a long period on a much reduced ration of food.

Nor do we need to understand the objects of feeding alone; it is equally important that we understand the composition of the various constituents of the ration the pig consumes. We must also understand something of the composition of the tissues that need rebuilding.

The breaking-down and the building-up processes going on in the body are frequently referred to under the term metabolism.

Breeding and Feeding.

There is an old saying in connection with the care of live stock that "half the breeding is in the feeding," which saying contains more than an ordinary share of common sense, as, after all, no matter how well bred as animal is, it will not prove successful as a breeder and as a unit on the farm unless it is properly fed.

It is especially important that the composition of the various foods and the part played by the different elements in the food should be properly understood by the breeder, and the composition of the tissues that need rebuilding.

Food Constituents.

In general it can be said that food is made up of four main parts, namely—Water, mineral matter, nitrogenous matter, and non-nitrogenous matter.

A more minute classification of the dry portions of food shows that they consist of—Albumenoids (or proteids), oils (or fats), soluble carbohydrates, crude fibre, and ash.

Water.—Water constitutes about two-thirds of the weight of the body; it enters into the composition of all its tissues and fluids. As there is not sufficient water in the ordinary food usually given to stock, it is necessary to provide additional supplies, and these are best given ad lib. so that the animal can drink when it likes. Water is just as necessary to the animal's body as is dry food.

Influence of Minerals.—Mineral substances in general make up about 5 per cent. of the body's weight. They enter into the formation of the teeth and bones, regulate the density of the blood and other fluids of the body, and have important functions to perform at all times.

The mineral substances consist principally of lime, potash, phosphoric acid, sodium, magnesia, iron, silica, and certain other acids—viz., sulphuric and hydrochloric. Most foods contain all of these ingredients to a greater or lesser extent, though many of our permanent pastures, as well as crops, are very deficient in lime and potash.

Proteins.—The nitrogenous components of the body are commonly called the flesh-formers. The proteins (i.e., those containing nitrogen) are principally found in the bones, gristle, tendons, ligaments, brain, nerves, hair, skin, and in the muscles and internal organs generally. Protein is generally called albumen, and the group name albumenoids is freely used. The white of an egg is an example of albumenoids. The protein portion of the food is generally the most expensive. The proteins can be changed into fats in the body, though in their absorption they cannot replace fat. They serve as fuel to make up for the daily waste of animal tissue, heat, and energy.

Carbohydrates.—The parts of the food that are free from nitrogen are divided into two main classes—the carbohydrates and the fats. The carbohydrates consist of sugars, gums, and woody fibres. They form the bulk of the food, and in the process of digestion they are converted into fats, and are used as fuel. The gums play only a secondary part as regards the nutritive value of any food. The carbohydrates represent the fat-forming portion of the food. For the purpose of heat and energy

production, fat is worth 2.25 times as much as carbohydrates, in the form of starchy matter; that is, 1 lb. of fat is equivalent, when used as fuel, to 2.25 lb. of the starchy matter.

Fats.—As fat is an essential body and is necessary in the digestion of food, the fat stored in the body is drawn upon largely if it is deficient in the food given to the animal. Protein may be converted into fat in the body and may be used as such. It is, therefore, plain that in feeding stock it is essential to have a proper proportion of fat in the food. If this is possible, not only is the fat in the body protected, but indirectly also the protein of the muscles and flesh. This is an important point.

The Process of Digestion.

Before food can be of any use to the animal it must undergo the process commonly called digestion. Digestion is the process by which the nutritious properties of the food are converted into a soluble form, so as to render them capable of being absorbed into the system to nourish and maintain the body. During the process of chewing, or masticating the food, there is mixed with it in the mouth, before it is swallowed, the first digestive juice called the saliva. Mastication is a mechanical action, the object of which is to reduce the food to a fine pulp, in which state it is most readily mixed with and acted upon by the chemical digestive juices. On completion of mastication, the food is swallowed. It must be remembered that in those animals that chew the cud (the ruminants), the food is returned to the mouth to be re-masticated. The muscular action of the stomach keeps the food churning, and as it passes through it becomes mixed with the gastric juice, one of the most important of the digestive juices. The food passing onwards enters the small intestines, where it becomes mixed with another digestive juice, the bile, secreted by the liver, and still another, the pancreatic juice, secreted by the pancreas. These various digestive juices have a special mission to perform. They change as large a portion as possible of the different constituents of the food into soluble form, which then pass directly or indirectly into the blood, and are made to serve the various requirements of the animal.

The saliva acts on starchy (carbohydrates) foods, also dissolves savory substances, salt, &c., enabling them to be tasted. It also assists in forming the food into a soft mass prior to swallowing. In the ruminants this mass is called a bolus or a ball of food.

The gastric juice acts on the nitrogenous (flesh-forming) portion of the food.

The bile emulsifies fats and causes the squirming (worm-like) action of the small bowels (peristaltic action).

The pancreatic juice acts both on the starchy foods and in the emulsifying of fats.

The coagulation of albumen and the prevention of putrefaction during digestion are special duties performed in the stomach by this gastric juice.

The soluble and diffusable substances formed by the action of the gastric juice on albuminous substances are called peptones; these are ready for absorption. Other substances are absorbed during the passage of food through the stomach and intestines. While the food is thus in passage through the body it is called chymous matter, and it consists not only of partially digested foods, but also of the several juices already named, mucous or saliva, and the indigestible substances (the residue), which, resisting the action of the digestive juices, is eventually passed out from the body in the form of fæces or dung. The nutritious matter that is absorbed and passed into the blood circulation is called "chyle."

Quality of Food—The Water Supply.

Food can, of course, be too rich, just as it can be of poor quality; it must always contain bulk. While it will be noted that only the soluble and diffusible nutritious portion of the food has any direct feeding value, a certain quantity of crude fibre and indigestible matter is necessary not only to form bulk and help in satisfying the animal's appetite, but also to increase the efficiency of digestion by increasing the bulk of the food, and thus causing it to fill the stomach and intestines and keep them in proper working order. This is why rich foods, such as oil cakes, linseed oil meals, and others of the same description must be fed in a small quantity in company with less valuable but more bulky foods. The direct opposite of this feeding principle is also true. Skim milk, although a bulky food, satisfying the animal and filling his stomach and intestines, is poor in actual feeding value, and needs enriching by the addition of fat-formers in the way of oil cakes or meals or concentrated cereal meal like pollard.

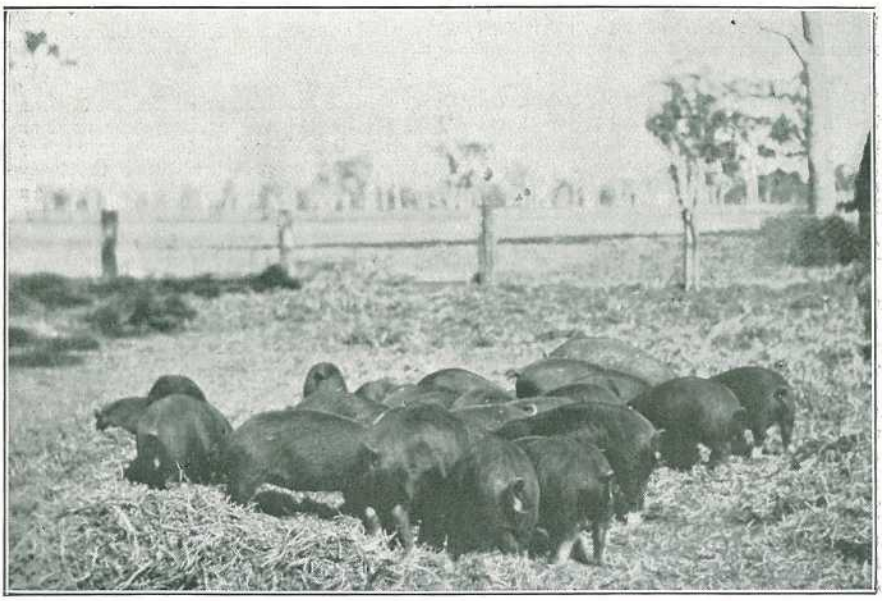
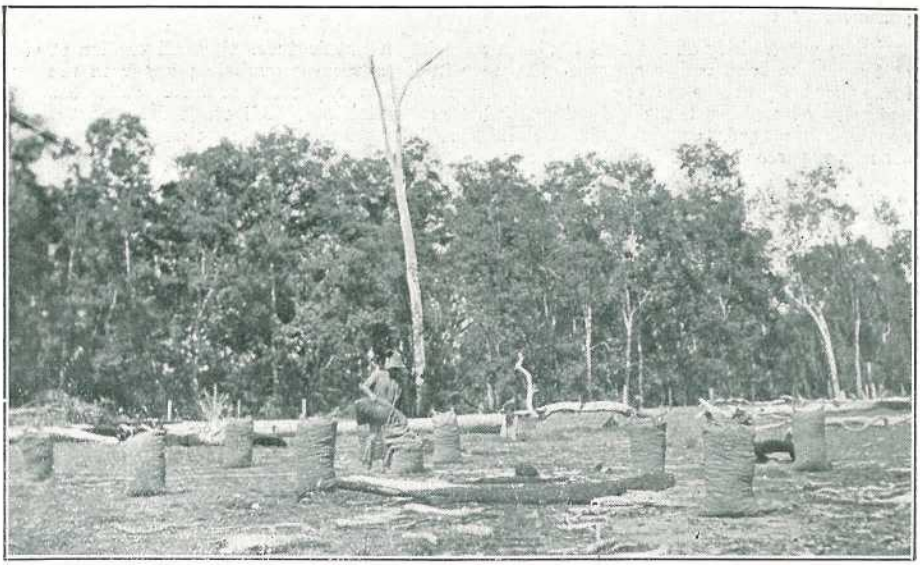


PLATE 79 (Fig. 2).—FINDING THE PEAS.

A group of young pigs that have the benefit of a roomy pasture, portion of which had been well littered over with Cow Pea Hay. The pigs appear to be enjoying the search for the hidden peas. There are many farm crops of great value in pig-feeding purposes in both the fresh succulent and the dried form. Pea hay is a favourite item on the pig's menu.

PLATE 80 (Fig. 3).—CLOVER VARIETY TRIALS.

Several varieties of clover are suitable for pig feeding, and for use in laying down mixed pastures. Bokhara Clover, White Clover, and Bursiess or Egyptian Clover are typical examples. The trials were carried out on the Warren State Farm, Queensland.



Plat 81 (Fig. 4).

Mineral matters play an important part in the feeding of pigs, for minerals are very necessary and are unfortunately deficient in many of the concentrated or more bulky foods. Wood ashes, charcoal, &c., are examples of minerals that can be made available on the farm at a nominal cost. This picture illustrates the manner in which the Manager of Warren State Farm, took advantage of gathering a supply of wood ashes and charcoal during clearing operations on the farm.

Plate 82 (Fig. 5).

Raking up the charcoal and bagging for future use is a money-making proposition. After the charcoal is gathered, the ashes should be evenly distributed over surrounding areas, in this way benefiting a larger area and making more efficient use of this very useful mineral matter.

Palatability of Foods.

The palatability of the food is also a most important feature. A small portion of salt added to food makes a great difference in its agreeable qualities; sugar in the same way makes some forms of food much more pleasant, yet few farmers realise the necessity of making the pig food palatable and nutritious. All stock derive more benefit from food that is easily obtained and is palatable, even though it may contain a percentage of indigestible fibre.

As already indicated, water is contained in all foods and is present in large quantities in the body. In some root crops and in melons, &c., it exists in quantities up to over 90 per cent., but in concentrates, such as pollard, the percentage varies from five to eight.

The fat of food as indicated is either burned to furnish heat and energy or is stored up in the body for future use.

The ash is what is left when the combustible part of a feeding stuff is burned away. Ash consists chiefly of the mineral part of the food—i.e., lime, magnesia, potash, soda, iron, silica, and the acids already named. Part of the ash is used in the formation of bone and part of it is stored up in the body for future use. The particles not otherwise required are voided in the urine and dung.

The fibre is the framework of plants and is, as a rule, the most indigestible portion of a foodstuff. The coarser fodders, such as sorghum grass and other plants, contain a large proportion of fibre, but, as already stated, this is a very necessary part of the food. In feeding pigs, however, it must be remembered that (unlike cattle) they have a small stomach, and, therefore, are not able to deal expeditiously with foods containing a very high percentage of indigestible fibre; in fact, nature teaches the pig not to swallow too much fibrous matter. Sorghum, for instance, makes an excellent grazing crop for pigs. When the plant flowers and forms seed, it can safely be fed (it is regarded as poisonous prior to the flowering stage and should not on any account be fed to any class of stock). Brood sows, in particular, relish a good crop of sorghum; they will graze on this plant, be satisfied and contented and do well, but they will not swallow the indigestible fibre—they chew it thoroughy and extract all the nutritious matter, then reject the coarse fibre. Coarse bran is of no value as a food for pigs; though, owing to its being in the form of meal, it may be swallowed, it passes through the pig undigested and may be wasted. There is nothing better for a brood sow that has a tendency to constipation than a good warm bran mash, but this is a bulky laxative mash, which, passing through the bowels quickly, relieves the costive condition, but does not satisfy the demand for nutrition. Cattle and sheep, and also goats, can consume large quantities of indigestible fibre and make some use of it, because they have capacious stomachs and have the power of rumination. The pig has a relatively lower power of dealing with fibrous foodstuffs, but it has a very high power of converting easily digested foodstuffs into meat; this is why pigs do so well on concentrated, non-bulky foods such as pollard, meals of various descriptions, dairy by-products, root crops, potatoes, artichokes, &c.

For a more detailed description of the composition of various foods, a study of the nutritive ratio and its application to the balancing of rations, and, in general, for the theoretical aspect of this great question, the reader is referred to the special text-books dealing with the subjects of Feeding Farm Animals, Feeds and Feeding, and other pamphlets on Stock Foods by J. C. Brünnich. Particulars of these can be supplied, if required, on application.

Definition of Terms.

For the benefit of junior readers of these articles, a few definitions of terms that they will come across in reading up this subject are here given. These definitions are stated in every-day language and make clear the several points.

When food is mixed and fed to stock in certain quantities, the term "ration" is used. A ration is the total allowance of food given to an animal for twenty-four hours.

"Balanced ration" has been defined as one in which the constituents are so blended as to produce the results sought in feeding, with but little or no waste.

"Dry matter" represents that portion of a feeding stuff which remains after all the water or moisture has, in analyses, been expelled by heat.

"Digestive nutrients" is that portion of the dry matter which can be digested by the animal and does not pass off through the bowels as excrement.

