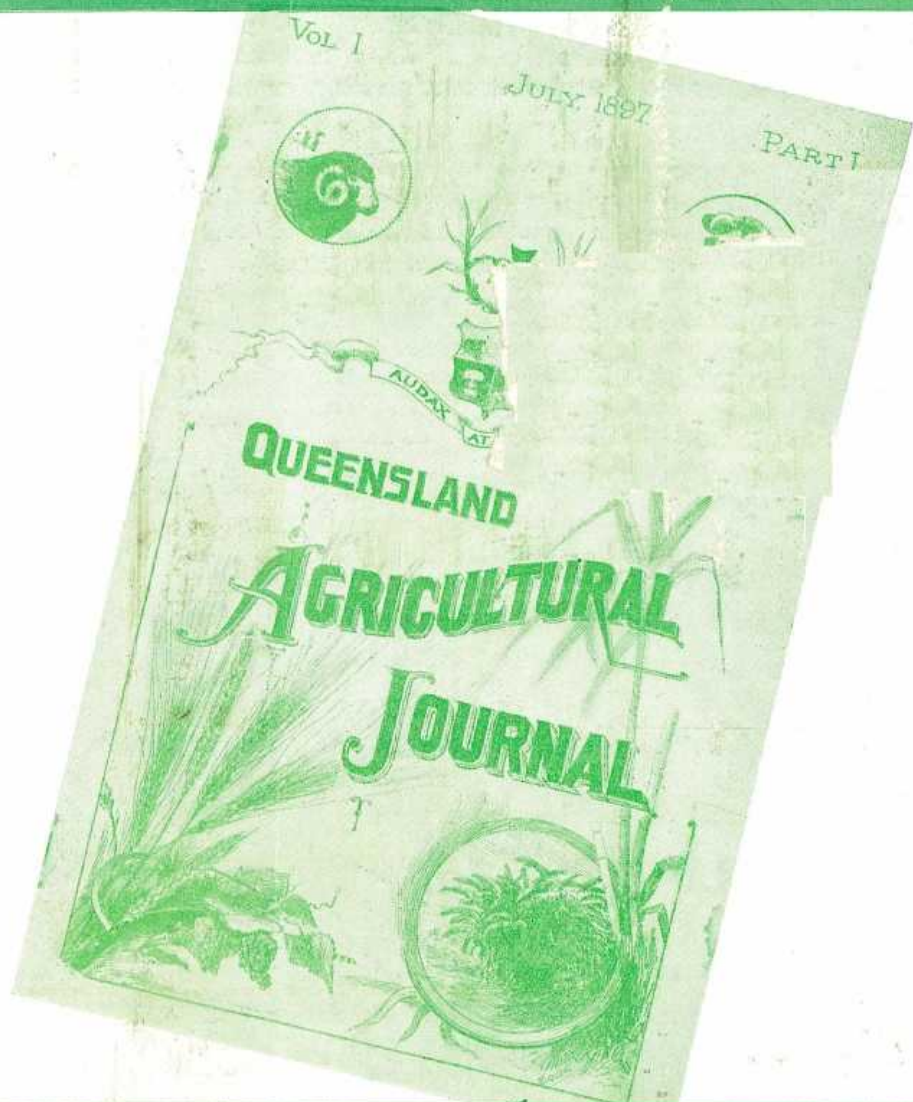


Queensland
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ORIGINAL COVER REPRODUCED TO MARK QUEENSLAND'S CENTENARY YEAR.

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"The Ringing Groove Of Change"

By E. T. HOCKINGS,
Editor of Publications.

"Growers would do well to take a lesson in packing from the Californians, who have been shipping apples, or from the Italians, who are shipping lemons to this colony, as those fruits . . . reach here in better condition and much more attractive state than our local fruit . . ."

WELL, our student orchardist has graduated since Albert H. Benson wrote those words in his "Orchard Notes for December" column in the *Queensland Agricultural Journal* 62 years ago. And the process of education and growth has applied not only to fruit growing and packing, but to all plant and animal industries in Queensland.

In this, our State's centenary year, it is right that those whose interests lie in the land should look over their shoulders and meditate on the conditions under which their fathers, and their fathers before them, laboured. This can be done most entertainingly by speculating among the pages of early issues of the *Queensland Agricultural Journal*.

The journal had its beginning in the year 1897. In the December issue of that year, we read:

"ANOTHER PAYING CROP FOR QUEENSLAND. THE TOMATO. By Henry A. Tardent, Manager of the Westbrook Experiment Farm.—

"One of the great charms of life in these Australian Colonies is that here the poorest of men, the humblest tillers

of the soil—provided they are gifted with some activity, industry, and taste—can indulge in the enjoyment of the most exquisite flowers and fruits, such as are in the old country available only to lords and wealthy capitalists provided with hothouses and other artificial heat-producing appliances . . . Among the new products met here, on landing, by the immigrant from Great Britain and Northern Europe, none perhaps meet with such a universal appreciation as the tomato or love-apple (*Lycopersicum esculentum*). If some do not take to it at once as a fruit, I know of nobody who does not like it as a vegetable or condiment. It is relished under the form of jams, jellies, chutneys, pickles, sauces, and salads; it is also excellent when stewed, fried, canned, stuffed with rice and minced meat . . ."

An Excellent Fish

In his notes on pisciculture in the journal of January, 1898, D. O'Connor writes: "We have running through Brisbane one of the finest rivers in Australia. Most of it is destitute of fish, excepting mullet, bony bream, and catfish; our laws prohibit the netting of the first, and the others are commonly regarded as worthless. Were

the Palmer (Barramundi or Giant Perch) established in the Brisbane, a high-class fish on our tables need no longer be a curiosity. Palmer-fishing in the Brisbane would attract anglers from all directions, and those who go hence to Tasmania and New Zealand for fishing might do better by stopping at home. The distance from Brisbane to Rockhampton is not very great, we have frequent steam communication, and as an alternative route a railway nearly the whole way. The acclimatisation of the Palmer in the Brisbane River should not be regarded as impossible."

Machinery for Wheat Growing.

The journal of November, 1899, contains this extract from an article on the influence of machinery on the cost of wheat production: "It is undeniable that the extraordinarily low cost of wheat production in South Australia is largely due to the original invention of the stripper, and to the continual improvements that have been made in that machine and other farm implements. That finality has been reached is highly improbable. Our manufacturers are always keen for improvement. Their working creed seems to be the sentiment which the immortal Tennyson expressed—

*Let the great world spin for ever
Down the ringing groove of change.*

"Anyhow, when posterity doffs its hat and bows its head in homage to the dead pioneer agriculturist, the dead pioneer manufacturer will also be worthy of reverent remembrance."

Tropical Industries

In a note on sisal hemp, the December, 1912, journal says: "It is possible that the Mexican rebellion, and the terrible hurricane at Cebu, in the Philippine Islands, which is the principal seat of the Manila hemp industry, may account for the present high prices and foreshadowed higher prices for sisal fibre.

"Under the circumstances, even with the high wages ruling in Queensland for rural labour, those who are growing sisal here may take heart and look forward to good profits . . ."

War Years

The journal of September, 1917, contains the following note, headed "Dyes and Papers From Native Plants":—

"A most interesting and, under present war conditions, important exhibit (at the Brisbane Exhibition) was one by Mr. J. Campbell, of Cairns, in which the manufacture of paper from various fibrous plants indigenous to Queensland was practically described by the exhibition of the plant, of its fibre, and of the several processes the material underwent to produce the fine samples of good, tough, brown packing-paper.

"Also there was shown how a highly important industry could easily be established in the manufacture of dyes of various hues, even black—a difficult dye to produce. These dyes have all the characteristics of the aniline dyes, so largely imported from Germany previous to the war. Mr. Campbell has clearly shown that we need not be dependent on importation of these products, since it is quite possible to produce them in our own State."

The Farm Family

A journal issued during World War II., that of November, 1943, says: "Mention of the wartime work of women in rural industry naturally suggests the need for a wider appreciation of the practicalities of country life, especially in relation to the farm home, when post-war planning is undertaken. It is the woman on the land who makes the farm home, and on her success in home making the smooth working of the farm as a business very often depends. Therefore, no scheme of rural reconstruction will be complete without full provision for

modern amenities in the farm home and in country centres . . .”

Big Task Ahead

Now that we are in our 100th year as a State, it is instructive to study the past. It may even be entirely gainful, if we manage to relate conditions of yesteryear to conditions of today, and in the light of comparison, make sensible plans for the future.