"Protein" is that portion of the digestible nutrients which goes to the formation of lean meats, ligaments, hair, horns, and the casein (or curd) of milk. Protein is the most expensive portion of any foodstuff. It is generally believed that protein may be, and many times is, converted into the fat in milk. The basis of protein is nitrogen, hence the protein elements are termed the nitrogenous part of the food. They are also called albumenoids.

"Carbohydrates" are that portion of the digestible nutrients which are the primary source of sustaining animal heat and furnishing the energy for keeping the animal's mechanism in operation. They are composed of the woody fibre of the plant and grain and the starch, sugars, and gums. In the published list of chemical analyses of foods, the carbohydrates are usually subdivided into the terms:—"Crude fibre," which is the least digestible portion of the food; "nitrogen free extract," so called, because it does not contain any nitrogen; "ether extract," that portion of the digestible nutrients which may be dissolved out of the foodstuff by ether. It is frequently called "crude fat." It can be used by the animal for maintaining the bodily temperature, and for this purpose is from 2.2 to 2.5 times more efficacious than the carbohydrates. It is maintained by some writers that the fat in milk comes largely from the crude fat in the food, but it has been demonstrated that it is not absolutely necessary for this purpose.

What is a Balanced Ration?

A balanced ration is one in which the essential constituents are supplied in adequate amount and in correct proportion for the purpose in view; or, in more definite language, a balanced ration is one which supplies an adequate amount of starch equivalent, containing the requisite quantity of digestible protein, and combined with a suitable bulk of food for the purpose in view.

In addition to the primary consideration of adequate supplies of starch equivalent and digestible protein in the construction of balanced rations, many other factors must be taken into account, of which the following are a few of the more important:—

(1) The stock of home-produced foods on hand.

(2) Relative costs of foodstuffs.

(3) Palatability.

(4) The characteristics of the foodstuffs used as regards the laxative or costive effects; the percentage of fibre; their effect on the colour and flavour of butter and milk; and in some cases their effect on the flavour and texture of the meat.

(5) Mineral matter.

(6) Vitamins—in some cases.

In commencing to build up a balanced ration it is necessary to ascertain approximately what quantites of such foods as are on hand can be arranged for per head per day. If, on calculation, it is found that the allowance of foods is insufficient to supply a ration which complies with the required feeding standards, consideration must then be given to the purchase of suitable supplementary foods.

Balanced Ration for Pigs.

The pig must be well bred, well fed, and well looked after if the maximum profit is to be derived. The pig is well known as the farmer's best scavenger, the housewife's most wholesome sink, but he excels as a rent payer, for he provides the dairyman with a return for his skim milk, the butcher a return for his offal, and the farmer a return for his surplus roots, grain, and greenstuff, and the profits are even greater when these feeds are combined, for skim milk contains too large a proportion of water, butchers' offal an excess of protein, and grain (with the exception of peas and beans) an overplus of carbohydrates. In balancing a ration for pigs, the fact that young animals require more protein than those that have arrived at the mature stage should not be overlooked. In this connection pollard, a product of milling wheat, is exceedingly valuable, provided it is up to the specified standard. It is wise too to keep a mixture of salt, ashes, sulphur, and lime constantly before pigs of all ages.

No food is too good for the pig, and the best is the most economical in the end. Breeding, feeding, and management are factors that play a highly important part in the fattening of pigs.

Feeding Points.

When making up rations for young pigs, the following points should be borne in mind:—

(1) The ration should be easily digested. In this respect milk is one of the best foods for pigs at weaning time.
(2) The fibre content should be low.
(3) The ration must contain plenty of raw material.

When the food is unduly sloppy it means that a greater bulk of food has to be consumed, the alimentary canal becomes greatly distended, and the animal does not thrive so well. A sufficiency of food does not, however, fulfil the requirements of a pig's diet. Quality is just as important as quantity, and the ration must be constituted as to include, in the most economic proportions, the variety of food constituents necessary for the maintenance of maximum efficiency in the normal working of the animal's body, as well as for the purpose of growth and the formation of flesh and fat.

Early Maturing Bacon Pigs.

Many farm pigs do not reach medium bacon weights until they are eight or nine months old. On this account they cost more to produce and not only is the risk of keeping them increased, but the profits are reduced. Young pigs should be hurried along from the weaning stage to maturity and should be topped up on a proportion of grain for the last two or three weeks of their life. This is done in order that the flesh may "firm up" and be in good condition for curing.

Slop fed pigs do not give the best results as baconers unless they are topped up on grain. This grain feeding appears to put the finishing touch to the feeding, for grain and milk-fed pigs kill out to the best advantage.

Food Necessary for Pigs.

A certain quantity of food is required by every pig daily to keep it alive and to keep its internal organisation in working order. If a pig were being maintained on grain or mash alone, it is estimated that the food necessary for this purpose would be 2 lb. of meal daily for each 100 lb. body weight, so that a pig weighing 100 lb. live weight would have to eat 14 lb. of meal each week without gaining any increase in weight from it. This increase ought really to amount up to 1 lb. per day increase in weight or 7 lb. per live pig in a week, equal to 4 or 5 lb. of pork for a pig between 4 and 4½ months old per week with increasing returns weekly.

This shows that the old-fashioned plan of keeping pigs in a merely store condition for many months and then fattening them would, under present conditions, be simply ruinous. Another and equally fatal objection to the out-of-date system is the fact that a young and growing pig is able to make a far greater proportionate increase from the food it consumes than is possible for the old pig.

One of the causes of this is that the food suitable for the pig supplies both the necessary requirements for growth and for the production of fat, whereas the old pig has no need for that portion of the nutrient in the food which merely increases growth, as it passes through the body unused and wasted. Further, the young pig consumes and turns into flesh a far greater proportionate quantity of food, according to its live weight, than the old pig is willing or able to do.

A still further reason for the practice of the combined growing and fattening system in the production of pork is the fact that pork, the produce of young, prime-quality pigs, is in so much greater demand than pork from older pigs, and at a much higher price per pound. So far as one can see, everything is in favour of the liberal system of feeding pigs from their earliest days.

The advantages pointed out exhaust the arguments in favour of liberal feeding. The cost of production of meat, as of most other articles, is increased by the extension of the period of manufacture, as all the standard expenses of rent, labour, interest on money, &c., continue whether the outturn be half or the full extent possible. In many instances, at least twice the outturn of pork might be made without any increase in the working expenses.

This would be equal to halving these expenses and doubling the other profits on the production of the pork. The enormous benefit thus available to the majority of pigkeepers needs no emphasising for during recent years the production of pork has been, comparatively speaking, one of the most profitable branches in the mixed farming world.

GESTATION CHART FOR BREEDING SOWS.

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

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

This chart presents in an instructive form figures relating to the gestation period of brood sows. For example, a sow mated to the boar on 1st January is due to farrow on 22nd April; a sow mated on 1st July is due on 20th October. The chart should be preserved for future reference by breeders of all classes of pigs. The normal period of gestation, *i.e.*, the period from the time of conception to the birth of the young pigs, is 112 days, this period is sometimes remembered as roughly three months three weeks three days, or 16 weeks. With very young sows the period is sometimes of shorter duration, and instances are on record where young sows have farrowed at from 100 to 108 days after becoming pregnant; on the other hand, old sows in abnormal condition have been known to carry their young for more than 140 days.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

BUSH HAY.

N. A. R. POLLOCK, H.D.A., Northern Instructor in Agriculture.

Among stock owners opinions are divided as to the merits of bush hay as a fodder in extra dry seasons, such opinions being probably influenced by the quality of the material from which the experience was gained.

All will agree, however, that the nutritive value of a grass varies from early growth to maturity, for the rapid advance of stock on young succulent pasturage as compared with the same pasturage when matured offers evidence that must be accepted. It would follow as a natural corollary that hay made from grasses at different stages of growth would vary similarly in nutritive value.

As set out in "Dry Season Safeguards and Animal Nutrition," "Q.A.J.," May, 1927, the proper time to cut grasses of perennial habit in order to ensure a maximum palatability and nutritive content, is just as they are breaking into flower.

An illustration of this is afforded in the result of an analysis of a sample of bush hay secured at Mr. N. H. Philp's holding, Stanley Downs, Stamford, in the Hughenden district, towards the close of last year. In this, the Government Botanist identified the following grasses and herbage, with a noting that the sample was very typical of the average better pastures of the Northern Downs and Central West.

Grasses.

Astrebla triticoides—Mitchell Grass.
Andropogon decompositum—Barley Grass.
Andropogon sericeus—Blue Grass.
Iseilma membranacea—Flinders Grass.
Chionachne barabata.

Herbage.

Malvastrum spicatum.
Hibiscus trionum—Bladder Ketmia.
Trichodesma Zeylanicum.
Ipomea sp.—A native convolvulus.
Datura Leichhardtii—Native thorn apple (poisonous), only one small fragment present.

The analysis returned by the Agricultural Chemist is as follows:—Water, 9.0; ash, 18.2; protein, 8.3; fibre, 25.4; fat, 1.6; carbohydrates, 37.5.

Analysis of the ash showed—Lime, 1.2 per cent.; phosphoric acid, 0.36 per cent.; chlorine, .567 per cent.

The striking feature of the fodder analysis is the very satisfactory protein content, showing the hay to be not only of high nutritive quality, but to provide a sufficiently balanced ration in itself for feeding in times of scarcity. The analysis of the ash shows the amount of phosphoric acid and chlorine also to be satisfactory.

The hay from which the sample was taken was cut at the right period, and presented a bright and well-cured appearance with good aroma.

This analysis should prove convincing testimony as to the value of properly made bush hay on the country devoted to depasturing sheep in the western areas of the State.

Pasture Improvement.

In the cutting of bush hay on the rolling downs and elsewhere, complaint is made of the difficulty in cutting low owing to the tussocky nature of the Mitchell Grass and also of the lack of thickness in the stand, both of which disallows a satisfactory yield to be harvested from each acre. Graziers will have noted that where the fire plough was used a more luxuriant growth of grass occurred on the loose soil turned back than on the soil not touched thereby, and that this grass not only grew better but preserved its green colour longer.

It is generally accepted that production lessens as age increases, so it may be expected that the tussocks of Mitchell Grass which are in general of more than a few years duration are less capable of production than those of newer growth.

As a remedy, it is suggested that a discing of the soil with a one-way disc harrow, such as manufactured by the Sunshine Harvester Works, followed by a good harrowing would level off the land to allow of close cutting by a mower and the production of a better growth of pasturage without any sowing of seed, as it is considered the land would already be sufficiently seeded from previous crops.

Feather Top.

A menace to the pastures on many holdings on the Rolling Downs is the spread of "Feather Top," *Aristida* sp., a three-awned spear grass. This grass, through its seed becoming entangled in the wool, reduces the latter's value while, being unpalatable to sheep, it is allowed to seed freely and thus to take possession of space that would be more profitably occupied by better grasses.

By the use of a tractor drawing a one-way disc harrow, followed by an ordinary harrow, a comparatively large area could be treated each year until the whole of the holding had been gone over, thus improving the pasturage which in its invigorated growth would tend to crowd out the Feather Top, increase the carrying capacity, and allow of more satisfactory cuts for hay.

In addition, the pasturage could be further improved by sowing prior to or during the discing operations, seeds of legumes found to do well in the locality, such as species of *Psoralea, Rhyncosia, Glycine,* &c.

Psorlea cinerea, a Valuable Legume.

A legume that is plentiful in many holdings in the western areas of the State, and worthy of further distribution through the pasturage, is found in *Psoralea cinerea,* a description of which, by the Government Botanist, together with an illustration, appeared in the "Queensland Agricultural Journal" for December, 1918.

An analysis of a sample secured in the Hughenden district and air dried was submitted to the Agricultural Chemist in December of 1927, and gave the following very fine analysis:—Moisture, 9.8; ash, 10.2; protein, 22.0; fibre, 10.1; fat, 7.4; carbohydrates, 40.5.

The analysis of the ash showed—Lime, 2.6 per cent.; phosphoric acid, 0.5 per cent.; chlorine, .157 per cent.

The chemist noted, "Only the leaves and young shoots were analysed, the hard central stalks discarded, which accounts for the low fibre. A very nutritious fodder."

The very high protein content of this legume and its adaptability to western conditions mark its extreme value.

Since the problem of feeding in dry times resolves itself into the supply of the necessary protein, the presence of this and other suitable legumes in the pasturage from which bush hay is made would be most advantageous.

CANE PRICES BOARD.

The following have been appointed Millowners and Canegrowers' Representatives respectively on the Local Sugar Cane Prices Boards against which their names are set, and the person so designated has been appointed chairman:—

Babinda Local Board—
Millowners' Representatives—F. A. Lamont and W. J. Ryan.
Canegrowers' Representatives—S. H. Warner and D. O. James.
Chairman—A. H. O'Kelly.

Bingera Local Board—
Millowners' Representatives—A. J. Gibson and B. A. Bourke.
Canegrowers' Representatives—N. Poulsen and T. Dexter.
Chairman—C. D. O'Brien.

Gin Gin Local Board—
Millowners' Representatives—C. M. English and E. N. Annand.
Canegrowers' Representatives—J. Laurison and G. Powell.
Chairman—C. D. O'Brien.

Goondi Local Board—
Millowners' Representatives—R. T. Challinor and D. A. Williams.
Canegrowers' Representatives—W. D. Davies and J. Moran.
Chairman—A. E. Aitkin.

Inkerman Local Board—
Millowners' Representatives—H. G. Bell and Wm. Gibson.
Canegrowers' Representatives—F. J. Woods and S. W. Gibson.
Chairman—R. A. Tait.

Isis Local Board—
Millowners' Representatives—A. Adie and John Alison.
Canegrowers' Representatives—W. M. Duncan and A. W. Macpherson.
Chairman—H. B. Carney.

Macknade Local Board—
Millowners' Representatives—E. Irving and A. H. Edwards.
Canegrowers' Representatives—G. Cantamessa and T. J. McMillan.
Chairman—J. A. Murray.

Marian Local Board—
Millowners' Representatives—A. J. Coyne and J. O'Neill.
Canegrowers' Representatives—A. J. Duncan and E. C. Walz.
Chairman—M. Gallagher.

Mossman Local Board—
Millowners' Representatives—E. J. O'Brien and C. J. Crees.
Canegrowers' Representatives—H. B. Schnitzerling and R. D. Rex.
Chairman—T. R. Beck.

RATIONS FOR DAIRY COWS.

E. H. GURNEY, Senior Analyst.

Feeders of dairy stock frequently forward to the Department lists of feed materials available to them, desiring to know how to make balanced rations from such material. On account of this it was thought that examples of rations made up with various feeds might prove useful, some of the examples being composed of feed stuffs named in the lists mentioned above.

The Agricultural Chemist, Mr. J. C. Brünnich, has written a pamphlet entitled "Stock Foods," in which the objects of feeding, description and analyses of various stock foods, and the making up of rations are all very fully detailed, and with this information the dairy farmer can judge how to feed to the best advantage.

Modern experience has shown that rations with somewhat lower protein content than was previously considered necessary can be successfully used.

Examples of rations computed from analyses of feed stuffs contained in "Stock Foods" are given below, and are in accordance with the feeding standards for dairy cows published in "Feeds and Feeding Abridged," by Henry and Morrison.

Professor J. K. Murray states that this standard is referred to in lectures in the Agricultural Course at the Queensland University.

HENRY AND MORRISON FEEDING STANDARD.

—	Digestible Crude Protein.	Total Digestible Nutrients.
Dairy Cows.		
For maintenance of a 1,000-lb. cow	0·700	7·925
To allowance for maintenance add—		
For each 1 lb. of 2·5 per cent. milk ..	0·045—0·053	0·230—0·256
For each 1 lb. of 3·0 per cent. milk ..	0·047—0·057	0·257—0·286
For each 1 lb. of 3·5 per cent. milk ..	0·049—0·061	0·284—0·316
For each 1 lb. of 4·0 per cent. milk ..	0·054—0·065	0·311—0·346
For each 1 lb. of 4·5 per cent. milk ..	0·057—0·069	0·338—0·376
For each 1 lb. of 5·0 per cent. milk ..	0·060—0·073	0·362—0·402
For each 1 lb. of 5·5 per cent. milk ..	0·064—0·077	0·385—0·428
For each 1 lb. of 6·0 per cent. milk ..	0·067—0·081	0·409—0·454
For each 1 lb. of 6.5 per cent. milk ..	0·072—0·085	0·434—0·482
For each 1 lb. of 7·0 per cent. milk ..	0·074—0·089	0·454—0·505

Then upon this standard, a 1,000-lb. cow, yielding 25 lb. of milk of 3.5 per cent. fat, would require from a minimum amount of digestible crude protein $0.049 \times 25 = 1.225 + 0.7 = 1.925$ lb. to a maximum amount $0.061 \times 25 = 1.527 + 0.7 = 2.225$ lb.; and this cow would require from a minimum amount of total digestible nutrients $0.284 \times 25 = 7.1 + 7.925 = 15.025$ lb. to a maximum amount $0.316 \times 25 = 7.900 + 7.925 = 15.825$ lb.

Again, a 1,000-lb. cow, yielding 25 lb. of milk of 4.0 per cent. fat, would require from 2.05 lb. to 2.325 lb. digestible crude protein, and from 15.7 lb. to 17.57 lb. total digestible nutrients.

The term "nutritive ratio" means that amount of digestible protein that exists in a feed compared with the amount of non-nitrogenous digestible nutrients in that feed. As fat is capable of producing more heat when digested than the other nutrients, the fat content in the following rations has been multiplied by 2.3, and the product added to the amount of digestible carbohydrate and fibre—this total divided by the digestible protein gives the "nutritive ratio" of the ration. Thus in No. 1 ration, there is one part of digestible protein to six parts of other digestible nutrients.

When considering rations for animals it must be understood that other factors, beside the digestible crude protein and total disgestive nutrients supplied to the animal, must be taken into account, such as succulence, palatability, and variety of feeds.

Proteins are very complex bodies, and different proteins yield different substances when digested, and a number of these different substances have to be supplied by the food for satisfactory nutrition. Therefore there is less chance of feeding an unbalanced protein content by using several feedstuffs, than by using only one or two.

Rations are useful guides in feeding, but it must be noted that the analyses of the feedstuffs from which they are computed are averages only—that is to say, the composition of the feedstuff varies according to soil and climate wherein grown, and particularly to the age of growth when harvested.

The legumes, such as lucerne, cowpea, clover, &c., are characterised by the high amount of phosphorus and lime (particularly lime) they contain. Therefore, when animals graze on grass pastures growing upon soils deficient in phosphoric acid and lime, the inclusion of a legume in a ration is of particular value to these animals supplying both protein and mineral matter. Bran is also relatively rich in phosphorus.

Another consideration is the cost of a particular ration—whether it pays, when it is compared with the price obtained from the milk produced. But care should be taken that blame for unprofitable feeding is not placed upon the ration, when the fault is due to the cow. Some cows are capable of producing a large amount of milk, other cows are only capable of yielding a small amount of milk, even when supplied with ample well-balanced feed; such poor producers do not pay, and should be culled out from the herd.

Rations per 1,000-lb. Cow Yielding 25 lb. Milk.

—	Dry Matter.	Digestible Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbohydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
1—							
40 lb. Green Sorghum ..	8·0	0·48	0·08	2·32	1·36		
60 lb. Mixed Pasture (average)	12·0	0·53	0·12	3·48	3·01		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
	27·4	2·25	0·25	8·02	5·04	15·5	1 ÷ 6·0
2—							
65 lb. Green Sorghum ..	13·0	0·78	0·13	3·76	2·14		
7 lb. Lucerne Chaff ..	6·4	1·08	0·04	1·95	0·58		
7 lb. Maize Meal	6·0	0·35	0·21	4·20	0·07		
	25·4	2·21	0·38	9·91	2·79	15·3	1 ÷ 6·1
3—							
45 lb. Green Sorghum ..	9·0	0·54	0·09	2·61	1·49		
13 lb. Wheat Chaff	11·3	0·27	0·12	3·39	2·04		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
2¾ lb. Cotton Seed Meal (decorticated)	2·5	0·96	0·17	0·54	0·06		
2 lb. Molasses	1·5	0·02	..	1·15	..		
	27·9	2·16	0·43	8·90	3·69	15·2	1 ÷ 6·2
4—							
50 lb. Green Sorghum ..	10·0	0·60	0·10	2·90	1·70		
40 lb. Green Cowpea ..	8·8	0·64	0·12	2·92	1·14		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
1¾ lb. Cotton Seed Meal (decorticated)	1·6	0·61	0·11	0·34	0·03		
4 lb. Molasses	3·0	0·04	..	2·29	..		
	26·0	2·26	0·38	9·66	2·97	15·3	1 ÷ 5·5

RATIONS FOR DAIRY COWS—*continued.*

RATIONS PER 1,000-LB. COW YIELDING 25 LB. MILK—*continued.*

—	Dry Matter.	Digestible Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbohydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
5—							
42 lb. Sorghum Silage ..	10·7	0·38	0·08	3·06	2·06		
9 lb. Lucerne Chaff ..	8·3	1·39	0·06	2·49	0·75		
7 lb. Maize Meal	6·0	0·35	0·21	4·20	0·07		
	25·0	2·12	0·35	9·75	2·88	15·1	1 ÷ 6·3
6—							
35 lb. Sorghum Silage ..	8·9	0·31	0·07	2·55	1·71		
5 lb. Lucerne Chaff ..	4·6	0·77	0·03	1·38	0·42		
6 lb. Wheat Chaff	5·3	0·12	0·05	1·56	0·96		
2 lb. Linseed Oil Meal ..	1·8	0·44	0·15	0·63	0·09		
3 lb. Pollard	2·7	0·41	0·09	1·62	0·06		
3 lb. Rice Meal	2·7	0·20	0·28	1·50	0·06		
	26·0	2·25	0·67	9·24	3·30	15·5	1 ÷ 6·2
7—							
65 lb. Green Maize	11·7	0·65	0·19	3·90	2·01		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
7 lb. Maize Meal	6·0	0·35	0·21	4·20	0·07		
	25·1	2·24	0·45	10·32	2·75	15·7	1 ÷ 6·3
8—							
54 lb. Green Maize	9·7	0·54	0·16	3·24	1·67		
10 lb. Wheat Chaff	8·7	0·21	0·09	2·61	1·57		
3 lb. Maize Meal	2·6	0·15	0·09	1·80	0·03		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
2¾ lb. Cotton Seed Meal (decorticated)	2·5	0·96	0·17	0·54	0·06		
	26·1	2·23	0·56	9·40	3·43	5·6	1 ÷ 6·3
9—							
30 lb. Maize Silage	9·0	0·30	0·09	3·21	1·56		
5 lb. Good Bush Hay ..	4·6	0·14	0·03	1·20	1·13		
4 lb. Cowpea Chaff ..	3·6	0·45	0·07	0·76	0·54		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
3 lb. Cocoanut Cake ..	2·6	0·40	0·21	1·19	0·20		
1 lb. Blood Meal	0·9	0·67	0·01	0·05	..		
	25·1	2·21	0·56	9·41	3·48	15·6	1 ÷ 6·4
10—							
35 lb. Maize Silage	10·5	0·35	0·10	3·75	1·82		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
7 lb. Barley Meal	6·2	0·65	0·06	4·27	0·21		
	24·1	2·24	0·21	10·24	2·70	15·4	1 ÷ 6·0
11—							
80 lb. Green Paspalum ..	20·0	1·20	0·16	5·60	4·96		
6 lb. Lucerne Chaff ..	5·5	0·93	0·04	1·67	0·50		
	25·5	2·13	0·20	7·27	5·46	15·0	1 ÷ 1·6

RATIONS FOR DAIRY COWS—*continued.*

RATIONS PER 1,000-LB. COW YIELDING 25 LB. MILK—*continued.*

—	Dry Matter.	Digestive Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
12—							
67 lb. Green Paspalum ..	16·5	1·00	0·13	4·69	4·15		
3 lb. Maize Meal	2·6	0·15	0·09	1·80	0·03		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
2 lb. Cotton Seed Meal (decorticated)	1·8	0·70	0·13	0·39	0·04		
	23·5	2·22	0·40	8·09	4·32	15·0	1 ÷ 6·0
13—							
100 lb. Sudan Grass	22·0	1·50	0·10	7·50	3·80		
4½ lb. Lucerne Chaff ..	4·1	0·70	0·03	1·25	0·37		
	26·1	2·20	0·13	8·75	4·17	15·3	1 ÷ 6·0
14—							
100 lb. Sudan Grass	22·0	1·50	0·10	7·50	3·80		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
1 lb. Cotton Seed Meal (decorticated)	0·9	0·35	0·07	0·19	0·02		
	25·5	2·22	0·22	8·90	3·92	15·3	1 ÷ 6·0
15—							
50 lb. Sudan Grass	11·0	0·75	0·05	3·75	1·90		
8 lb. Wheat Chaff	7·0	0·16	0·07	2·09	1·29		
4 lb. Lucerne Chaff ..	3·7	0·62	0·02	1·11	0·33		
3 lb. Maize Meal	2·6	0·15	0·09	1·80	0·03		
2 lb. Linseed Oil Meal ..	1·8	0·44	0·15	0·63	0·09		
	26·1	2·12	0·38	9·38	3·64	15·5	1 ÷ 6·5
16—							
20 lb. Green Oats	4·6	0·28	0·08	1·30	0·98		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
10 lb. Wheat Chaff	8·8	0·21	0 09	2·61	1·61		
3 lb. Cocoanut Cake ..	2·6	0·40	0·22	1·19	0·20		
3 lb. Molasses	2·3	0·03	..	1·72	..		
	25·7	2·16	0·45	9·04	3·46	15·1	1 ÷ 6·3
17—							
25 lb. Green Barley.. ..	5·2	0·45	0·10	1·50	1·07		
13 lb. Wheat Chaff	11·4	0·27	0·11	3·40	2·10		
6 lb. Lucerne Chaff ..	5·5	0·93	0·04	1·67	0·50		
2 lb. Linseed Oil Meal ..	1·8	0·44	0·15	0·63	0·09		
3 lb. Molasses	2·3	0·03	..	1·72	..		
	26·2	2·12	0·40	8·92	3·76	15·2	1 ÷ 6·4
18—							
60 lb. Sugar-cane Tops ..	16·8	1·02	0·18	5·64	3·90		
10 lb. Cowpea Chaff ..	9·2	1·12	0·19	1·90	1·35		
	26·0	2·12	0·37	7·54	5·25	15·3	1 ÷ 6·4

RATIONS FOR DAIRY COWS—*continued.*

RATIONS PER 1,000-LB. COW YIELDING 25 LB. MILK—*continued.*

—	Dry Matter.	Digestible Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
19—							
50 lb. Sugar-cane Tops ..	14·0	0·85	0·15	4·70	3·25		
30 lb. Green Cowpea ..	6·6	0·48	0·09	2·19	0·84		
5 lb. Lucerne Chaff ..	4·6	0·77	0·04	1·38	0·42		
	25·2	2·10	0·28	8·27	4·51	15·2	1 ÷ 6·3
20—							
35 lb. Elephant Grass ..	7·0	0·32	0·07	2·03	1·75		
35 lb. Imphee	7·0	0·42	0·07	2·03	1·15		
8 lb. Lucerne Chaff ..	7·4	1·24	0·05	2·22	0·67		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
	25·8	2·23	0·34	9·28	3·62	15·5	1 ÷ 6·1
21—							
35 lb. Elephant Grass ..	7·0	0·32	0·07	2·03	1·75		
35 lb. Imphee	7·0	0·42	0·07	2·03	1·15		
10 lb. Pumpkins	1·7	0·15	0·06	0·80	0·16		
7 lb. Lucerne Chaff ..	6·4	1·08	0·04	1·95	0·58		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
	26·5	2·22	0·39	9·81	3·69	16·1	1 ÷ 6·4
22—							
65 lb. Mixed Pasture (average)	13·0	0·57	0·13	3·77	3·26		
9 lb. Lucerne Chaff ..	8·3	1·39	0·05	2·50	0·75		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
	25·7	2·21	0·33	9·27	4·06	15·8	1 ÷ 6·3
23—							
15 lb. Poor Bush Hay ..	14·0	0·21	0·08	2·77	3·03		
10 lb. Pumpkins	1·7	0·15	0·06	0·80	0·16		
5 lb. Lucerne Chaff ..	4·6	0·77	0·03	1·38	0·42		
7 lb. Maize Meal	6·1	0·35	0·21	4·20	0·07		
1 lb. Blood Meal	0·8	0·66	0·02	0·06	..		
	27·2	2·14	0·40	9·21	3·68	15·4	1 ÷ 6·4
24—							
65 lb. Prairie Grass ..	15·1	1·95	0·26	4·29	2·75		
5 lb. Wheat Chaff	4·4	0·10	0·04	1·30	0·80		
5 lb. Maize Meal	4·4	0·25	0·15	3·00	0·05		
1 lb. Molasses	0·7	0·01	..	0·57	..		
	24·6	2·31	0·45	9·16	3·60	15·5	1 ÷ 5·9

It has been mentioned before that better results are obtained from rations composed of a variety of feed ingredients than from a ration made up with only one or two feedstuffs.