The Department of Agriculture and Stock could not, surely, be accused of vanity if it accepted some small measure of acclaim for its part in the

improvement of conditions on the land in the last 100 years. At the same time, it is obvious that the alarming acceleration of human activity in just the last 20 years has made the task of tackling present-day problems one of immense magnitude.

We must therefore, continue to contribute our best endeavours to the job of harnessing science to the plough. And, concurrently, we must join hands with the farm family and walk encouragingly beside them along the road that leads not merely to more productive acres but to a better life.



Serving The Man On The Land

This float, prepared by the Department for the Australia Day procession on January 26, shows several of the ways in which the recommendations of scientists are passed on to Queensland farmers and graziers. This service, which is known as extension work, is given due prominence by the Department, which recognises, as Bertrand Russell puts it, that “Those who can act effectively as liaison officers between technical scientists and the public perform a work which is necessary not only for human welfare, but even for bare survival of the human race.”

This Was The Farmer's Year

By Officers of the Marketing Branch.

Drought conditions caused a serious decline in farm incomes during 1957-58 and although in the latter part of the year there was a rapid improvement in seasonal conditions over the greater part of the State, economic recovery was adversely affected because of rising costs and deterioration of overseas markets.

Dry conditions throughout the year resulted in reduced production of many commodities and, coupled with price falls, they resulted in a deterioration in the balance of payments position. The value of exports was £172m. less than in the previous year, whilst the value of imports increased. The net result, therefore, was an excess of exports over imports of £28m. The corresponding figure at the end of 1956-57 was £274m.

Price falls, together with other difficulties, point the need for primary industry to devote more attention to the local market. Particularly is this the case with dairy produce and eggs. Consumption of butter in Australia, for example, has not kept pace with the increase in population. Consumption per head in 1938 was 32.6 lb.; in 1956-57 it had in fact fallen to 27.5 lb. Although Australians rank high in the per capita consumption of meat, consumption of beef and veal, which stood at 144 lb. in 1938, is now only 127 lb.

Although cheese consumption showed a pronounced rise in 1957-58 it is worthy of note that insufficient effort has as yet been made to produce those exotic types of cheese for which there has been an increasing demand since the war.

Any increase in the consumption of dairy products in all forms, including liquid and dried milks, would tend to reduce the uneconomic exportable surplus of butter.

United Kingdom Market

Traditionally the best customer for our agricultural products, the United Kingdom market has deteriorated in post-war years. The main cause is the impetus given to home production by large Government subsidies—£240m. in 1956-57 and £290m. in 1957-58. Agricultural output in 1957-58 was estimated at 63 per cent. above pre-war.

In the case of eggs, British farmers now produce 95 per cent. of United Kingdom requirements compared with 17 per cent. pre-war. Comparative figures for other products are as follows:—butter, 9 per cent. and 4 per cent.; cheese, 48 per cent. and 23 per cent.; meat, 64 per cent. and 50 per cent.

Further marketing problems on this important market arise from the policy of the United States of America in disposing of surplus farm products

under Public Law 480, whereby surpluses are exported and paid for in the currency of the importing country.

Local Markets

In stressing the need for the export industries to develop more interest in the local market, attention must be drawn to those commodities the demand for which is at present largely met by imports. In particular, reference is made to tobacco leaf, cotton, peanuts, and oil-bearing seeds.

The problems peculiar to these industries are those of stable and satisfactory returns relative to the returns from alternative crops. A good deal of attention is being given to the establishment of the tobacco leaf and cotton industries on a sound technological basis so as to give the consumer the type of product required on the Australian market. The Tobacco Industry Trust Fund is an example of grower, manufacturer, and Government co-operation towards this end.

Pastoral

It is estimated that the Australian wool clip for 1957-58 was 1,426m. lb. greasy, or 9 per cent. less than in the previous season. The average Australian price for greasy wool was 62.27d. per lb. compared with 79.66d. per lb. in the previous season. Queensland sales were 705,657 bales, compared with 798,906 bales in the previous year, and the average price for greasy wool realised at these sales was 65.07d. per lb. compared with 84.09d. per lb. in 1956-57. Australian exports declined by 9 per cent. from 1956-57.

Meat production achieved a new peak for the 12 months ended December 1957, when output reached 1,273,000 tons. The continuance of drought conditions into 1958 reduced the turn-off of cattle for slaughter,

especially in Queensland. Production of beef and veal in Queensland for the twelve months ended June 1958 was 14 per cent. lower than in the previous twelve months.

The 15-Year Meat Agreement with the United Kingdom provides an assured market for Australian meat as there is no restriction on the quantity which may be shipped.

Negotiations held in late 1958 resulted in the guaranteed minimum prices for beef and veal for 1961-64 being 9 per cent. less than the prices for 1958-61, making in all a reduction of 13.5 per cent. on the prices fixed for 1955-58. Guaranteed minimum prices, converted to Australian currency, f.o.b. are now:—

1955	18.4d. per lb.
1958	17.5d. per lb.
1961	15.75d. per lb.

For the three-year period 1958-61 there will be a free quota of 7,500 tons per annum for first and second quality beef. There will be no restrictions on lower quality meat. The 1957-58 quota of 15,000 tons covered all quality and all classes of meats (beef, veal, mutton and lamb). After 1961 there will be no restriction whatever on exports of any quality beef to any destination.

Minimum prices for lamb for the two years 1958-60 will be 5 per cent. below those for the period 1955-58. In the case of mutton the reduction is 15 per cent. All restrictions on the export of mutton and lamb to other markets have been removed.

An encouraging feature is the development of chilled beef shipping services to the United Kingdom via Torres Strait, which will enable meat to be landed in the United Kingdom within 28 days of leaving Queensland ports.

Dairy Products

But for the protection given the dairy industry by the Dairying Industry Stabilisation Plan, the year 1957-58 would have been a disastrous one. Australian production of butter and cheese was down by 9 per cent. and 22 per cent. respectively due to the drought. The consequent fall in farmers' incomes was accentuated by the collapse of butter prices on the United Kingdom market, while cheese prices were also unsatisfactory.

The fall in price was the result of accumulated stocks in cold store in the United Kingdom following abnormal imports from Eire, Finland, Poland and Sweden. United Kingdom home production also increased, both from higher cow numbers and greater production per cow.

The graph in Plate 1 shows the fall in prices of Australian butter sold in the United Kingdom since the termination of the long-term contract in June 1955. The extent to which the industry has been buttressed by subsidies paid under the Dairy Industry Stabilisation Plan is clear.

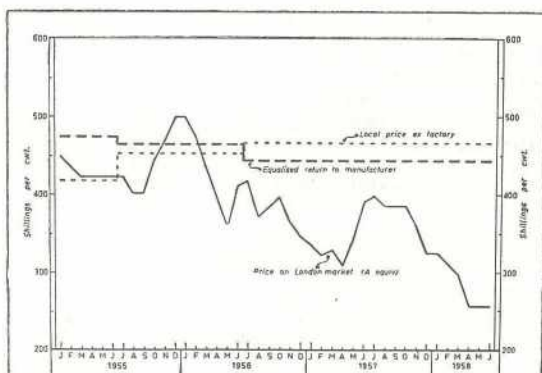


Plate 1.—Fall in Price of Australian Butter in the United Kingdom.

Eggs

The United Kingdom has again greatly influenced the returns to egg producers. Stimulated by subsidies

which in 1957-58 were expected to exceed £48m., United Kingdom producers now provide 95 per cent. of United Kingdom requirements. Consequently other markets have had to be sought, and during 1957-58 only 18 per cent. of exports were sold in the United Kingdom, while 48 per cent. were sold to Western Germany. New markets have also been explored in Southern European countries.

Net payments by The Egg Board to its suppliers averaged 5·38d. per dozen higher than in 1956-57. This resulted directly from a decline in production, which meant that a lower proportion had to be disposed of on the less remunerative export market. The decline in production is directly attributable to the higher cost of feed occasioned by cumulative drought conditions.

Sugar

The international market last year was marked by high prices and wide fluctuations in daily quotations. From January 25 to November 18 international quotas were suspended. The suspension of quotas enabled Australia to export 767,832 tons of sugar in 1957, 148,000 tons in excess of the quota of 619,177 tons.

The International Agreement expired at the end of 1958, and talks under the aegis of the United Nations held in September led to the formulation of a new agreement for 5 years from 1959. The price range remains as in the current agreement.

The negotiated price for 1958 under the Commonwealth Sugar Agreement was fixed at £43 16s. 8d. stg. per ton, an increase of £1 13s. 4d. stg. per ton over the 1957 price.