A very convenient method is to have on hand a quantity of the concentrates already mixed, and then to feed a certain quantity of this mixture with the roughage that is being used, increasing the quantity of the mixture used until it is noticed that no further increased milk production is obtained. An example of this procedure has been published in the "Live Stock Bulletin" under the heading of "4-2-1" plan; this meaning that a concentrate mixture is made of four parts maize meal, two parts

ground oats, and one part linseed meal. The above mentioned paper recommends the following:—3 lb. of silage and 1 lb. of legume hay for every 100 lb. of the animal's body weight, and to gradually increase the amount given of the concentrate mixture until the cow is getting 1 lb. for every 5 lb. of milk produced. Thus a 1,000-lb. cow, yielding 25 lb. of milk, would be given a ration of 30 lb. maize silage, 10 lb. lucerne hay, and 5 lb. of the concentrate mixture—containing 2.26 lb. digestible crude protein and 13.6 lb. total digestible nutrients. This ration has the amount of digestible crude protein required by the Henry and Morrison standard, but has a somewhat lower amount of total digestible nutrients. Other concentrates can be used in this convenient manner.

For instance, a concentrate mixture could be prepared by mixing eight parts maize meal, one part bran, and one part cotton seed meal. This mixture would have the following composition:—

—	Dry Matter.	Digestible.			
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.
	Lb.	Lb.	Lb.	Lb.	Lb.
1 lb. Concentrate Mixture	0·87	0·088	0·032	0·539	0·014
5 lb. Concentrate Mixture	4·3	0·44	0·16	2·69	0·07

If 4 lb. maize silage and 1 lb. lucerne chaff be used for every 100 lb. live weight, and 1 lb. of the above concentrate mixture for every 5 lb. of milk produced, the following will be the ration for a 1,000-lb. cow yielding 25 lb. of milk:—

—	Dry Matter.	Digestible.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
40 lb. Maize Silage	12·0	0·40	0·12	4·27	2·08		
10 lb. Lucerne Chaff	9·2	1·55	0·07	2·77	0·84		
5 lb. Concentrate Mixture ..	4·3	0·44	0·16	2·69	0·07		
	25·5	2·39	0·35	9·73	2·99	15·5	1 ÷ 5·6

The amount of digestible crude protein is a little higher in this ration than is required by the standard.

The following extracts from the "Agricultural Gazette" of New South Wales, December, 1927, are given as an illustration of what complete feeding, when combined with high milk-producing power, can accomplish:—

"On 15th October, 1927, Wagga Gladys, the seven-year old Jersey cow of the Hawkesbury Agricultural College herd, completed 365 days' official test for a yield of 20,835 lb. milk, with an average test of 5.52 per cent. and 1,149.385 lb. butter fat, which is equivalent to 1,384.8 lb. commercial butter. This is an official world's record for both milk and butter fat production for the Jersey breed. It was achieved on twice-a-day milking, whereas all the great records in other countries have been made on three and four milkings a day. Wagga Gladys calved on 9th November, 1926, and on the day of her last periodical test she yielded 53.5 lb. milk and 3.694 lb. butter fat in twenty-four hours."

The following is extracted from the "Agricultural Gazette" of New South Wales, October, 1927, and shows the ration fed to Wagga Gladys, together with the record of her 273 days' performance:—

"On her present lactations as a seven-year-old, which is still in progress, she has produced for the first nine-months' period 15,951 lb. milk, of 5.3 per cent. test, 839.814 lb. butter fat, being equal to 1,011.8 lb. commercial butter. . . . On the hypothesis that feeding must be linked with breeding to secure high production, an indication of the ration fed to Wagga Gladys may be given.

"*Concentrates.*—The following mixture was fed daily at the rate of 1 lb. to every 3½ lb. milk produced:—300 lb. maize meal, 200 lb. bran, 100 lb. crushed oats, 50 lb. linseed meal. During March and April the mixture was altered by the substitution of 25 lb. cotton seed meal for 25 lb. of the linseed meal.

"*Bulk Ration.*—The daily bulk ration consisted of:—25 lb. maize silage, 10 lb. lucerne chaff (of poor quality during May), 3 lb. bran, and 1½ lb. linseed meal. During March and April half the linseed meal was replaced by an equal amount of cotton seed meal. During the latter half of the month of March the silage was replaced by an equal amount of green corn stalks chaffed.

"*Grazing.*—The pastures were very poor, except after the Easter rain. In December, Wagga Gladys was grazed on a poor stand of green lucerne for two days prior to test. In January, she was grazed on green lucerne for two hours daily for a week previous to test. In February, March, and April, she was grazed on green lucerne for two hours daily, and in May and June for one hour daily. In July, green oats were given for a week previous to the test; Gladys and the whole herd went off in butter fat yield this month, and the green oats were blamed. In August, she was grazed on green lucerne for two hours daily."

It will be interesting to compare the above mentioned cow's milk production and her feeding, with the standard used in computing the examples of rations previously given. The weight of Wagga Gladys is not known, and though it may not be 1,000 lb. live weight, this figure will be used for the sake of comparison.

The cow produced 15,951 lb. milk in 273 days—that is, 58.4 lb. of milk per day, of 5.3 per cent. fat. Using the minimum requirements of the standard the cow should receive 4.32 lb. digestible crude protein and 29.7 lb. total digestible nutrients.

The cow produced on an average 58.4 lb. of milk per day, and it is stated that for every 3½ lb. of milk produced 1 lb. of the mixed concentrate was given, therefore, 16.6 lb. mixed concentrate was fed daily. The following is the total ration fed:—

	Dry Matter.	Digestible Nutrients.				Total Digestible Nutrients.	Nutritive Ratio.
		Crude Protein.	Fat.	Carbo-hydrates.	Fibre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	
Bulk Ration—							
25 lb. Maize Ensilage ..	7·5	0·25	0·07	2·67	1·30		
10 lb. Lucerne Chaff ..	9·2	1·55	0·07	2·77	0·84		
3 lb. Bran	2·6	0·37	0·05	1·21	0·10		
1·5 lb. Linseed Meal ..	1·3	0·33	0·11	0·47	0·06		
16·6 lb. Mixed Concentrate	14·6	1·50	0·52	8·20	0·37		
	35·2	4·00	0·82	15·32	2·67	22·8	1 ÷ 4·9
Allowing 10 lb. Green Lucerne for one hour's grazing ..	2·4	0·32	0·04	0·63	0·29		
	37·6	4·32	0·86	15·95	2·96	24·0	1 ÷ 4·83
Or Allowing 20 lb. Green Lucerne for two hours' grazing	4·8	0·64	0·08	1·26	0·58		
	40·0	4·64	0·90	16·58	3·25	25·4	1 ÷ 4·7

It will be seen that the digestible crude protein, 4.32 lb., agrees with that required by the standard, and that the amount of total digestible nutrients of this ration is somewhat lower.

Answers to Correspondents.

Mammitis.

W.B. (Millaa Millaa, N.Q.)—

Mr. Veterinary Surgeon Rudd advises that it is possible for a dry cow turned out quite free from mammitis to come in a few weeks later badly infected with the complaint. It is more likely, however, that she was infected before going out and that it was not noticeable. It is hardly likely that she would be infected in the paddock under the conditions mentioned, but if the camp which she frequented were infected, then it may be possible, but not probable. The possibility of tubercular mammitis has to be considered. This aspect of the case is fairly typical of tubercular mammitis.

BOTANY.

A Species of Dodder.

The following replies have been selected from the heavy outward mail of the Government Botanist, Mr. C. White, F.L.S.:—

H.T.R. (Jondaryan)—

Your specimen is *Cuscuta australis*, a species of Dodder. It is a parasite in Queensland on various weeds, &c. It is not, however, very particular as to its host and often attacks garden plants and agricultural crops. It is not uncommon about Brisbane, mostly on Smart Weeds (*Polygonum* spp.) in wet places, but we have had specimens submitted this season as parasitic on Chrysanthemum and other garden plants. For this reason it is not a suitable plant to propagate for weed destruction.

"Hairy Indigo."

T.K. (Goodwood)—

Your specimen is *Indigofera hirsuta*, the Hairy Indigo, a fairly common plant in Queensland and extending through to India. In Queensland it is most common along railway cuttings or where the ground has been disturbed, but is not confined to such situations, being sometimes found as a weed in the general pasture. Several of the same genus have been accused of being poisonous, but though the present species is fairly common here and abroad, it is not known to possess any harmful properties.

"Corn-Beef Wood."

L.H. (Brandon, N.Q.)—

The specimen is *Barringtonia calyptrata*, a native tree fairly common in North Queensland, particularly from Cairns north to Port Douglas. In the latter place the wood is used for fruit cases, though regarded as rather heavy. It is known as "Corn-beef Wood," because it is said to have an odour of corn-beef when freshly cut. It also occurs in New Guinea. The fruit is not edible.

Native Fodder Trees.

J.B. (Noumea, New Caledonia)—

We have no trees on hand at present of native fodder trees, but have seeds of a couple of species that are grown extensively here and thought highly of as fodders, viz., *Celtis sinensis*—miscalled here "Portugese Elm"—and *Phytolacca dioica*, the Portulacca or Bella Sombra tree. The latter is an exceptionally quick-growing species. When a fair size it is pruned every year and the prunings used for fodder. Both trees should do well on your west coast. The seeds of the Phytolacca will have to be freed from the sweet pulp with which they are surrounded.

Star Burr, a Noxious Weed—Fruiting Carob.

J.F. (Laidley)—

Your specimen is the Star Burr (*Acanthospermum hispidum*), gazetted a noxious weed throughout the State. The weed is very bad in North Queensland and covers large areas of country on the coast and along the river-flats in the Gulf country. We noticed a few plants about Laidley some years ago, but the plant does not seem to spread here anything like it does from, say, Townsville northwards.

The only explanation we can see for your Carob fruiting is that one or two of the female flowers have become fertilised from other trees in the same district. There are, we think, a few trees planted about Laidley. We have not seen them there, but have received specimens once or twice from Laidley for determination.

Atherton Flora Identified—A Poisonous Plant.

N.A.R.P. (Townsville)—

1. *Gastrolobium grandiflorum*. Heart-leaf Poison Bush, Wall-flower Poison, or Desert Poison. One of our worst poisonous plants. It varies somewhat in the leaf shape.

2. *Eucalyptus clavigera*.

3. The eucalypts are—
   Bloodwood—*Eucalyptus corymbosa*.
   Ironbark—*Eucalyptus crebra*.
   Cabbage Gum or Pudding Gum—*Eucalyptus papuana*.
   Silver-leaved Ironbark—*Eucalyptus malanophloia*.
   Moreton Bay Ash—*Eucalyptus tessellaris*.
   Poplar Gum—*Eucalyptus alba*.
   Scented Gum—*Eucalyptus citriodora*.
   Gray Box—*Eucalyptus leptophleba*.

A Rhodes Grass Ally.

G.B. (Drillham)—

Your specimen is *Chloris virgata*, a very close ally of the Rhodes Grass, but is not as palatable to stock as that species, and is an annual, not a perennial, grass. It is fairly well established in many parts of Queensland, and its light seeds tend to give the grass a wide range.

Pine Tree Propagation.

F.E.J. (Pittsworth)—

Reference your query on the propagation of the Aleppo Pine (*Pinus halepensis*) and Insignis or Remarkable Pine (*Pinus insignis*), these plants are easily raised from seed. Get ripe cones and extract the seeds from between the woody scales; sow these in flats or specially prepared garden beds; thin out if necessary when the seedlings are a couple of inches high, and transplant into permanent positions when anything from 6 inches in height or more. The Insignis Pine does not shed its seeds very freely and the cones remain closed on the trees for years, so you will have to break them open. The cones of the Aleppo Pine open naturally; get those that are commencing to split and extract the seeds.

"Rag Weed."

INQUIRER (Brisbane)—

The specimen of "Horse Weed" from Imbil is *Erigeron linifolius*, commonly known here as "Rag Weed." The name "Cobblers' Pegs" is also given to it, though this name is now more generally applied to another weed—*Bidens pilosa*.

Whitewood.

INQUIRER (Melbourne, Victoria)—

A. hemiglauca is universally known throughout Queensland as "Whitewood." It has a very wide distribution over the whole State. In the South it is

generally regarded as quite a useful fodder tree. In the far west—say, the Georgina River—and central and north-west the young shoots are looked upon as causing "staggers" or "shivers" in working horses, acting in much the same way as *Stachys arvensis*. This has simply been mentioned to us when in the west or has been noted in correspondence, but has never been put on record.

Grasses Identified.

J.M.B. (Pickanjinnie)—Your specimens are—

1. *Iseilema membranacea*. Flinders Grass. The specimen was without seed head, and determination is, therefore, a little doubtful, but I think correct. One of the best known fodder grasses of Queensland.

2. *Eleusine indica*. Crow-foot Grass. A species with a wide distribution over the warmer regions of the globe. It occurs as a weed mostly along cultivation headlands, around cowyards, &c., or, in fact, anywhere where the ground has been disturbed. Like young Sorghum it contains a prussic-acid yielding glucoside, but I have never heard of deaths from it.

3. *Panicum colonum*. Wild Millet. This grass, like the last, grows mostly in cultivation paddocks, &c., also often in wet, swampy situations. It has a wide distribution over the warmer parts of the world. It is looked on as one of the wild forms of such cultivated fodders as Japanese Millet and White Panicum.

4. *Setaria glauca*. Pigeon Grass.

Jambool or Jamum Fruit—Candle Nut.

T.W.A. (Charters Towers)—

(1) The fruit is *Eugenia Jambos*, the Jambool or Jamum Fruit, a native of India. The fruit is edible.

(2) The nut is *Aleurites moluccana*, the Candle Nut. A large tree with a wide distribution from the East Indies, through Australia, to the Pacific. The nuts are commonly eaten without ill effects, but are always dangerous, often causing severe gastric troubles, though I know of no cases of deaths from eating them. The oil of the seeds is a drying oil, and can be used in the same way as linseed oil in the manufacture of paints, varnishes, linoleums, &c.

"Lambs' Tails"—Castor Oil Plant—Thorn Apple.

H.C.P. (Fernvale)—

The specimen is *Boussingaultia baselloides*, a climbing plant, native of South America, and commonly grown in gardens as an ornamental creeper under the name of "Lambs' Tails." It is allied botanically to the salt-bushes, and is not known to possess any poisonous properties.