The sugar industry is fortunate in the protection it receives on the United Kingdom market from the Commonwealth Agreement. The industry is continually striving to increase its efficiency. Bulk handling is already functioning smoothly at Mackay, Lucinda and Bundaberg and the industry is to provide similar facilities at Townsville and Mourilyan. The local market, too, is receiving attention, and there has been an encouraging expansion of the trade in liquid sugar delivered by tanker.

Fruit

Export prospects for canned pineapple products showed no improvement on 1956-57. Competition from other Commonwealth countries remains very keen and Queensland's prices have been undercut by both Malaya and South Africa. The position has been worsened by the United Kingdom issuing import licences for imports from the dollar area.

A notable feature of the horticultural industries in 1957 was the record plantings of strawberries in southern Queensland. This was partly due to the stimulus of a minimum price of 2s. 3d. per lb. for canning quality guaranteed by Northgate Cannery, as compared with 2s. per lb. in the previous year.

Apple exports to the United Kingdom are usually made via Sydney, because of lack of shipping space. In early 1958 space became available from Brisbane and the two shipments made, totalling 16,976 cases, were well received in the United Kingdom. Good prices were realised.

Grains

For the second successive year, the wheat crop in Queensland failed to produce sufficient grain to meet the State's normal requirements. All available supplies of Queensland wheat were reserved for flour milling.

The whole of the State's requirements of stock feed, as well as supplies to supplement local wheat for flour, were imported from southern States.

In order to retain as much wheat as possible in Queensland in the face of heavy demand from New South Wales, also stricken by drought, the Government authorised a special drought loading of 1s. per bushel to be paid on all wheat delivered to the State Wheat Board. In addition there was a special freight concession equivalent to 3d. per bushel overall. These additional costs were borne entirely by Queensland consumers.

Surcharges, on Queensland sales, of 2s. 5½d. per bushel on milling wheat, and 2s. 5½d. per bushel on feed wheat were added to the basic Australian home consumption price of 14s. 4d. per bushel. The quality premium on Queensland wheat for flour milling was raised from 2½d. to 6d. per bushel for the 1957-58 crop. From the end of January the selling price for feed wheat was 16s. 11½d. per bushel bulk basis.

Part of the feed grain demand was met by barley, the season's production being held by the Board for the local market. Supplies of grain sorghum and maize helped to meet the feed demand for a time, but supplies of these grains were largely exhausted by September, 1957.

The improved seasonal conditions from March onwards resulted in heavy late plantings of summer grains. Heavy supplies came onto the market and feed grain prices fell sharply.

Tobacco Leaf

Production of tobacco leaf for the year 1957-58 was a record for the State. Deliveries to the Tobacco Leaf Marketing Board were more than 40 per cent. above the previous season.

The problems arising from an auction system of marketing, particularly those relating to average prices, grades, and unsold leaf, were the subject of considerable negotiations between the manufacturers and the Board; they have also been dealt with by the Tobacco Advisory Committee.

Qualifying percentages for import duty rebates to apply from July, 1, 1958, to June 30, 1959, were announced as 16½ per cent. for tobacco and 15½ per cent. for cigarettes. For 1959-60 the percentages will be 23½ per cent. and 22 per cent. respectively. These percentages, if met, would mean that nearly one quarter of the tobacco used in manufacture in Australia during 1959-60 would be of Australian origin.

Cotton

Although cotton growers have had the advantage of guaranteed returns for many years by way of bounty from the Commonwealth Government, growers have considered the guaranteed price too low and the term of the guarantee too short to induce them to extend their planting; it has also been difficult to attract new growers.

The present guarantee of 14d. per lb. which expires in December, 1958, will now be continued for five years from January, 1959. A longer term guarantee would have further stimulated the heavy investment in equipment in labour-saving machinery, a necessary prerequisite to any marked expansion in cotton growing.

Australian spinners use about 80,000-90,000 bales of cotton each year, of which 3,000 bales are home-produced. Apart from cotton goods, imports of raw cotton cost over £6m. annually. There is thus plenty of scope for increased production of raw cotton, which could make a worthwhile contribution towards an

improvement in the balance of payments position.

Peanuts

Peanut growers in the past season benefited from better growing conditions, and there was a substantial increase in plantings. The crop was more than double the 1957 crop of 8,600 tons. Artificial drying experiments are being continued by The Peanut Market Board, the object of the experiments being to develop a dryer and a drying technique which could be used by individual farmers.

The Board's grading scheme, instituted for the 1957 crop, is considered to be very successful; growers are paid according to the grading of their deliveries. The average payment to growers for the 1957 crop was 12·385d. per lb., nut-in-shell basis. This is the highest pay on record, the next highest being that for the previous year, at 11·225d. per lb. It is of interest to see the effect of grading in the prices paid to growers. The highest pay for Virginia Bunch was 13·645d. per lb. and the lowest 10·495d. per lb. In the case of the Red Spanish variety, the corresponding figures were 12·337d. per lb. and 10·969d. per lb.

Application was made in 1956-57 to the Tariff Board for increased protection on both nuts and oil. Although some measure of assistance has been given, the beneficial effects of increased duty are largely vitiated by the removal of primage duties.

What of the Future?

Mention has been made of the severe effects of the drought, of the decrease in demand for our products on the traditional United Kingdom market, and of the fall in prices for our primary products.

The answer to these problems lies in greater efficiency—more extensive water and fodder conservation, an intense drive for new markets, the greater diversification of production and products, and a constant fight against rising costs, particularly those which are to some extent within the control of the farmer; more attention must also be given to the home market.

The outlook is not entirely a dismal one. A welcome start has been made to sell more on the local market, by

more attractive packaging and presentation of products. Various marketing boards are becoming "publicity conscious."

The revised terms of the meat agreement with the United Kingdom offer new possibilities for the meat export trade. Queensland exporters have not been slow to take advantage of this, and shipments of lower quality bone-out meat have already been made to the United States of America where there is a demand for this type of meat.

There is no doubt that the effects of the drought would have been more severe but for the better conservation methods practised nowadays by more progressive farmers.

Broadcasts To Farmers And Graziers



Mr. J. R. M. WOLFE, Extension Training and Research Officer, preparing "Agricultural Digest"—a series of short items containing valuable information for farmers and graziers—which is broadcast from the following

country radio stations every week: 4QY, 4AY, 4RO, 4MB, 4GY, 4SB, 4QL, 4VL, 4ZR, 4GR, 4QS, 4IP, 4WK, 4AK. *Journal* readers may obtain the time of broadcast by inquiring from the nearest of these stations.

Crop and Pasture

EARLY cultivation of cotton before the weeds have become well established is relatively cheap and quick. In addition, weeds are not allowed to take soil moisture and plant foods from the growing crop.

Fit guards to the inside tines of your cultivators to prevent the build up of soil from burying the small plants.

You can cultivate closer to the rows this way and reduce the amount of hand chipping.

—*W. G. STEELE,*
Senior Adviser in Agriculture.

ALTHOUGH contour banks aren't the whole answer to soil erosion, they do reduce losses to harmless proportions.

More and more farmers are now becoming aware of this and are building contour banks. At the end of last year, over 1,500 Queensland farmers had started on soil conservation programmes. They had built and grassed water disposal systems and installed contour banks on more than 60,000 acres of cultivation.

South Burnett farmers have shown how quickly interest in soil conservation can build up once the value of the work is demonstrated. In 1954-55, 1,100 acres of land were contour banked, but during the last three months of 1958, over 4,000 acres were protected.

—*J. E. LADEWIG,*
Chief Soil Conservationist.

FARMERS purchasing seed for autumn planting are advised to pay particular care and attention to its purity and germination.

A lack of the knowledge of these particulars can lead to disappointing yields or financial loss. This may be due to lack of germination of seeds or infestation of clean paddocks by the introduction of noxious or undesirable weed pests.

Further, a knowledge of the germination capacity helps in adjusting the sowing rate and together with the purity gives a comparison of the value of other lines of seeds of similar kind.

Tests are conducted free of charge by the Department on samples representing seed for the farmer's own sowing.

Farmers are therefore advised to take advantage of these facilities by purchasing their seed requirements early and forwarding a sample, together with a covering letter, to the Seed Testing Station, Department of Agriculture and Stock, William Street, Brisbane.

—*J. E. BEAN,*
Inspector, Standards Branch.

HIGH temperatures are the order during mid-summer, and careful management is required to lessen the effect of hot conditions. Graze lightly and maintain a dense cover of pasture to insulate the soil from the sun's heat. Temperatures under a dense stand of pasture are from 30 to 40 deg. lower than on bare soil.

Use the pasture harrow sparingly. Heavy harrowing will remove protective litter and reduce clover and grass stand. A smoothing board or chain harrows are useful for manure spreading and less harmful to pastures. Don't allow water shortage to check pasture growth during heat waves.

—*A. NAGLE,*
Irrigationist.

Growing Our Own Centro Seed

By J. B. Gude,
Field Assistant,
Agriculture Branch.

An Ingham grazier has carried out the first successful mechanical harvest of centro seed on a commercial scale. This could be the first step in making us self-sufficient in centro seed. In Queensland, there is a growing demand for the seed of this legume, and the development of mechanical harvesting makes it possible for farmers to produce and market home-grown seed.

Centro (*Centrosema pubescens*), a tropical legume introduced and tested by the Department of Agriculture and

Stock, is the most suitable pasture legume for the wet tropics in coastal Queensland. It is palatable, high in protein content, and increases the productivity of grasses in sown pastures.

Seed for planting, being imported, has been in short supply at times, and local production would have great advantages.

Mr. John Murray, of "The Orient," Ingham, has made the first commercial attempt to harvest centro seed mechanically, and he has been very successful. Approximately 15 acres of established pasture, a mixture of molasses grass and centro, yielded one ton of centro seed and four tons of useful fodder roughage.

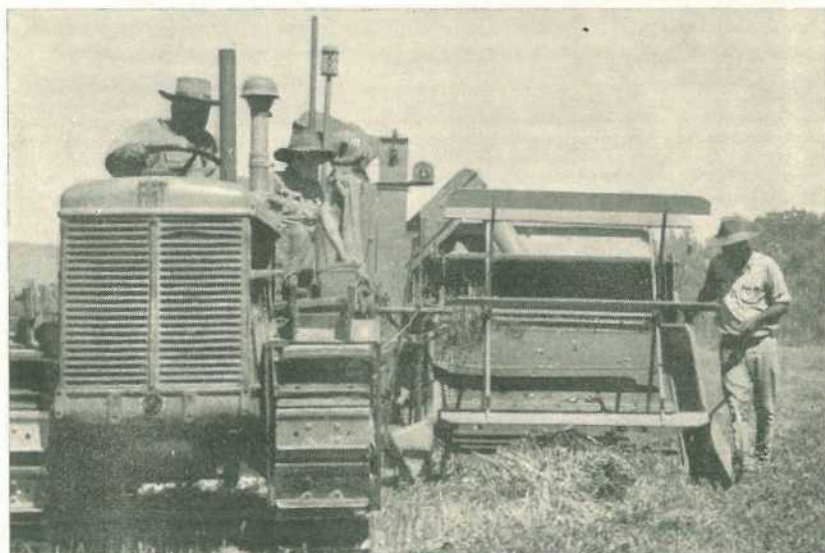


Plate 1.

The Header Picking Up a Windrow of Mown Pasture Ready for Threshing.

The seed was harvested in August, 1958, with the machine illustrated in Plate 1. Two harvesting methods were used. In the first, the pasture was mown short soon after the first centro seedpods opened. The "hay" was cured for a few days, and, when dried out sufficiently for threshing, it was picked up by the machine direct from the windrow. The second method was to top the pasture high, from 8 in. to 15 in., with the machine instead of mowing. This completed the harvest in one operation except for drying the seed on a tarpaulin before bagging. The second was the better method. The pasture could be grazed immediately after harvesting, it saved time and was light work for the machine.

The residue from both methods was valuable as stock fodder. August was generally fine and dry, but heavy dews limited harvesting to the hours between 10 a.m. and 5 p.m.

Yield of Seed

The yield varied from 320 to 480 lb. of centro seed a day depending on the stand. Mr. Murray's average yield of 130 lb. of seed an acre from his mixed pasture is most gratifying and he intends harvesting a larger area next year. Other graziers might follow his example and so establish the production of clean weed-free centro seed as a commercial success in Queensland.



339 Attend Beekeeping Field Day



THIS modern mobile honey extracting van, belonging to Mr. G. HAMMANT, of Oxley, was on display at the Field Day conducted by the Department, in conjunction with the Queensland Beekeepers' Association, at the Queensland Agricultural High School and College's apiary at Lawes. Altogether, 339 attended the field day to see the demonstrations of equipment.

Farmers Beat Deluge With Soil Conservation

By R. F. S. KELSEY,
Soil Conservation Officer.

JUNE, 1958, will long be remembered by Dalby farmers. Erosion struck heavily. The fertile, undulating scrub lands that nestle under the Bunya Mountains and the rich black soil plains for which Dalby is renowned were equally hard hit. This damage was the "worst ever" in several districts. Ample opportunity was provided to compare properties that had been protected with contour banks with those that were untreated.

June found the farm lands about Dalby in a fine state of seed bed preparation—if the crop had not already been planted.

The soil in a good year, because of long and well prepared fallows, has a high moisture content. It is not capable of absorbing much additional water.

A record 8 in. of rain fell in June, exceeding any previous registration for that month. Of this total,



Plate 1.

Erosion Typical of That on Many Moola Farms Following Excessive Rains in June, 1958.



Plate 2.

Extensive Erosion on a Moola Farm During June Rains.

6 in. fell in three days. High mid-winter rains are not usual. Most of Dalby's 26 in. average falls during the summer and early autumn.

Excessive Damage

The rainfall in the Moola-Kaimkillenbun area was as high as at any

centre within the district. Extensive damage was caused to cultivation by gully and sheet erosion.

Many farms had their paddocks torn into strips. Up to 20 per cent. of the top soil to the depth of ploughing was lost from some paddocks.

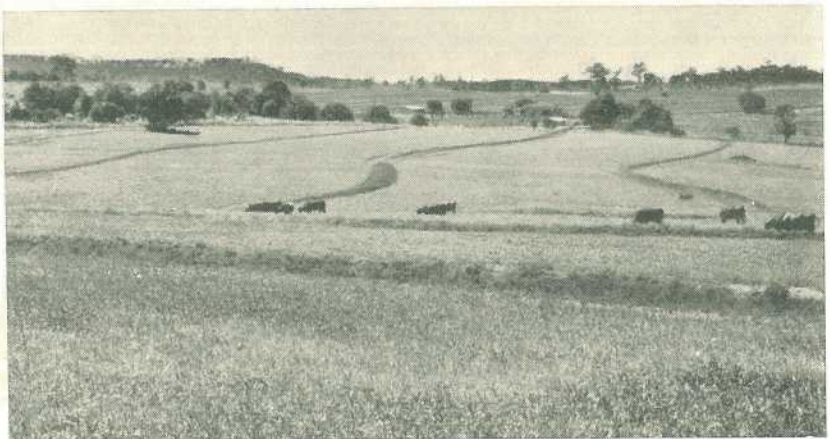


Plate 3.

Farm Near Moola Protected by Narrow-Base Contour Banks.

Fortunately many of the Moola farmers have taken a lively interest in Soil Conservation in recent years. Where contour banks were installed they provided a striking example of their protective value.

Throughout the area the soil conservation earth works proved a complete barrier to the ravages of erosion.

Untreated Paddocks Severely Eroded

Untreated paddocks were an unsightly mess with eroded strips at 5 or 6 yd. intervals and seed bed preparation had to start over again—but not with the same soil nor with soil as fertile as that lost.

Silt fans on the lower portions of the paddock have proved as great a hazard as the gullies themselves. Because of their slow drying and boggy nature, the silted areas could not be planted.

Contour Banked Paddocks Undamaged

On paddocks protected with soil conservation measures, the surface was left entirely in order. Planting following the rains was able to proceed without worries of gullies and silt.

A newly contoured paddock on Mr. G. McKay's property at Moola was left undisturbed by the rain. In previous years this paddock was notorious for the amount of soil that was dislodged to silt, and stop traffic on, the road below.



Plate 4.

Wheat Growing on Contour Banks on Mr. R. Dun's Property at Moola.



Plate 5.

Mr. Dun's Only Unprotected Paddock in June 1958. It was seriously eroded; now partly contoured. See Plate 6.

There were numerous examples of the efficiency of new earth works in paddocks that had previously suffered severe erosion.

Mr. C. Stockwell, in the Kaimkillenbun area, was completing a paddock of contour banks as the rains started. This particular paddock had in the past been severely eroded. Although the banks had no time whatever to settle, they provided the complete answer.

Delays Can Be Costly

"Don't put off 'till tomorrow" is the motto of Mr. R. Dun, of Moola, following the June disaster.

Mr. Dun has been active in furthering the work of soil conservation in the Moola area. Most of his property is contour banked. However, one big paddock remained to be done and erosion hit it hard in June.

Broad stretches of the paddock were sheeted away. Silt covered the road below to a depth of 15 in. for over 100 yd. and held up traffic.