The seeds of the true Castor Oil plant are poisonous; this plant is naturalised in Queensland. A plant known commonly, though erroneously, as Castor Oil plant in various parts of Queensland is the Thorn Apple or Stramonium (*Datura Stramonium*), a bad weed in Queensland, and the whole plant, particularly the seeds, is very poisonous. If either plant is growing on your place and the fowls have eaten the seeds they are the cause of your trouble.

"Balloon" or "Cape Cotton."

Inquirer (Cabarlah)—

The specimen is *Gomphocarpus fruticosus*, the Balloon or Cape Cotton, a native of South Africa and a common naturalised weed in Queensland. It is sometimes grown as a curiosity in gardens, but can become a most aggressive weed. In some districts, such as along the North Coast, it overruns the pastures to the exclusion of other plants, particularly over newly fallen scrub land. It is practically untouched by stock, but is reputed poisonous and belongs to a poisonous family, the Asclepiadaceæ. The silk-cotton within the pods has some value as a kapok, but the collection here would be far from a paying proposition. The stem has a strong fibre.

PIG RAISING.

The following replies have been selected from the outward mail of the Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—

A Point in Pig Practice.

W.H.S. (Miva)—

Never place a sick pig in a pen with other healthy ones, as the risk of infection is too great. Pigs are not valuable enough to take risks with; it is better to cull out immediately and get rid of unsatisfactory sorts and put the feed into more healthy, growthy animals.

Artichokes for Planting—Gloucester Old Spot.

C.A.S. (Kairi, N.Q.)—

(1) The principal difficulty experienced by seed merchants in regard to stocking artichokes is that it is difficult to keep these tubers during the off season. They require to be stored in moist sand and be kept in a comparatively cool spot in order to maintain them in good condition for planting when planting time arrives. Most of the seedsmen have not the conveniences for storing them, and as the demand is limited they do not bother.

(2) We have not had sufficient experience with the G.O.S. breed in this country yet to be able to definitely place them ahead of the Tamworth, Berkshire, or similar well-known breeds and types. They certain appear to be well worth trial, and you could obtain further local experience from Mr. C. W. Roseblade, of Yungaburra, who has been using the G.O.S. type now for several years.

Poland-Chinas—Duroc-Jerseys.

H.S. (Ardlethan, N.S.W.)—

(1) The Poland-China breed has a tendency to fatten very readily and, unless carefully handled, the resulting product is overfat and realises less in comparison than prime, fleshy pigs would. However, with proper care and management and the provision of abundant supplies of green food, there seems to be no reason why the Poland-China should not prove an excellent type for cross-breeding with grade sows of superior type and quality.

(2) As to whether the Duroc-Jersey is superior to the Poland-China or Tamworth-Berkshire cross for quick-maturing porkers is largely a matter of opinion. So far, in Australia, we have had no opportunity of testing out these breeds in competition one with the other.

Points in Feeding—A Bad Practice.

INQUIRER (Northern Downs)—

You are making a great mistake in feeding to your pigs without boiling or other treatment milk from cattle suffering from Contagious Mammitis. The feeding of uncooked milk or flesh to pigs from cattle suffering from diseases of any description is invariably the cause of trouble amongst the pigs and, as you will note, prevention of such troubles can only be brought about by absolutely discarding the milk or flesh from diseased stock, or, if this is not possible, thoroughly boiling these foods before they are utilised for pig feed. The germs of mammitis appear to have their natural home in the mammary glands of the female, and apparently these germs thrive equally as well in the mammary glands of cattle and pigs. In your attempt to rid your pigs of disease, attention must be given to the matter of feeding. It is waste of time giving the pigs medicine unless the conditions in regard to feeding are attended to.

It is apparent that some of your pigs have been fed too heavily on fattening foods. These would be the pigs which, whilst seemingly fat and healthy, suddenly go away and mope on their own and appear very ill.

Though this may not be classified by the veterinarian as heat apoplexy, it is a condition brought about largely by exposure of over-fat animals to abnormal weather conditions.

It appears that numbers of the pigs have been suffering from constipation and bowel disorders. This is indicated by the fact that the animal to which you have given a good dose of castor oil rapidly improved. Constipation is responsible for a great number of ills to which stock of all descriptions are liable. Attention must, therefore, be given to the supply of succulent green food and, where necessary, to medicines like castor oil or the more rapidly acting purgative, Epsom salts.

Sweet Potato Vines as Pig Food.

A.E.S. (Landsborough)—

We have no definite record of any ill effect resulting to pigs fed with a proportion of Sweet Potato Vines mixed with their other food. It is certainly not advisable to attempt to force pigs to consume more vines than they care to eat at each meal by refusing to give them other more concentrated foods like the Sweet Potato itself, corn, lucerne, milk, or other foods. Any attempt to force pigs to live on Sweet Potato Vines would certainly be disastrous, for the proportion of indigestible fibre in them is very high, while the food value itself is very low. Pigs turned on to a patch of Sweet Potatoes and that had opportunity of consuming both the tubers and the vines would suffer no ill effect, providing they had ample water, suitable accommodation, and some grain. If it is not convenient to feed the crop in this way, a proportion of vines may be utilised as green food, preferably after the animals have been fed their ordinary ration each day. The vines themselves are not poisonous, hence there is no necessity to refuse the animals a proportion as suggested above.

Western Trees.

M.F. (Brisbane)—

The "Flooded Gum" of Tambourine, so far as we know, does not grow west of the Main Range, though it is common along the coast from the Tweed northwards to Cairns. It is not confined to mountains, but often grows on flats inclined to be flooded; hence the name. There are many western trees you could use for your purpose—the River Red Gum—magnificent trees with white boles, splashed with red or green—along all the western rivers; the Coolibah—smaller, but along rivers and flats; the Bimble Box, Yellow Box, and Ribbon Box—all western trees. The Brigalow and Beelah, which form inland scrubs. The Whitewood, the Wilga, and the Gruie or Emu Apple—all good fodders and small, but beautiful shade trees.

Honey Bean.

G.C. (Swan Creek, Warwick)—

The tree widely planted on the Downs and known as Honey Bean is *Gleditschia triacanthos*, a native of North America, widely planted in temperate countries everywhere as an ornamental tree. The beans are used as cattle fodder, and the sweetish pulp in the pods is freely eaten by children wherever the trees grow. If a child were to swallow the seeds mechanical injury might follow, but the pods are certainly not known to possess any poisonous character.

Wild Millet.

C.J.G. (Toowoomba)—

Your specimen is *Panicum colonum*, commonly known here as "Wild Millet." It is a grass with a very wide distribution over the warmer parts of the world, and is supposed to be one of the parents of such fodders as Japanese Millet and White Panicum. It is an annual, and in Queensland is mostly seen either as a weed in fallows, along cultivation headlands, &c., or in wet, swampy situations.

SHEEP AND WOOL.

Abstracts from the outward correspondence of the Assistant Instructor in Sheep and Wool, Mr. J. Carew.

Sheep Drench.

C.C. (Mungallala)—

The bluestone and mustard drench recommended by this Department is as follows:—

1 lb. bluestone, avoirdupois (sulphate of copper).
1 lb. mustard (fresh).
10 gallons rain water.

Dose for grown sheep, 4 fluid oz.; for 9 to 15 months, 3 fluid oz.; for lambs, 2 fluid oz.

The bluestone should be in clear blue crystals having no white crust. Dissolve the bluestone in a wooden or enamelled vessel. Mix the mustard in a small quantity of water to get it to a damp paste, then add to the bluestone water and make up to the desired strength. The drench should not be brought into contact with iron or metal. If the animal coughs while dosing, stop pouring the drench and lower the head at once, as it is likely to get in their lungs and cause trouble or perhaps death. Give the same treatment to sheep both before and after drenching with arsenic, except to those sheep that are weak and cannot stand the starving, or in time of drought when sheep are actually starving in the paddocks, when they should be kept away from water for several hours before and a few hours after drenching. One drench of bluestone to 3 of arsenic is recommended.

QUEENSLAND SHOW DATES.

The following show dates have been listed by the Queensland Chamber of Agricultural Societies for the present year:—

MARCH.	
Goombungee	23-24
Goondiwindi	21-22
Killarney	27-28
Chinchilla	27-28
Milmerran	29
APRIL.	
Pittsworth	3
Clifton	11-12
Toowoomba	16-19
Kingaroy	19-20
Dalby	26-27
Nanango	26-27
MAY.	
Beaudesert	2-5
Taroom	2
Maleny	2-3
Longreach	2-3
Kalbar	2
Charleville	2-3
Wondai	3-5
Oakey	4
Mitchell	8-9
Mundubbera	9-10
Boonah	9-10
Murgon	10-12
Blackall	8-10
Roma	15-16
Gayndah	16-17
Ipswich	16-18
Springsure	16-17
Wallumbilla	22-23
Biggenden	24-25
Toogoolawah	25-26
JUNE.	
Marburg	2-4
Childers	2-6
Lowood	8-9
Bundaberg	7-9
Wowan	7-8
Miriam Vale	13-14
Gladstone	20-21
Mount Larcom	22-23
Gatton	28-29
Rockhampton	27-30
JULY.	
Mackay	3-5
Kilcoy	5-6
Esk	13-14
Townsville	10-12
Woodford	12-13
Nundah	14
Charters Towers	18-19
Caboolture	19-20
Ingham	20-21
Rosewood	20-21
Charters Towers	18-19
Laidley	25-26
AUGUST.	
Bowen	1-2
Royal National	6-11
Crow's Nest	22-23
Coorparoo	25

General Notes.

Canary Seed Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Act empowering the Canary Seed Board to borrow money and give the necessary security.

Staff Changes and Appointments.

The appointments as Inspectors under the Diseases in Stock Act of Messrs. James Bishop, Ravensbourne, and N. C. Copeman, Helidon, have been confirmed, as from the 22nd August, 1927.

Messrs. S. C. Smith (late of Wandal, Rockhampton) and Archibald Dick (late of Purga) have been appointed Inspectors of Slaughterhouses, as from the 20th February, 1928.

Mr. S. E. Stephens, Inspector under the Diseases in Plants Acts, at present stationed at Innisfail, is to be transferred to Cardwell, as from the 23rd March, 1928.

The Officer in Charge of Police, Kumbia, has been appointed an Acting Inspector of Stock, as from the 1st March, 1928.

Mr. M. J. Hickey, Clerk of Petty Sessions, Cairns, has been appointed to act as Chairman of the Babinda and Hambledon Local Sugar Cane Prices Boards during the absence of Mr. A. H. O'Kelly, Police Magistrate.

The following have been appointed Honorary Officers under the Animals and Birds Acts:—

Mrs. W. M. Mayo, Secretary of the Nature Lovers' League of Queensland; Mr. J. H. Grice, Southport; Mr. J. W. Troyahn, Southport; Mr. J. W. Proud, Southport; Mr. J. C. Tuesley, Southport; Mr. W. H. Gould, Southport; and Mr. J. D. Maddox, Gap View, *viâ* Kalbar.

Mr. A. V. Wilson, of Waterloo, *viâ* Yandaran, has been appointed an Honorary Inspector under the Diseases in Plants Acts.

The resignation has been accepted of Mr. A. H. Warner, of Talwood Station, Talwood, as Acting Inspector of Stock, as from the 18th February, 1928.

Mr. J. E. James, of Myer's Ferry, Southport, and Mr. H. C. Fenn, lodgekeeper, Government House, have been appointed officers under the Animals and Birds Acts, as from the 1st March, 1928.

Constable J. H. Daley, of Mourilyan, has been appointed Inspector of Slaughterhouses, as from the 17th February, 1928.

The transfer has been approved of Mr. D. J. Callaghan, Inspector under the Dairy Produce Acts, from Brisbane to Mundubbera.

Messrs. F. C. Anderson ("Hazlebrook," Booinbah, Goomeri) and J. J. McLachlan (Poultry Inspector, Department of Agriculture and Stock, Brisbane) have been appointed Officers under the Animals and Birds Acts, as from the 17th March, 1928.

The following Police Constables have been appointed Inspectors of Slaughterhouses:—F. F. W. Jahnke, Cordalba; J. M. O'Malley, Sapphire; and Frank Dawson, Marmor.

The following transfers of Inspectors of Slaughter-houses have been approved:—Mr. G. R. L. Anderson, to be attached to Brisbane; Mr. A. Dick, to be attached to Ayr; Mr. S. C. Smith, to be attached to Mareeba; Mr. R. T. Cridland, to be transferred from Mareeba to Bundaberg; and Mr. W. A. D. Davidson, to be transferred from Bundaberg to Brisbane.

Tractor School at Gatton.

The tractors likely to be used at the Fifth Queensland Tractor School this month at Gatton College are—Advance (crude oil), Case, Caterpillar, Fordson, Cletrac, Hart Parr, McCormick Deering, Peterbro', Ronaldson-Tippett, Twin City, and Wallis.

The Parker Producer Gas Company have been cabled to, asking that one of their producers for a Fordson tractor be made available, if possible; and the Migration Department, which, it is understood has been testing such a plant with trucks, has been asked to make the plant available for demonstration at the Tractor School.

Government House Grounds Declared a Sanctuary.

The grounds surrounding Government House, Paddington (portion 223 and subdivision 1 of portion 291, parish of Enoggera, county of Stanley, area 41 acres 3 roods 9.7 perches), have been declared a Sanctuary under the Animals and Birds Acts.

A Pest Destroyer—Copper Dust.

A regulation has been issued under the Pest Destroyers Act providing for the addition of copper dusts to the list of pest destroyers under the Act.

This pest destroyer is defined as—"Copper salts, as copper carbonate and other copper compounds, in the form of fine, dry dust for the treatment of wheat against bunt." It must contain not less than 50 per cent. of metallic copper, and be of such fineness as to permit of 95 per cent. passing through a sieve of 200 meshes to the linear inch.

Success.

"There is another form of success within the reach of ordinary mortals, not indeed as the outside world understands and uses the word, but from the individual's own point of view; it is to preserve your own peace of mind and respect by the consciousness of honest work well done, and duty carried out without fear or favour, in making others better and happier in body and mind, and by freedom from discomfort and regrets for any action mean and contrary to the golden rule to 'do unto others as you would they should do unto you.' "—Sir Humphry Rolleston, in the "Lancet."

Custard Apple Levy.

A regulation has been issued under the Fruit Marketing Organisation Acts extending the Custard Apple Levy Regulations passed last year.

This levy is at the rate of one halfpenny per half-bushel case of custard apples, and will operate from the 1st March, 1928, to the 28th February, 1929. It will be collected by means of levy stamps, which are obtainable from the Head Office of the Committee of Direction of Fruit Marketing, Brisbane. These stamps are to be affixed to account sales, credit notes, or any other document giving evidence of the sale of custard apples. Agents who affix these stamps are entitled to deduct the value thereof from the money payable to the custard apple growers concerned.