Such deposits represent only a fraction of the gross soil loss. Most remains in suspension in the water and is carried on to silt creeks and rivers.

This paddock of Mr. Dun's has since been worked and planted but this time with a difference. A quick road-side conference between Mr. Dun, interested neighbours, the Wambo Shire Council engineer and a soil conservation officer found everyone co-operative. A soil conservation plan was discussed and approved. It was unanimously agreed that by contouring the paddock there was everything to gain but nothing to lose. Before any further work was done in the paddock, diversion and contour banks were constructed.



Plate 6.

Newly Constructed Contour Bank in the Eroded Paddock Shown in Plate 5.

Further banks are needed but these must wait the construction and grassing of a waterway through the paddock.

The Moola farmers are pleased to work with contour banks. As one farmer puts it: "They just set a paddock off."



The Common Mallard

RECENT requests have sought the introduction of the common mallard into Queensland as a potential game bird.

The Department, as the authority responsible for administering fauna conservation in this State, is not in favour of the introduction of this duck, as the proposal has a number of undesirable features.

Briefly, this duck, known as the common mallard, inhabits each of the northern hemisphere continents. It lends itself to domestication and is the progenitor of nearly all our domestic breeds. It is probably the world's best-known game duck.

As far as Queensland is concerned, exotic species when they become established usually do so to the detriment of native animals. In the case of the common mallard, if it did

become established here, it would do so by taking over part of the available basic food, water and shelter requirements of other native duck species.

The common mallard crosses freely with some other wild duck species, including the Australian black duck. In America, it has crossed with the American black duck, gadwall, pintail, baldpate and green-winged teal. This is another feature not desirable so far as the conservation of particular native species is concerned.

Overseas, the common mallard is partial to wheat, barley, maize, rice and buckwheat, and in some places is a pest. There is, therefore, a strong possibility of crop damage from this species if introduced to Queensland.

—C. ROFF,
Fauna Officer.

Bucket and Bail

MILK and cream cans will sometimes rust in immersion type cabinets causing a loss to the producer both in terms of equipment and milk quality. This rusting indicates either unsatisfactory water or unsuitable cans.

The water in the cabinets should be changed regularly and kept free from foreign matter. A few minutes spent wiping down the outside of the cans before placing them in the refrigerator is a valuable precaution.

If the water becomes acid, rusting will occur. The water can be maintained in a alkaline condition by adding small quantities of caustic soda or soda ash.

Placing untinned cans into water is only asking for trouble. All surfaces should be satisfactorily tinned.

—K. FITZGERALD,
Dairy Officer.

ALTHOUGH silo gas poisoning hasn't been recorded in Queensland, farmers who make silage in towers or deep pits should always be alert for possible trouble. Either or both of two gases, carbon dioxide and nitrogen dioxide, cause the poisoning. They may be given off while a crop is being ensiled or a few days afterwards. Both gases are heavier than air and tend to occupy the space

immediately above the material being ensiled.

As a precaution, you should lower a lighted candle to the full depth of the silo each morning before entering it yourself. If the candle goes out, there isn't enough oxygen for you. If detected, you can remove these gases with a blower or by vigorous action with bags on long sticks.

—A. HUTCHINGS,
Senior Adviser in Cattle Husbandry.

THE need for the most efficient use of pastures and grazing crops has brought the electric fence to hundreds of Queensland farms. But if the fence is to do its job properly, it must be in good working order.

The most common faults are a weak shock or no shock at all.

You can find out whether the fault is in the unit by disconnecting the high tension lead to the fence and seeing whether you can get a spark. A poor spark or no spark at all shows that the fault is in the unit. A flat battery, broken wires or loose or dirty connections may be the cause of the trouble. If the fault persists, the unit should be sent in for expert attention. If the fault is in the fence itself, check the earth and connections. If it still persists, look for broken or trailing wires, damaged insulators or an improperly insulated reel.

—C. G. WRAGGE,
Agricultural Engineer.

Plans For April

Supplementary feeding will extend the lactation period.

Change the separator oil.

Plant winter cereals for grazing.

Inoculate all legume seed.



Green Panic And Its Use In Pastures

By N. F. FOX, Agrostologist, and
R. G. WILSON, Adviser in Agriculture.

GREEN panic has earned a place as one of Queensland's important summer-growing, perennial, pasture types. Its remarkable drought hardiness, palatability and rapid growth-response to rain are the main reasons for its increasing popularity and spread within the 25 to 70 in. rainfall belt of this State.

Green panic is a fine-stemmed guinea grass. Botanically it is *Panicum maximum* var. *trichoglume*. The importance of this grass as a sown pasture

species has increased with the years following 1936. It is most significant that in the Royal National Association's Pasture Competitions conducted within this State since 1954, the winning rain-grown pastures in Class I for areas receiving between 20 in. and 45 in. of rain a year, have been green panic-lucerne pasture mixtures.

The guinea grasses are native to Africa but they have become naturalized throughout the tropical and most of the subtropical world.

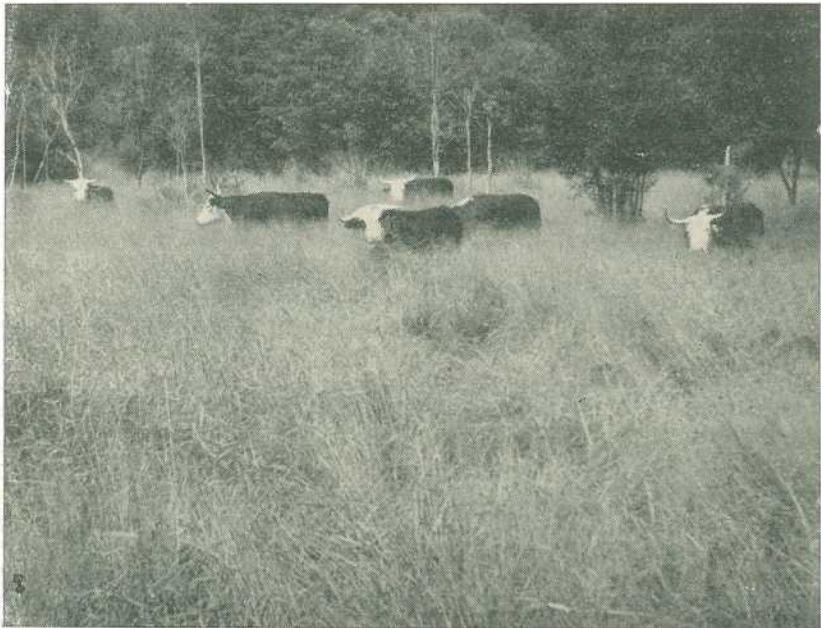


Plate 1.

Topping Off Herefords on Green Panic on "Madoora," Gayndah.



Plate 2.

Seven-Year-Old Green Panic at Mt. Wyangapinni, Pittsworth, Showing Excellent Recovery after the 1951 Drought.

The fine-stemmed strain which was to become known in Queensland as green panic almost certainly came to this country from Africa. Plants were recognised at "Madoora", near Gayndah, about 1936. Their feeding value and vigour so impressed the owner, Mr. Petrie, that he encouraged their spread to embrace some 800 acres of softwood scrub country. (Plate 1). Local farmers obtained seed, and sowings in the area and in adjacent district increased. Considerable quantities of seed are now produced, and the central Burnett at present produces the bulk of the State's green panic seed. The northern Darling Downs is also becoming an important source of seed, aided greatly by the higher degree of farm mechanisation found in the area.

Where it Grows

The distribution of green panic in Queensland is probably wider than any other improved pasture species, including Rhodes, paspalum and kikuyu grasses. Green panic is grown on the Atherton Tableland, and the central and southern coasts. It has spread inland and is grown successfully in the Fitzroy, Dawson and Burnett River catchments. To the south, green panic has been sown in the Brisbane Valley and has become increasingly popular on the Darling Downs.

Pastures of green panic have come into being in the Maranoa, while a small isolated stand has persisted for the past 5 years as far west as Charleville, within the 20 in. rainfall belt. It requires a summer rainfall and grows best in regions lying between

the 70 in. isohyet in the north and the 25 in. isohyet on the Darling Downs.

During the 1957-58 drought, green panic (as with buffel grass) created drought history in districts where rainfall for the year averaged as low as 11 in. Prolonged, record-breaking heat waves checked it until periodic showers encouraged it into rapid growth which provided valuable feed for starving sheep and cattle in many centres. Its growth is checked by frost but in most districts it is able to make new growth during the warm spells usually experienced each winter.

Green panic's climatic adaptability is matched by a wide tolerance of soil conditions. It will grow in acid or alkaline soils (pH5 to pH8) but best results occur from slightly acid (pH 6.5) to neutral soils (pH 7.0).

The plant will grow on the dark, grey-brown, self-mulching, clay loams

of the open forest or downs country. These soils are usually well supplied with phosphorus and lime. They are neutral to alkaline in reaction. It is, however, often difficult to retain on the heavier, dark-grey clays that crack badly when dry, with resultant damage to plants. This is important on the open Darling Downs where plants on these soils are more vulnerable to heavy frosts. Management is a key factor on these plains. Sufficient growth should be left for crown protection prior to the onset of winter.

Green panic pastures have also been successfully established on the grey-brown, yellow-brown and brown brigalow soils.

The grass grows extremely well on Queensland's red loams, particularly on the softwood scrub soils of the Burnett Valley and Darling Downs. These soils are usually acid and phosphates tend to be unavailable.



Plate 3.

Green Panic on Poor Spotted Gum Country on "Madoora," Gayndah.



Plate 4.

Three Months' Old Green Panic on Cultivation at Peachester.

From the coast to the Maranoa, reasonably fair green panic pastures have been grown on poor soils with sandy or loamy textures. Their success under these conditions depends largely on good management. Green panic is tolerant of shade and will grow where lantana dominates and on the coastal scrub soils.

Where a soil lacks adequate nitrogen, green panic generally responds most markedly (in density, height, seed yield and colour) to adequate applications of nitrogenous fertilizer.

What it Looks Like

Green panic is a summer-growing perennial. It is tall and tufted. It will grow to 5 ft. or 6 ft. but normally the foliage will not exceed 3 to 3½ ft.

The seed head is a typical panicle borne on a slender stem, and extruded

well above the foliage. Seed is easily harvested with a header—particularly the "All-crop" types incorporating a "reel-bat" ahead of and above the comb.

As the green panic stand matures, well-developed and spaced tussocks or crowns occur. These crowns will develop to a diameter of 12 in. or so. At this stage, if managed correctly, green panic pastures are usually at their hardiest.

Strong crowns covered with short, woody stems are protected from frost, heat and close-grazing damage. Following rain, these crowns are rapidly covered with succulent feed. Within the spaces between the plants, other grass and legume components such as lucerne, barrel medic, centro, glycine, prairie or wimmera rye according to the district, are able to grow.

In some coastal districts, renovation is conducted to destroy the tussocks and encourage the softer seedling regeneration of the stand.

Frosts may damage exposed green panic crowns. Where frosts are usual, the pasture should be managed so that the green panic will enter the winter with sufficient top growth to protect its crown. Winter bulk can also assist in suppressing new growth in a "false" spring.

The grass is palatable, particularly in the flush-of-growth stage. Its nutritive value is comparatively high. It has marked shade-tolerance and will grow amongst timber and in scrub fringes. It has even grown under dense green brigalow, and has been observed under the leafy wilga trees of the western Darling Downs. In coastal districts, and the higher rainfall scrubs of the eastern Darling Downs, green panic has competed with and dominated tall weeds and lantana.

How to Plant

Green panic has a smooth seed which runs freely through drills and which can be sown easily from the air. It can be sown during September-October or more safely in the January-February period. Except in frost-free areas, later sowings run the risk of frost injury. It is preferable to broadcast or drill it in at 2 to 4 lb. per acre. In some instances, successful sowings into scrub burns or into carefully-prepared seed beds have been made at rates of 1 lb. per acre or less.

Good quality seed is essential at these rates.

Many experienced growers prefer to sow at the rate of 6 to 7 lb. per acre when using their own seed but this is not justified when purchased seed is used.

Plant on to a well-prepared seed bed or scrub burn. Best results on the Darling Downs and Maranoa occur following a 7 to 12 month fallow;



Plate 5.

Dairy Cattle Grazing a Green Panic-Lucerne Pasture in the Monto District.

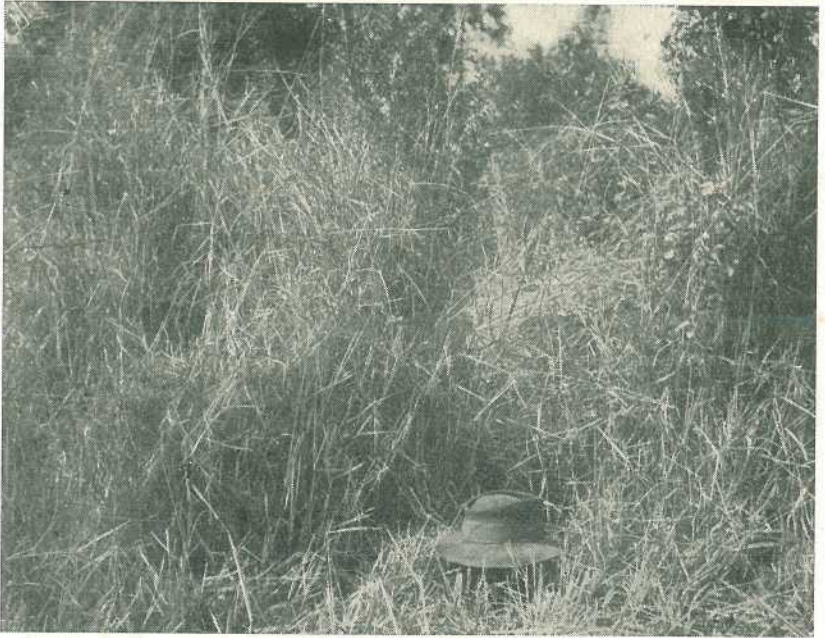


Plate 6.

Green Panic Invading Scrub in the Gayndah District.

particularly those following a sudan or sorghum crop. Some growers oversow their grain sorghum crops with green panic, with the intent of harvesting sorghum seed for home use and reverting the cultivation to pasture.

Excellent drill-sown stands have been produced in loamy soils by sowing high quality seed of 40 to 50 per cent. germination value at $\frac{1}{2}$ to 1 lb. per acre in 28 in. to 42 in. contour spacing. Shallow plantings at 1 in. or less are generally desirable; though satisfactory results with good seed on the Darling Downs have followed from $1\frac{1}{2}$ to 2 in. sowing depths.

The seeding rate to be used will depend on the viability of the seed and the seed-bed preparation. Poor strikes are often traced to faulty seed.

See that bought seed is up to standard. The minimum germination prescribed by law is 15 per cent. The ability of the seed to lie dormant in the soil until favourable conditions occur is interesting. For example, many reported cases of delayed germination have occurred on the Darling Downs. Following the break of the 1957 drought, seed sown some 3 years previously germinated to produce good pasture.

When sowing with lucerne or barrel medic, the lot can be mixed and sown through every run of the small seed box or fine side of the combine suitably reduced or checked to secure the desired rate of flow. Usually the minimum wheat setting is used, preferably with a reduction cog or with a "check" inserted in the hopper to regulate flow. At times, only every second run may have to be used in

order to obtain the desired rate. With the more modern combine-drills little trouble is usually encountered, as low settings are more easily obtained. Spaced contour row sowings involve a little more trouble when using two rows green panic and one row lucerne—as is recommended on the drier areas of the Darling Downs.

On a small scale and in broken country, such as hill tops, vegetative plantings are made at times, by topping and hand-separating plants into root divisions and transplanting these spaced at intervals within the area. This method, with initial protection from stock, is usually most successful.

Aerial sowing into the new ash of scrub burns is also quite successful.

Green Panic Pasture Mixtures

The species has been sown alone to produce a mono-specific sward or row pasture. In sward form, green panic pastures have persisted on fertile soils for up to 20 years. On properties where Rhodes grass is also grown,

there is a tendency for the aggressive creeping Rhodes grass to invade and dominate the green panic.

In drought years, Rhodes grass may be killed out or greatly reduced when in competition with the more drought-resistant green panic. However, in good seasons, Rhodes grass actively invades and suppresses the green panic. Except under very careful management, stock also assist the Rhodes invasion by favouring the green panic and leaving the less-palatable Rhodes grass to grow unhindered.

Green panic will combine with a variety of legumes to produce a well-balanced pasture mixture. Lucerne at 1 to 1½ lb. per acre is the most useful legume to sow, with green panic at 3 to 6 lb. per acre in the Burnett, Maranoa and on the Darling Downs. (Plate 7). Phasey bean is mainly recommended for pioneer sowings, in rough country and in scrub burns. Sowing rates as low as 4 oz. per acre or less are used for this legume. On



Plate 7.

A Well-Managed Green Panic-Lucerne Pasture at Maclaagan on the Northern Darling Downs.

the Darling Downs and in the Maranoa, barrel medic at 1 to 1½ lb. per acre is also included with the lucerne and green panic.