The object of the levy is to enable the custard apple growers of Queensland to carry out an extensive advertising scheme to popularise the custard apple in the South.

Oil from Coal.

The promotion of a £10,000,000 scheme in Great Britain for the extraction of smokeless fuel and oils from coal at the pithead has been announced. It was stated by Sir Arthur Wheeler, Bt., at the recent annual meeting of Low Temperature Carbonisation, Limited, that for the first time the low temperature carbonisation process is completely successful, both from the technical and commercial standpoints. The four objects attained by the process were: (1) The obviation of the enormous loss due to the burning of raw coal in an open grate; (2) the production of a fuel (coalite) as bright as coal, but smokeless; (3) the extraction of oil (including petrol) and gaseous products, retaining their chemical and physical properties at their highest possible value; (4) the utilisation of small coal (slack) which constitutes so large a percentage of the total output of many collieries.

Butter Board Election.

The election for the return of two members for Divisions Nos. 1 and 6 for the Butter Board resulted as follows:—

Division No. 1 (North Queensland)—	
William James Sloan, Malanda	187 votes
Walter Scott, Peeramon	89 votes
Division No. 6 (Gympie to Kingston)—	
Thomas Flood Plunkett, Beaudesert	1,238 votes
Edwin Brabiner, Gympie	575 votes

Messrs. Sloan and Plunkett, the retiring members, have therefore been re-elected, and together with the other four members will hold office until the 30th June, 1931.

For the Divisions Nos. 2, 3, 4, and 5, Messrs. J. L. Wilson, James McRobert, James Purcell, and Charles Henry Jamieson, respectively, were returned unopposed.

Fertilisers from the Dead Sea.

Queensland Light Horsemen who fought in Palestine and endured campaign rigors in the Jordan Valley will be interested in the press reports that indicate that the Imperial Chemical Industries, Limited, a huge British chemical combine, of which Sir Alfred Mond is the head, has secured concessions which will enable it to extract valuable fertilisers, &c., from Dead Sea water, Palestine.

Atherton Tableland Maize Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Act empowering the Atherton Tableland Maize Board to give, subject to the approval of the Governor in Council, a mortgage over any property to which the Board now is or may hereafter become entitled, or a mortgage or security over any machinery or effects to which the Board now is or may hereafter become entitled, to secure the repayment of any money borrowed by the Board from, or in which it may become indebted to, any person, Government, or corporation.

European Maize Imports.

Official returns of the imports of maize from 1st August, 1927, to 21st January, 1928 (twenty-five weeks), to principal European ports amounted to 20,536,000 quarters (480 lb.), or at the rate of 42,700,000 qr. (480 lb.) per annum (exclusive of trans-frontier imports). The price offering in England at the end of 1927 for f.a.q. maize was from 8s. 6d. to 8s. 9d. per bushel. Great Britain's imports for 1927 show a total of 9,784,075 qr., against 7,416,212 for 1926. The chief consignors were—Argentine, 8,315,939 qr.; South Africa, 466,086 qr.; Roumania, 292,123 qr.

New year cargo sales include Argentine at 38s. for 480 lb., No. 2 South Africa 39s. 6d., and No. 3 39s., while maize meal comes at £10 3s. 9d. per ton for yellow and £9 for white.

Fruit Levy.

Regulations have been issued under the Fruit Marketing Organisation Acts to provide for a levy at the rate of 5d. per ton on all fruit and vegetables grown within a radius of 40 miles from Wallangarra, and railed from any railway station within that area. The railway stations in question will be those between Wallangarra and Dalveen (both inclusive), and from Amiens to Fleurbaix (both inclusive).

This levy will operate from the 27th February, 1928, to the 25th February, 1929, and will be collected in the first instance by the Railway Commissioner. It is to be utilised in the payment of any expenses attaching to the collection of the levy, for making financial grants to the various local producers' associations in the district paying the levy, and the balance to be paid yearly to the Deciduous Sectional Group Committee, to be used by it at its discretion.

These regulations have been approved by the Local Producers' Associations in the Stanthorpe district, by the Deciduous Sectional Group Committee, and by the Committee of Direction of Fruit Marketing.

Canada's Fur Farms.

Fur farming in Canada is developing into a major industry. A report recently issued by the Canadian Government Bureau of Statistics for the year 1926 shows that the total value of the fur-bearing animals on the 2,819 fur farms in Canada was $11,007,530, located on property valued at $14,888,705. Fox farming is the predominant leader in the industry. Of the 2,819 fur farms in Canada 2,517 are fox farms, 107 muskrat, 95 mink, 57 racoon, and 43 are raising other kinds of fur-bearing animals, such as skunk, marten, fisher, chinchilla, and rabbits.

Silver foxes are the aristocrats of Canada's fur farms. In the year under review there were 10,469 silver foxes sold valued at $2,371,480 on the farms, representing an average value of $226. The total number of all other kinds of fur-bearing animals sold was 14,211, valued at $2,276,664. The sale of pelts totalled 16,643, valued at $1,218,111, of which 14,045 were silver foxes, valued at $1,168,020. Canadian fur farmers received from the sale of animals and pelts $3,494,775 in 1926. Silver fox pelts sold for an average price of $83, but some pelts commanded three or four times that figure. Ninety-six per cent. of the total value of the animals on these farms are silver foxes, which are valued at $10,591,054.

Canada's smallest province, Prince Edward Island, leads in the fur-farming industry with animals valued at $3,304,610, on property estimated to be worth $4,305,000. Ontario is next with about half the value in animals that Prince Edward Island has. Quebec holds third place and is not far behind Ontario.

Many of the fur-bearing animals raised on the Canadian farms find a market in the United States.

Butter Pool.

Following on the notice that was issued on the 23rd December last, an Order in Council has now been issued under the Primary Producers' Organisation and Marketing Act, extending the life of the existing Butter Pool from the 1st March, 1928, to the 30th June, 1931.

The Butter Pool is administered by six representatives of growers, together with the Director of Marketing. Each of the representative members is elected by the cream suppliers of the companies and associations in his district, and the election for the Board members takes place on the 28th of this month. Three of the Board members have already been returned unopposed—namely, Mr. J. L. Wilson, of Calliope, for Division No. 2; Mr. James McRobert, of Maryborough, for Division No. 3; Mr. James Purcell, of Toowoomba, for Division No. 4; and Mr. C. H. Jamieson, of Tent Hill, Gatton, for Division No. 5. Elections are being held in the cases of Division No. 1, the candidates being Captain W. Scott, of Peeramon, and Mr. W. J. Sloan, of Malanda; and for Division No. 6, the candidates being Mr. Edwin Brabiner, of Gympie, and Mr. T. Flood Plunkett, of Beaudesert.

Electric Farm Equipment for Drying Grain.

The Swedish Export Journal of January, 1928, states that promising attempts to dry grain by means of electric power have been carried out by the Royal Waterfalls Administration during the past autumn. The method tried was invented by Mr. H. Edholm, an official of the Administration, the latter having placed the funds required for the practical tests at the disposal of the inventor.

The testing equipment had a capacity of about about 8 tons, and consisted of a fan in connection with an injector and a discharge tube, which latter at the upper end opens out on a certain number of inclined boards for the airing of the grain. The air current from the fan forces the grain gradually up through the tube and on to the boards. The latter being inclined at an angle closely approximating the friction angle of the grains, the latter descend slowly towards the silo. The air current used to raise the grain is in the meantime carried off between the boards, and therefore subjects the thin layers of grain on the boards to an effective airing. In this way the grain can be circulated once a day or oftener, according to requirements.

As to the cost, the trial operation shows the consumption of current to be from 2 to 3 p.k.w. per 2 cwt. of grain. It is considered that this method constitutes an excellent and inexpensive means for keeping the grain in good condition on small estates and middling-size farms. Under normal conditions the above operation is sufficient for drying the grain down to 16 or 17 per cent. of water. If a higher degree of dryness is wanted it is, of course, possible to install a steam coil at some suitable point. Further trials will be carried out in order to design a series of standard-size driers of this description.

Organising New Zealand's Pork Export.

An earnest attempt to overcome the marketing problems which confront the export, on a large scale, of New Zealand pork to the British market, is being made by thirteen dairies operating in the South Auckland province, which have joined the New Zealand Co-operative Pig Marketing Association.

The Association realises that the present marketing methods are unsatisfactory, in that the farmer has to accept a price arbitrarily fixed which has no relationship to the true value of the pig.

It therefore aims at marketing bacon and pork carcasses graded for quality of meat and weights to suit export buyers, and, where possible, to send these direct to the wholesale houses in the United Kingdom.

The success of the scheme will necessarily depend entirely on the support accorded by the producers. It is merely an attempt to gain the best returns from pigs, and a good supply of well-finished pigs is essential.

Under the system adopted, complete identification of the pig is established right to the time it is sold, and the producer will therefore be certain of getting his proper weight and full value. As the carcasses will be graded not only for weight, but also for quality, the breeder who feeds properly will obtain better returns than the man who relies solely on his skim milk or whey for feeding.

The Association will not deduct the usual 1s. per carcass for insurance against loss, but will accept liability, and pay for all pigs trucked. In other words, the Association is offering to pig producers a means of eliminating objectionable tactics in the trade, and replacing these by a method which will put the producers in direct touch with the consumers of bacon for no more than the bare handling charges.

Sugar and Alcohol from Cellulose.

A report has been received by the Power Alcohol Section of the British Empire Producers' Organisation of the first tests carried out in a factory in Germany on a commercial scale for using sawdust, straw, sisal waste, and bagasse as raw materials for the production of grape sugar and ethyl alcohol.

The process consists of the saturation by hydrochloric gas, in the presence of catalysts, of the raw materials, and in a period of under one hour the whole of the cellulose content is converted into glucose. This glucose is then treated for the removal of the acid, and can either be sold as cattle food, or refined as pure white glucose for human consumption, or it can be fermented into alcohol for fuel, industrial or potable purposes. As much as 60 per cent. of the weight of the dried sawdust has been obtained in pure sugar, and in the case of straws and other materials higher percentages are obtained.

The development of such a process must have a far-reaching effect in the Dominions and Colonies, where large supplies of raw materials of the kind mentioned are now being wasted, and also in those countries where abundant supplies of grasses and bamboos are available, as these materials are equally suitable for conversion into alcohol.

Various European Governments are investigating the process and the Australian Government has sent a representative. It seems probable that this process in the near future will provide countries with an alternate motor fuel supply to that of petrol.

The Rage for Milking Records.

Opinions are greatly divided among dairy farmers as to the value of forcing cows to heavy production. Many are of opinion that the yields obtained in the official tests are of no value because the heavy feeding with concentrates could not be done by a dairyman carrying on business on commercial lines. Others declare that the forcing of dairy cows in order to establish records is ruinous to the cows.

The recent performance of the Government-owned Jersey, Wagga Gladys, at the Hawkesbury Agricultural College at Richmond (N.S.W.) in yielding 20,835 lb. of milk and 1,149 lb. of butter-fat in 365 days, which is a world's official record for the breed, no doubt will act as an inspiration to breeders to "go one better."

Writing upon this subject, the "Argus" says that this will probably be the undoing of more than one good cow. Deep-milking cattle are required in the majority of Australian herds if dairying is to be made to pay, but heavy production can be, and is being, overdone. Forced feeding impairs the breeding organs, as is proved by the frequency with which cows thus treated will not breed, or abort their calf after carrying it for only a short period. In addition, it induces mammitis, with probably the loss of one or more quarters, and instances are not uncommon in Victoria where good cows have been ruined in this manner.

During the last Melbourne Royal Show, Mr. E. Griffiths, of New Plymouth (N.Z.), who judged the Jerseys, said that although heavy production was what everyone was striving for, Jersey breeders must remember that production alone would not lead to success. The ideal Jersey cow outlined in the standard of perfection was not only the most beautiful cow in the world, but she was the most evenly balanced and the most economical and profitable producer. If breeders depended upon production alone, and ignored type, the cows would quickly lose constitution and the very ideal they were striving for, namely, profitable production. Mr. Griffiths said that he was prompted to make these remarks after watching an auction sale at the show grounds and observing the tendency of the beginner to be unduly influenced by butter-fat records without giving reasonable consideration to type. Type not only depicted the symmetrical, well-balanced outline, but also a well-shaped milk vessel, a capacious body, and a head denoting constitution and nervous energy.

It appears that in the future (says the writer in the "Argus") if breeders of dairy cattle are to increase production, they must obtain constitution and try to recapture some of the hardiness of the old-time animals. Possibly in aiming at super-producers they have lost sight of the fact that to yield well at the dairy, and to keep it up, a cow must possess a robust constitution, and unless she inherits that vital attribute it can never be acquired. It is essential, therefore, to breed cattle with strong constitutions and at the same time not to disregard the importance of breed type. Although refinement of form and bone is desirable, refinement carried to the point of delicacy is to be avoided. Constitution does not necessarily imply excessive bodily development or coarseness, but no animal lacking it will make a satisfactory producer or breeder. The type of cow dairymen should aim at is one that will yield, say, about 400 lb. of butter-fat in a lactation, and produce a strong, healthy calf annually on a reasonable ration. That is the most profitable type, and a glance at the pedigrees of the cows that have been through the Government herd test will show that it is from such cows that the best bulls and heifers are bred.

The Food Value of Kurrajong—And Its Limitations.

Little scrub feeding is being carried out at present, but a sheepowner in the Rankin's Springs district recently found it necessary to resort to it, and in a letter to the New South Wales Department of Agriculture he raised a point of interest to sheepowners generally. Writing on 14th January, he stated:—"I am giving them kurrajong now, and plenty of salt and plenty of water. They are in good condition yet. Some people say kurrajong will kill them; others say it is good for them."

Commenting on the foregoing, an officer of the Sheep and Wool Branch of the New South Wales Department observes that of all scrub fodders kurrajong is the best, and in circumstances such as those indicated it should comprise a quite satisfactory feed, if supplemented by a good laxative lick. It would be preferable, however, at the same time to feed some concentrate, such as grain or linseed nuts. The statement that deaths have been traced to kurrajong would require investigation, account being taken of every possible contributory circumstance, such, for example, as the weather, the condition of the sheep, and (if ewes) their state in relation to lambing. No scrub feed can be considered ideal for ewes very close to lambing, though it is satisfactory until within a certain time of lambing and for short periods. With dry sheep, on the other hand, scrub feeding may be carried out for a much longer time.