Where row plantings are used, lower planting rates are required. The rates may also be reduced when seed quality is high and the seed bed preparation is good.

Successful management is generally based on a modified "lucerne rotation" method (that is, graze for up to 2 weeks and spell for 4 to 8 weeks—depending on the season). On the Darling Downs, 5 to 8 years old green panic-lucerne pastures are carrying on the average 1 cow to 3 or 4 acres. In good seasons with mild, moist winters, carrying capacity on some favoured scrub areas is as high as 1 cow to 1 or 2 acres. Under drought conditions, this ratio may widen to 1 to 6 or 8. Contour-row green panic-lucerne pastures established for 3 years in the Chinchilla area are carrying stock at the rate of 1 cow to 2 or 3 acres.

On dark, grey-brown forest soils in the central Burnett, a stocking rate of 1 beast to 4 acres is considered satisfactory for this mixture. In reasonably good years, the pasture has maintained stock in condition and produced a steady liveweight gain. Its production per acre varies from two to five times that of native pastures, depending on the type and state of the native pasture. It is usually four times better.

Near Mundubbera and on the Darling Downs, green panic-lucerne pastures have been developed to a high degree. They are either renovated annually or contour-ripped at 2 ft., 11 ft. or 22 ft. intervals down the slope. Green panic seed is harvested by hand, with the reaper-binder or by direct heading. The surplus early summer growth has been conserved as baled hay and silage.

Cattle and sheep find it palatable. It is fattening, and dairy stock milk well on the pasture. At Mundubbera, one 26-acre area sown to green panic and lucerne in 1954 produced during 1956, (an exceptionally moist year) 350 lb. of green panic seed, 1,700 bales of silage, 500 bales of hay and grazing for up to 95 head between August and November.

On the poor coastal soils, green panic has also been used with success in mixtures with molasses grass and centro. Molasses grass tends to fill in or provide ground cover between the tufted green panic plants in the same way that barrel medic, rye and prairie do on the Darling Downs.

Sow green panic at 3 lb., molasses at 1 lb. to 2 lb., and centro at 2 lb. as a mixture per each acre. As in the case of lucerne and barrel medic use only inoculated centro seed and cover as soon after broadcasting as possible. If seed of glycine, fine-leaved stylo or desmodium is available, inoculate these too with the relevant strain of bacteria and, if desirable, sow with the mixture at the rate of ¼ lb. of each to every acre in addition to the 2 lb. of centro.

The use of these "tropical" legumes assists to build soil fertility and provide the nitrogen necessary to maintain green panic on these soils.

Practise a system of deferred grazing. Allow green panic to make growth to 6 in.-12 in. before grazing, but in February-March, ensure that the green panic sets seed.

Molasses grass should be allowed to seed in April-May. This mixture has persisted under a system of deferred grazing for a number of years on the sandy soils in the Bundaberg district.

Seed, Hay and Silage

Green panic seed is harvested in three main ways—by direct header harvesting, by reaper-binder, followed

by stooking in the field and machine threshing, and finally by the more laborious hand-harvesting method in rough scrub areas.

Header-harvesting is a fast method and is preferred by most growers on the Darling Downs. Yields vary from 1 bag (55 to 60 lb.) to over three bags (180 lb.) per acre. As many immature seeds are harvested in the process, heating and the ultimate deterioration of the product are inevitable unless drying of the seed occurs. This entails the provision of sufficient floor space for spreading and turning prior to bagging. Greatest yields with the least effort are obtained by means of the modern "all-crop" type header-harvester.

A number of farmers with limited floor drying space incorporate with header-harvesting the *reaper-binder* method. This involves leaving the sheaves in stooks to dry in the field, threshing then taking place after a suitable interval. To minimise seed

losses while "stooked", the heads are tied in so that most of the seed will fall into the sheaves. Yields are in the vicinity of 160 to over 200 lb. per acre.

Hand harvesting and "sweating" is still used in rough country where it would be impossible for the use of orthodox equipment. Sufficient floor space for seed drying as in the header-harvester method limits the area to be harvested. Yields are usually heavy, but seed viability may be greatly impaired by allowing high temperatures to develop in the "sweat" heaps. Temperatures in these heaps should not exceed 90 deg. F.

For home supplies some farmers use a harvesting box or tray. This is attached to the front of a vehicle or tractor which is driven into the seed stand at 8 to 10 miles per hour. Only the ripest seed is harvested and yields vary from 30 to 60 odd lb. per acre.



Plate 8.

Stooks of Green Panic Harvested for Seed in the Mundubbera District.

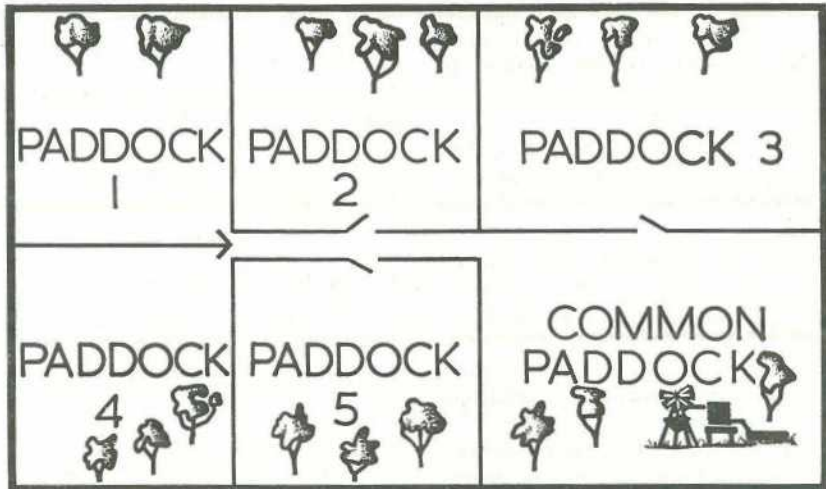


Plate 9.

Diagrammatic Layout for the Lucerne Rotational Grazing. Each paddock in turn would be grazed for two weeks, then closed up for eight weeks.

The germination percentage of green panic seed improves with storage for up to two years or so. It is often advisable to hold freshly harvested seed at least a season or 12 months in a dry, airy place before sowing.

To comply with the Agricultural Standards Act of Queensland, green panic seed for sale must have a germination percentage of 15 per cent. or greater.

Green panic or a green panic-lucerne pasture cut at the flowering stage makes a good hay. During the 1957 drought, many bales of good-quality baled hay were fed back with a grain supplement to aid and continue production. A grazier in the 22 in. average rainfall district of Glenmorgan, in south-eastern Maranoa commented that his baled green panic-lucerne hay was of a considerably better quality than his baled wheat and oaten hay. Some 88 bales per acre were harvested in 1954. Yields vary from one to three tons per acre.

With the event of the buckrake and forage harvester, some dairymen have converted their surplus into silage, some 5 to 8 tons green weight per acre being ensiled.

Assisted by nitrogenous fertilizer applications, some green weights on the Darling Downs have reached a peak of 12 tons. The air-dry matter equivalent was about 4 tons/acre.

Management Vital

Once a green panic pasture germinates then the most vital contribution to its success and persistence lies largely in its management. If grazing is unavoidable in the first season, allow some 12 in. to 2 ft. of bulk to develop before lightly grazing. Most growers prefer to allow the pasture to seed as a safety measure in the first year before grazing. This is a matter of intelligent judgement gained from individual experience under the particular environment.

The system of grazing may vary according to the season, area and topography. In general, a broad system combining deferred and rotational grazing is desirable for the small and larger grazing areas. Under small paddock systems, a system of "on-and-off" grazing based on a modified "lucerne rotation" system is profitable, that is a rapid but not close grazing-off followed by 4 to 8 weeks spelling—depending on the maturing

stage of the lucerne growth. During the late autumn to early spring months, this system may have to be modified for the good of the green panic component in the mixture. One system of subdivision using a common paddock to make use of only one watering point is illustrated. (See Plate 9.)

Many good stands had been damaged in the past by close early spring and late autumn grazing and mowing. Overstocking is often a danger where strip grazing is carried out, as there is a pronounced tendency to keep stock on the strips for too long.

Green panic should go into winter with some bulk growth as crown protection. The amount of bulk depends largely on the frost incidence and its ultimate use within the farm economy—for example as stand-over hay.

Green panic, lucerne and barrel medic pastures when irrigated have provided bulky, high-quality feed which has produced high milk yields on parts of the Darling Downs. In the southern parts of the Downs the oversowing in the next season of either prairie perennial prairie or wimmera rye and possibly some of the

hardier subclover strains such as Clare, Yarloop or Baechus Marsh could also be an asset. The use of an irrigated green panic-centro pasture is also worth considering for the lighter soils in frost-free areas of the State.