The varieties of native scrub and trees available for feeding stock in drought depends on the districts affected. Probably the best known besides kurrajong are wilga, mulga, myall, and willow; others not so palatable but extensively used are apple, box, rosewood, boree, pine, &c. Certain drought-resistant plants, such as saltbush, &c., are not included in this category, since they are the natural sheep food of the western districts. It is a matter of regret, as some stockowners are beginning to realise, that these natural fodders should have been so ruthlessly cut out. Even when being cut for sheep it is noticed that, in some cases, instead of being lopped the trees are felled; thus destroying their future usefulness, not only as food, but as shade and shelter.

But, again let it be borne in mind that these are only emergency fodders. They do not provide a balanced ration, and, while alone they may keep up the health of stock for a limited period, eventually condition will be lost and signs of digestive disturbances will be noted.

Alcohol from Bananas.

This interesting subject is again being carefully studied with the object of discovering whether the enterprise of erecting distilleries in tropical localities where this raw material is very abundant is likely to prove successful. In the columns of "Bulletin de l'Agence Economique de l'Afrique Occidentale," the following article, written by M. Paul Ammann, appears:—

"It has been ascertained from trials made during the last few years at the Ivory Coast, West Africa, that the banana can be used advantageously in the production of alcohol. The pulp of the banana represents 70 per cent. of the weight of the fruit, and it consists of an important proportion of sugars directly fermentable, as the two following analyses show:—

	Bananas gathered at Blagueville—		
	At the close of a dry season.		During a wet season.
Moisture	71.64	..	79.38
Sugars directly fermentable ..	17.85	..	15.15
Saccharose	5.45	..	2.33
Alcohol from 100 parts of pulp ..	11.30	..	8.40

Naturally, bananas gathered during a wet season are more watery and contain less sugar than those collected ripe after a dry season, yet in both cases the yield in alcohol is important, and amounts respectively for the wet and the dry gatherings to 17.6 and 23.7 hectolitres of pure alcohol per hectare (say in British equivalents, 677.7 and 912.5 proof gallons per hectare of 2.45 acres).

In the first trials the alcohol was obtained by the direct fermentation of the pulp, without any attempt to transform the starch which the ripe bananas contain into fermentable sugar and thence into alcohol. But the subject of the complete transformation of the constituents into fermentable sugars is very important so that the maximum yield of alcohol may be obtained. For this reason further trials were instituted by M. Boulard, and by his own process. Thus some bananas from China, well ripened, have yielded at least 1 per cent. more alcohol by a mucor fermentation method than by the direct fermentation of the pulp. The composition of some bananas incompletely ripened, native to China, was found to be: Moisture, 62 per cent.;

fermentable sugars (initial), 10.76; starch, 19.80 per cent. (i.e., total sugars and starch, 32.75 per cent.). When these bananas were treated with the Boulard mucor No. 5, and with the Boulard yeast No. 21, all the starch was transformed, and the yield of alcohol was raised to 19 per cent.

Danish Egg Export Control.

Some years ago, when certain questions were raised both as to the quality and the sorting weight of Danish eggs, the matter was investigated by the Danish Ministry of Agriculture, and as a result the Act of 1st April, 1925, was passed dealing with both the export and import of eggs.

Since this Act came into force there have been significant improvements alike in regard to the quality and the sorting weight of eggs exported from Denmark. But in view of the efforts made in the same direction by other egg-exporting countries, the Danish Government has decided to take all necessary measures to maintain for Danish eggs the place they now hold in the world markets. The Act of April, 1925, expires in April, 1928, and on 2nd December the Minister for Agriculture introduced in the Landsting a Bill for its renewal with certain amendments sharpening the regulations and making the control more stringent.

Under the new proposal the Minister is to be authorised to order that all eggs exported or imported shall be marked in a way specified by him, both on the eggs themselves and on the packing. In the case of export, the marking on the packing shall, among other things, indicate the quality and the sorting weight of the eggs, and the packing itself must conform to the requirements of the Ministry.

All egg exporters must be duly authorised by the Ministry.

When intended for resale or redelivery, Danish eggs must at the time of original sale and delivery be fresh laid unless sold or delivered under other description. Dirty or washed eggs, or eggs that have been damaged by brooding, incubation, heat, or in any other way, shall be marked as "Sekunda." The Minister can order that all who buy or receive eggs for further sale or delivery shall give notice thereof to the Ministry.

Besides ordering that eggs and packing shall be marked according to his regulations, the Minister may also take any other control measures he regards as necessary.

As a test of the accuracy of the quality and sorting weight marked on the packing, the officers of the Minister may extract and examine larger or smaller quantities of the eggs, and where the marking is found to have been inaccurate the bulk may be confiscated. To cover the cost of the control, a fee is imposed on the authorised exporters in respect of all eggs exported from the country.

Offences against the regulations of the Act are punishable with fines of from 20 to 2,000 kroner unless punishment for the particular offence is provided for in any other Act. The name of the offender and character of the offence may be published by the Minister, and repetition of the offence entails cancellation of the license to export.

Breed Plus Feed—Main Factors Determining Fat Content of Milk.

The fat content of milk is, to a great extent, a question of inheritance. Different breeds are noted for high, medium, or low percentage of fat. Jerseys, for instance, have long been noted for a high percentage. Friesians had in the past a name for great volume, but with a low fat content. Recently, however, this breed is proving by records that the average fat percentage has been and is being increased. The Australian Milking Shorthorns and their full sisters, the Illawarras, are proving the same thing. Thus it is evident that the capacity to give a milk rich in fat can be bred into any breed of cows by careful selection in a comparatively short period of time. This would not be done in one or two generations, but experience shows that a gradual improvement can be made.

A cow inherits fat-producing capacity (*a*) on account of her breed, and (*b*) individually, as a result of breeding. If a cow has been well born and well reared, her records for production in after life depend to a great extent on feeding.

She should not be starved during the three or four months preceding freshening, and after calving she should be well and regularly fed. Both under-feeding and over-feeding are undesirable; too rich a ration (one containing too great a proportion of concentrates) and a ration of grainless wheat straw are both to be avoided. The digestive organs of a cow should not be out of order if she is to give good results.

During droughts, when stock are more than half starved, the fat content of their milk is lowered. This has been demonstrated by the official records obtained from both Government and private herds. Again, during the spring season, when the pastures are soft and young, while the quantity of milk given increases, the fat percentage is lowered.—A. and P. Notes, N.S.W. Dept. Ag.

Clean Milking—Important Points in Dairy Practice.

Many dairy farmers are convinced that only by careful hand-milking can the cleanest milk be obtained, and that the use of a machine results in a much-increased bacterial contamination. Many, on the other hand, have demonstrated that by the use of the machine a milk can be obtained which is comparable with, or even superior in quality to, that which can be produced under the most careful conditions from hand-milking. Clean milk production, whether by hand or machine, actually rests largely in the hands of the producer himself. It is essentially a matter of sanitary methods, based upon a knowledge of the chief sources of bacterial contamination, and the means to be used to keep this at a minimum.

The germ-content of machine-drawn milk will depend upon the care taken to keep the tubes, cups, and pails clean far more than upon any other factor. Where the machine is held responsible for failure to produce good-quality milk, the fault is usually traceable to failure to keep it clean. Highly infected milk drawn by machine is due in almost all cases, not to any fault of the machine itself, but rather to lack of knowledge on the part of the operator of the means to be taken to keep the machine parts sterile. The secret of "low-count" milk lies in having the producer appreciate the difference between a bacteriologically clean machine and one which "looks clean."

It is not sufficient to rinse out the pails, the cups, and the rubber tubes so that visible dirt or traces of milk are removed. It is necessary to destroy the bacteria which lurk in unsterilised, though apparently clean, pails, or which adhere to the moist inner surfaces of the tubes and teat-cups, and which will otherwise multiply and infect the fresh milk. Efficient sterilisation, while entailing more care, amply repays for the effort taken, and is quite essential if the producer is to obtain a milk of low germ content and good keeping quality. The whole question of caring for the machine is simplified if the producer, having once realised the importance of killing unseen germs, commences cleaning and sterilising promptly after the last milking, and makes this a practice every day in the year. Promptness and regularity make for easier and more efficient sterilisation.

Queensland—A Land of Opportunity.

"I make bold to say that there is no part of the world in which a grander opportunity is given to those in power to develop and build up the prosperity and happiness of a country than is given to our public men here. Queensland simply teems with natural wealth, and when one has made all allowances for the drawbacks of droughts and floods there is still a magnificent margin for development. I give you, for what they are worth, certain suggestions that arise out of whatever information about the actual state of things I have been able to glean.

"In order to bring about an era of progress, it is essential that both our primary and secondary industries should be encouraged and developed. The more persons engaged in secondary industries the bigger will be the home market established for primary products. A home market is always a good market, and it is essential for the well-being of a country like Australia, where the standard of living is high, and the cost of production is equally so. Now, what of the future? We are on the threshold of an era in the development of Queensland when wise legislation, suitable settlers, and expert advice must become paramount factors in bringing the State to the position which it ought to hold in the world of primary industries. The 30,000,000 acres of land becoming available for closer settlement during the next five years cannot be utilised without men and means. If advantageous settlement is to take place the financing of it must become a national concern, and the selection of settlers must depend rather on their experience and general fitness for the primary industries to be engaged in than on the amount of money they possess," said Archbishop Duhig in the course of a recent public address.

He added that he believed the Government had made a wise provision that, in future ballots for land, applicants would have to submit themselves for an examination as to their experience and financial standing. This fell in exactly with his idea that preference should be given to men with experience, particularly in Western areas. He further suggested that, all other things being equal, preference should be given to married men. Anyone familiar with conditions in the far West must have noticed the absence of children on big holdings. It would be a pity if this state of things were to continue, and, therefore, married couples ought to be encouraged to settle and bring up in those magnificent, healthy spaces children that in their generation would be one of the strongest bulwarks of our primary industries. Good immigrants would always be welcome, but let us remember that a native-born population was Queensland's greatest asset. Queensland should, therefore, grasp the opportunity of settling with this asset its magnificent Western lands.

Worms in Sheep.

Some farmers only use drenches when they see evidences of worm infestation, but experience has shown that if drenching is done at certain periods of the year the sheep are maintained in better health and condition. Stomach worms are generally evident towards the winter, and if the sheep are drenched at the right time—once a month, say, from March until May—it will generally be found that the parasites will be controlled.

All parasites thrive in an animal that is low in condition, and good management and the provision of nourishing food are, therefore, the first means of prevention. Where practicable, feed off fodder crops to sheep. In wormy country it pays to keep sheep well away from the poverty line. Many a wormy sheep has owed its life to good feeding. Keep sheep supplied with a salt lick, of which the following is suitable, namely: Sulphate of iron, 1 part; sterilised bone meal, 5 parts; coarse salt, 30 parts.

Do not over-stock, especially on succulent pastures (such as on alluvial flats) where worm larvæ are very likely to remain active in large numbers and for a longer time. Pastures carrying large numbers of sheep should, where practicable, be treated periodically with quicklime (½ ton to the acre), or burned off and spelled. Such paddocks can, if desired, be spelled by grazing horses on them.

Since the stomach worm can probably remain infective in the soil under natural conditions for twelve months, it is advisable, when spelling a pasture, to do so for at least that length of time. Fence off or reclaim boggy places, and, where practicable, dams should be replaced by troughs, which should be cleaned periodically. Keep sheep in healthy condition by strict supervision and attention to their needs—e.g., "foot-rotting" them at regular periods, crutching, &c.

Move sheep about from pasture to pasture, from low country to hilly country, from introduced grasses to native grasses, and vice versa. Very young lambs apparently are healthier and less liable to verminous infestation on sweet, hilly country and native grasses. It is well to remember that young lambs, though in good condition and wool, may suffer heavy mortality from stomach worms.

Lucerne Sowing.

Farmers generally prefer to broadcast lucerne seed where the area is small, but sowing through the grass seed attachment of the wheat drill is a useful method when the area is larger.

A method of sowing that is well suited for wheat districts is to mix thoroughly 70 lb. of superphosphate with 10 lb. to 12 lb. of lucerne seed, put the mixture into the manure box of an ordinary seed drill, and set the drill to sow about 80 lb. of manure per acre. The discs or hoes of the drill should not be set into the soil too deeply. Some drills, especially when new, cannot be set to a shallower depth than 1½ to 2 inches; in such a case a good plan to follow is not to set the lever of the drill into the first notch but to let it dangle. The cogs of the drill will be in gear, but the hoes will not go down as deeply as if the lever had been set into the first notch. In this way the seed will be sown about ¾ inch deep. Special care must be taken not to fill the manure box right up. Not more than sufficient seed and manure for 1 acre—i.e., about 80 lb.—should be put into the drill at one time. In order that the seed may be thoroughly covered, it is advisable either to improvise a brush harrow at the back of the drill or to harrow with light harrows after the sowing.

A fine, level, rolled surface is required for sowing. The seed must be covered not more than 2 inches deep, nor less than half an inch, and to secure this fineness is essential. An even distribution of the seed is required, and although some men are sufficiently expert to obtain it by hand-sowing that method is not recommended to the inexperienced. Many good machines are available which do the work satisfactorily.

If a farmer is compelled to resort to hand-broadcasting, half the seed should be sown in one direction across the paddock, and the other half at right angles across the first cast, so that strips missed the first time will receive some seed. Select a calm day or early morning, as it is hard to distribute the seed evenly on a choppy, windy day.

The seed should be covered with a light harrow, though a brush harrow is often used. Adjustable lever harrows are very effective for this work, as the depth can easily be regulated. The seed should not be covered deeply, and precautions must be taken to prevent a crust forming on the surface.

Owing to the slow growth of lucerne during the first year, many farmers are tempted to sow it with another crop, such as wheat or oats, from which some return may be obtained. Others think that the sowing of such crops will assist the young

lucerne by giving it some cover. This is not a sound practice. The young lucerne plant is slow in growing, while the wheat, oats, or barley, &c., are vigorous growers which take from the soil moisture and plant food and so rob the young lucerne plants, which instead of growing sturdily become stunted and weak, and are not in condition to stand the hot weather conditions when the cover crop is taken off.

Careful preparation of the soil is required for lucerne, and this, with the cost of the seed, represents a good deal of expenditure, and it is not worth while risking the loss of this for the comparatively small return obtained from the cover crop.

Sheep Classing.

Sheep classing—the operation of grading the breeding flock and selecting the sires for use in mating, with the object of gradually raising the standard of the flock—is an annual practice on all stud properties, or where large numbers of ewes are bred from each year. But sheep classing should not be confined to the larger flocks. In every flock, no matter how small, there is room for improvement, and on account of the casual methods by which many flocks are built up the need is usually very great. The man who only requires a small breeding flock is at a disadvantage, because station owners and managers do not like selling small lines of sheep, and he is forced to accept what he can get. Then again, he may not have sufficient funds to procure a good even line of ewes. Unfortunately, too, there are some flock owners who, when buying rams, take the lowest-priced animals without considering whether they will help to "make" or "mar" their flocks.

It is recommended, therefore, that every owner of a flock of sheep should class his ewes at least to the extent of culling out all the low-grade animals. In this operation wool must not be the only consideration. In flocks which are used primarily for fat lamb production, size of frame, roominess in girth and hindquarters, good milk-producing qualities, and early maturity are points of importance, and all ewes lacking these qualities to any extent should be eliminated from the breeding flock. At the same time, these being days of good wool prices, the wool side must not be lost sight of, as a ewe can raise a satisfactory fat lamb and still produce a payable fleece of wool.

The best time to class the flock is just prior to shearing, as the sheep are then carrying full evidence of their value as producers of wool. It is hardly necessary to say that sheep classing is impossible after the wool has been removed, although it is quite possible to carry out the job any time after the sheep are carrying seven or eight months' wool.

The small flock owner who is breeding for wool should have an ideal in his mind. He must have in view the sheep that will grow the type of wool most payable and best suited to the district, and he will find it worth while to acquaint himself with the views of those who have had longer experience as to the most satisfactory type of wool to grow under local conditions. Having thus got his ideal before him, he should keep it steadily before him, striving each year when classing his sheep to bring the flock nearer the ideal by culling out all ewes that vary greatly in any of the essential qualities. The important qualities to consider are a well-shaped frame, considering the type and breed, good legs (not crooked), and wool of the desired quality (fineness), and as even and dense as possible all over the body. Regarding the frame, it may be remarked that if the flock is of Merino breed, it is not necessary to have quite such a shapely carcase as with the mutton breeds.

The most common faults are small, undersized, or weedy frame, a dip behind the shoulders called "devil's grip" (a sign of weak constitution), narrow shoulders or hips, and crooked legs or feet. Common faults in the wool growth which should also be avoided are unevenness over the body, lack of density or length, and dullness or dinginess in colour due to too much condition or to an undesirable type of yolk. There are other wool characteristics and faults which should be considered, but those mentioned are the most important.

Farm Notes for May.

Field.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Clover land, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginnery should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

Orchard Notes for May.

THE COASTAL DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become specked or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2¼ to 2½ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are

given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, CENTRAL AND SOUTHERN TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give 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.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work 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*, as the later vines are pruned in the season the better in the Granite Belt district, as late pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will becomes sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

The Home and the Garden.

KITCHEN GARDEN.

Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleaned, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

FLOWER GARDEN.

Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pentstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia bulbs should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

APPLE AND PLUM PRESERVATION.

By Miss A. KNIGHT, Fruit Preserving Expert.*

THE APPLE.

The apple is regarded by many as the king of fruits. Most of us are fully aware of its wonderful medicinal qualities, and, with few exceptions, every one finds it an agreeable and wholesome food.

It may be said that the apple family caters for all tastes, as it includes sweet, sour, crisp, firm, and floury varieties, and from these we may choose good dessert and good cooking varieties.

Hardly any fruit would be missed more than the apple. It will blend well with nearly all foods, and almost any flavouring agent will tone nicely with it.

If every housewife could make up her mind to preserve a case or more of good, juicy cooking apples, she would find them very useful during the spring and early summer when fruit is in many places unobtainable.

Any good cooking apple will preserve well. I would suggest that a quantity be preserved in the form of pulp or puree, for such makes a good foundation for many preparations suitable for the daily menu.

* In the "Journal of Agriculture," Victoria, for February.

If we think for a moment of the many ways in which cooked apples may be served at table we will realise the value of having such a foundation at hand, and always ready to use. Some of the pulp should be put up plain, that is, sweetened to taste, but with the addition of no other ingredient than sugar. It is advisable, too, that some should be flavoured with various suitable flavourings. Some may be flavoured with whole ginger, some with cinnamon and cloves, and some with sweet spice. Apples can especially be recommended for variations of this nature, and we all know that a fresh method of serving food will often have a beneficial effect on the appetite.

Some Apple Dishes.

The gingered puree is excellent for tart fillings; so also is that flavoured with cinnamon and cloves. Plain sweetened apple pulp will blend well with fresh or preserved wild blackberries, while it will also work in to advantage with other tart fillings.

The proportion of apple puree for adding to the fresh blackberries would be one cup to two cups of blackberries; to these one tablespoon of sugar (or to taste), and a little strained lemon juice should be added. Either variety of paste may be used, flaky or short, according to preference.

The plain, sweetened, apple pulp makes an excellent sauce for serving with roast pork, duck, &c. For this purpose the contents of the jar should be re-heated in an enamelled saucepan. Then, after it has boiled for a minute or two, add the strained juice of half a lemon for each cup of apple pulp. Do not *boil* the sauce after adding the lemon juice.

The flavoured apple is nice when baked in a deep dish with the surface of the pulp covered with thin slices of buttered bread, then dusted with sugar and a little nutmeg. Sometimes, if the puree is very firm, the buttered bread will need to be slightly sprinkled with a little syrup, just to moisten it slightly. When nicely baked, serve hot with a little cream.

Dutch apple cake from preserved apple can be highly recommended; also many other similar tasty variations which can be quickly prepared.

Apple Puree—"Plain."

Take any good, tart, cooking apples. Peel, core, and cut them up. Put on to cook in the preserving pan, with very little water—just enough to prevent burning. Put the lid on the pan, and bring slowly to boiling heat, then remove the lid, and allow the fruit to boil for about fifteen minutes, stirring occasionally.

Meanwhile, the containers should be made quite hot. This is best done by steaming, or immersing them in hot water. When the jars are hot, ladle the boiling pulp carefully into them, and seal air-tight at once. Stand the jars on a wet cloth, and when cold they are ready for storing.

Gingered Apple Puree.

Proceed in the same manner as for the plain, but allow about ¼ lb. of sugar to each pound of apples, and a small piece of whole ginger. Dried ginger (also green, when procurable) is suitable, and should be bruised, tied in a piece of cloth, and suspended in the mixture during the cooking, and removed before the puree is bottled.

Cinnamon Flavoured Product.

Cook the apples and sugar in the same manner as that described for the gingered puree, but instead of ginger, add about 1 inch of the stick cinnamon and three cloves to each pound of apples. When the product is cooked, remove the cinnamon and cloves from the puree, which should be bottled while at boiling heat.

Apple Marmalade.

For apple jam, or as it is sometimes called, apple marmalade, the Rokewood apple will give excellent results. The colour will be a deep red, and the flavour good if the apples are nice and fresh. A slow cooking is better than rapid boiling for apple jam.

Apple Blends.

Apple and quince in equal parts make up nicely, for either jelly or jam. Apple and rhubarb is another nice combination; also apple and mulberries.

PRESERVATION OF PLUMS.

Though plums will not, perhaps, blend in quite so many combinations in cooking as apples, they are an excellent fruit for winter use. They make good pies, and are very suitable for steamed suet puddings, and in the warmer weather they make nice chilled sweets. The plum season is not a long one, therefore it is well to have this fruit stored in the larder for winter use. The Orlean, Blue Diamond, Grand Duke, President, Yellow Gage, Green Gage, and Yellow Magnum Bonum are all good pie plums.

All plums for bottling are better for being on the firm side. The filling syrup should not be made too strong, as a very strong syrup will sometimes cause the skins to toughen. Extra sugar can always be added to them at the time of making the pie or pudding. The usual allowance of sugar when bottling the plums is 4 oz. to each pint of water. This is boiled for ten minutes, then strained, and it is ready for use.

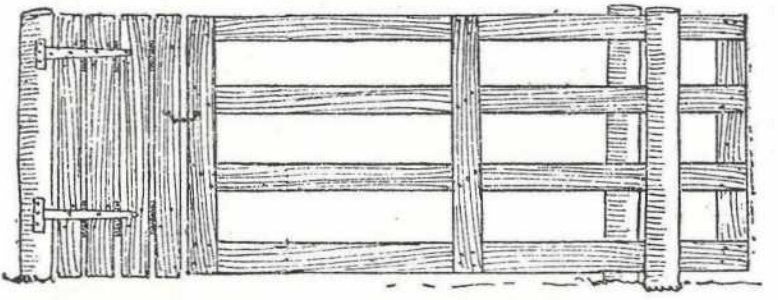
The raw plums should be packed into the preserving jars, with about a tablespoon of cold syrup, the jars then placed on the rack inside the steriliser, with sufficient water to barely reach the top of the rack, and this brought gradually to boiling heat. This heat is maintained for ten to fifteen minutes, according to size of jar. The jars are then filled with the boiling syrup from the kettle, and sealed air-tight at once.

Spiced plums suitable for serving with hot meats are appreciated by many. For spicing, firm-fleshed plums are the best to use. They should be heated through slowly by steam (but not softened too much), and the sweet spiced dressing poured over them while they are still hot. The dressing could be of any desired flavouring. The average fancy is something like this:—2 pints of vinegar; 1 oz. of cloves; ½ oz. of nutmeg; 1 oz. of cinnamon; 1 lb. or 1¼ lb. of sugar.

To make it, simmer the vinegar for a few minutes with the ingredients added. The latter, with the exception of the sugar, should be tied in a muslin bag and suspended in the vinegar. When sufficiently flavoured, remove the bag of spices. The vinegar is then ready to be poured over the plums. They should then be sealed and stored.

A HANDY GATEWAY—ILLUSTRATED.

It is awkward to open a big, heavy farmyard gate with a basket of feed on one shoulder, particularly if it must be done repeatedly at each feeding time. One Iowa farmer avoids this effort by arranging his gate as shown in the sketch, which is



reproduced from "Hoard's Dairyman." The smaller gate is wide enough for a man to walk through comfortably, but it is too narrow for cattle to get through should it be left open.

Both gates hook to the same post. The smaller is hung from the side of the barn or feed storeroom, and the larger slides between two posts. Since the narrow gate is used many times to the few times it is necessary to open the large gate, making the change has saved this farmer considerable time and effort.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	April, 1928.		May 1928.		MOONRISE. April, 1928.	MOONRISE. May 1928.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6.4	5.49	6.20	5.18	3.52	3.36
2	6.4	5.48	6.21	5.17	4.31	4.6
3	6.5	5.47	6.22	5.16	5.2	4.34
4	6.6	5.45	6.22	5.16	5.32	5.4
5	6.6	5.44	6.23	5.15	6.2	5.37
6	6.7	5.43	6.23	5.15	6.32	6.12
7	6.7	5.42	6.24	5.14	8.2	6.51
8	6.8	5.41	6.24	5.13	7.36	7.37
9	6.8	5.40	6.25	5.12	8.11	8.26
10	6.9	5.39	6.25	5.11	8.53	9.20
11	6.9	5.38	6.26	5.11	9.40	10.15
12	6.10	5.37	6.26	5.10	10.30	11.15
13	6.10	5.36	6.27	5.10	11.26	...
					a.m.	a.m.
14	6.11	5.35	6.27	5.9	...	12.16
					a.m.	
15	6.11	5.34	6.28	5.9	12.24	1.17
16	6.12	5.33	6.29	5.8	1.25	2.20
17	6.12	5.32	6.30	5.7	2.29	3.24
18	6.13	5.31	6.31	5.6	3.33	4.31
19	6.13	5.30	6.32	5.6	4.38	5.41
20	6.14	5.29	6.32	5.5	5.45	6.52
21	6.14	5.28	6.33	5.5	6.53	8.2
22	6.15	5.27	6.33	5.5	8.4	9.8
23	6.15	5.26	6.34	5.4	9.18	10.11
24	6.16	5.25	6.34	5.4	10.20	11.6
25	6.16	5.24	6.35	5.3	11.24	11.54
					p.m.	p.m.
26	6.17	5.23	6.35	5.3	12.21	12.33
27	6.17	5.22	6.36	5.3	1.12	1.8
28	6.18	5.22	6.36	5.2	1.54	1.39
29	6.18	5.21	6.37	5.2	2.32	2.7
30	6.19	5.21	6.38	5.2	3.3	2.40
31			6.38	5.2		3.6

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

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 April	○	Full Moon	1 38 p.m.
13 „	☽	Last Quarter	6 8 p.m.
20 „	●	New Moon	3 24 p.m.
27 „	☾	First Quarter	7 41 a.m.

Apogee 8th April, at 10 12 a.m.
Perigee 21st April, at 5 12 a.m.

Omega Orphiuchi will be occulted on the 10th from about 1.30 at Mackay and somewhat later in Southern Queensland.

On the 10th at 11 p.m. the Moon will be passing Saturn, slightly to the south of it. A small star in Orphiucus between Scorpio and Saggitarius will be occulted by the Moon, commencing about a quarter past three in the morning. A small star in Saggitarius (Magnitude 5.8) will be occulted by the Moon about a quarter past ten on the evening of the 12th. In the south-east of Queensland this will form an interesting object for observation on its reappearance on the bright side of the Moon, about half an hour after it has risen. This occultation will require binoculars or telescope.

The occultation of Eta Leonis (Magnitude 3.6) will take place only in the Northern part of Queensland at such places as Charters Towers and Cairns, a little before half past nine on the evening of the 28th. At Brisbane, Toowoomba, Warwick, etc., the star will be seen to skirt the southern edge of the Moon without being occulted.

The conjunction of Venus and Jupiter at 6 p.m. will occur when both are below the horizon, but they will be visible in the early morning before sunrise.

Omega Virginis (Magnitude 5.4) will be occulted on the 30th, before half past seven at Warwick and seven or eight minutes earlier at Townsville. The reappearance of the star on the western side of the Moon will occur at Warwick about forty minutes later.

5 May	○	Full Moon	6 11 a.m.
13 „	☽	Last Quarter	6 50 a.m.
19 „	●	New Moon	11 14 p.m.
26 „	☾	First Quarter	7 11 p.m.

Apogee 5th May at 2 30 p.m.
Perigee 19th May at 3 36 p.m.

On the 3rd, Mercury will be on the farthest side of its orbit and will pass behind the Sun.

Beta Scorpii, a star of about the third magnitude, will be occulted by the Moon soon after half-past six on the evening of the 6th, at Brisbane, Toowoomba, Warwick, and other places in Southern Queensland where the Moon rises before that time. The star will reappear on the western side of the Moon an hour later. At places in Northern Queensland the time of disappearance will be somewhat later and of reappearance earlier.

The conjunction of Saturn with the Moon, about 3 o'clock in the morning of the 8th, will take place in the part of the sky between Scorpio and Saggitarius, which affords no other brilliant object. Saturn will be about four diameters of the Moon to the northward.