The results obtained by various prize-winners in the Royal National Association's Pasture Competition since 1954 indicate that well-managed green panic-lucerne pastures have the following advantages when correctly managed:

1. Practically 100 per cent. weed and soil erosion control.
2. Clean run-off water into the dams.
3. Comparatively long grazing season, particularly where the lucerne component is high.
4. Rapid response after rain providing nutritious feed. (It is common to have some 6 in. or so of succulent feed before the native pastures have "shot.")
5. Ability to maintain a high level of lucerne population for at least 7 years.



Stock and Slaughtering Inspectors

Examinations of candidates for admission to the Public Service as—

- (a) Inspector, Division II. (Stock),
Division of Animal Industry;
or
(b) Inspector, Division II.
(Slaughtering), Division of
Animal Industry;

Department of Agriculture and Stock, will be held in Brisbane and other principal towns of the State on May 25 and 26. Vacancies are:—

- (a) Inspectors, Division II.
(Stock) 4

- (b) Inspector, Division II.
(Slaughtering) 1

Candidates who obtain the minimum marks will subsequently be required to undergo viva voce tests and will be required to pass a medical examination.

Application forms, a copy of the regulations containing a list of the subjects in which candidates will be examined, and particulars of textbooks, etc., may be obtained from the Secretary to the Public Service Commissioner, Box 59, P.O., Brisbane-North Quay.

You Can Put a Stop to This . . .

The cow this heart was taken from was sick for two days with symptoms of a digestive upset. At the end of this time she died suddenly.

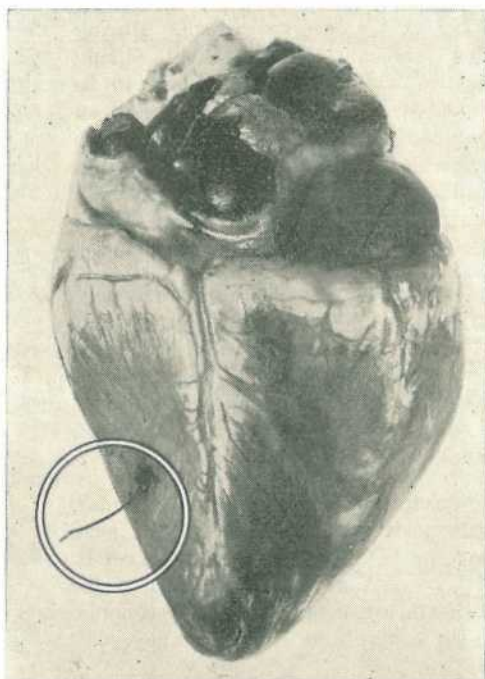
You can see the wire and the wound it has made in the heart. The wire was swallowed in the feed and worked its way through from the "honeycomb" (reticulum) into the heart.

Generally wire (or bone or other foreign bodies) take much longer to work through and cause a chronic condition.

What can be done to prevent a fatality of this sort?

1. Keep the food supplement as free as possible from foreign bodies.

2. Feed phosphate if your cows chew foreign objects outside the bails.



3. If the foreign body has not penetrated too far, a veterinary surgeon can remove it by an operation. So call him early, while the cow is showing only mild symptoms.



Cattle on Sheep Stations

"Calf-Branding on a Sheep Station," the subject used on the cover of the January issue of the *Queensland Agricultural Journal*, has for many years been a yearly routine on many sheep properties.

The enterprising sheepman is often a stockman in the true sense, and can, according to the country he owns or manages, employ cattle as a further means of making the most of his property. This is particularly noticeable on those properties where there is, as the stockman puts it, "That bit of rough country," "the ridges," "the back paddocks," or in those areas where there might be "an odd dog or two."

Rapid growth following a wet season can make heavy bodies of grass,

resulting in a wall of feed, which sheep will not readily penetrate. Then the use of cattle will assist in opening up, giving the following sheep a better chance to track through and benefit from this feed.

Also, there is often the block that may not be so well watered or subdivided, where good grazing is a fair way from water. Cattle lend themselves more readily to these conditions than sheep, and so the sheepman runs cattle.

These men are the mixed farmers of the grazing country, who know the value of "a few" cattle in the sheep country.

—JOHN G. NATION,
Adviser in Sheep and Wool.

Stock and Station

SOME graziers in the Rockhampton district have placed their bulls into the breeding herd to ensure earlier calving. They have adopted the following methods:—

1. Heifers coming into the herd to replace old breeders are mated separately from October to December.

2. Breeders which are obviously not in calf when calves were weaned are drafted off and mated at the same time as the heifers.

3. Bulls are placed with calving breeders a month earlier than what has been regarded as the normal time.

By using these methods and taking as many culls as practicable from the late calving section of the herd, earlier calving (July-September) should be effected in the shortest possible time.

Earlier calving is a sound practice when it goes hand in hand with good husbandry and management.

—*J. ARBUCKLE,*
Senior Adviser in Cattle
Husbandry.

Timely Tips For April

April might be regarded as the beginning of winter. Last year "winter dysentery" swept through the State after the Exhibition. It caused scouring and loss of condition and production in our dairy herds. Treatment was of limited value.

We must be careful this year not to regard every cow that scours as having "winter dysentery". Many cows will scour from other causes such as Salmonellosis, nutritional upsets, arsenical poisoning, etc. Judge each case individually. Some will require urgent treatment.

Don't make the mistake of thinking that they're all "winter dysentery".

Changeable weather and a declining milk supply may make symptoms of pneumonia more obvious in your pigs. This extremely common disease causes panting, high temperature and unthriftiness—and a great loss of income to pig growers.

Erysipelas may also occur this month, although it may be seen at any time. It is a disease which may take many forms. Veterinary advice will lessen the loss from either of these conditions in pigs.

Swollen joints and lameness in calves may follow navel infection soon after birth. Tincture of iodine (2 per cent.) painted on the cord as early as possible after birth will prevent.

Strangles vaccine if used correctly, will make an attack of this disease less serious to a horse. If you hear that Strangles is about your district, contact your local vet. to vaccinate your horses. To be successful this vaccine must be used properly.

Tuberculosis-Free Cattle Herds.

(As at 1st March, 1959.)

Aberdeen Angus.

- G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

- M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus," Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reushle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Spurling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooolin
H.M. State Farm, Numinbah
- Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafeld Farm," Wallumbilla
J. Crooke, "Arolia" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

- L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
B. Goddard, Mt. Tyson, *via* Oakkey
- C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

- C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
- S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

- C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendsen, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
- R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Woowoonga, *via* Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

- Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
- G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
S. A. Cramb, Bridge st., Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgildie
R. N. Burrows, Box 23, Wondai
W. T. Tatnell, Cedar Pocket, *via* Gympie

Poll Hereford.

- W. Maller, "Boreview," Pickanjinnee
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick.
- E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

- W. Leonard & Sons, Welltown, Goondiwindi

Recorded Herds Averaged 345 Gal. Last Year

By S. E. PEGG, Chief Adviser, Herd Recording Section.

During the 1957-58 herd recording year, 43,726 cows from 1,217 herds completed lactations for an average production of 345 gal. of milk and 143 lb. of butterfat.

AS drought conditions prevailed for a considerable portion of the season this yield was higher than expected. For comparison the average butterfat production per cow in 1955-56, a normal year, was 155 lb. fat. In the same years, total butter production for the State dropped from 48,189 tons in 1955-56 to 32,280 tons in 1957-58. Thus the yield of recorded cows dropped by only 8 per cent., whereas the total butterfat production for the whole of the State was 33 per cent. lower.

From this it can be deduced that members of herd recording groups were in a better position to withstand the ravages of drought than other dairymen. It does seem that herd recording has created an awareness of the necessity to provide against lean periods.

Owing to the dry season, a number of farmers withdrew their herds from recording groups. The number of groups recorded fell from 81 to 78 during the year. In a number of cases, when a recorder resigned he was not replaced but the members of the group were serviced by the recorders of adjacent groups.

The total completed lactations and average production per cow for each year since group recording was instituted are given in Table 1.

TABLE 1.

Year.	Herds.	Lactations.	Average Production per Cow.		
			Milk (lb.).	Test (%).	Butterfat (lb.).
1948-49 ..	507	17,216	3,289	4.3	144
1949-50 ..	715	22,392	3,523	4.3	152
1950-51 ..	814	26,798	3,312	4.4	146
1951-52* ..	818	23,123	2,657	4.2	112
1952-53 ..	1,073	34,304	3,467	4.3	150
1953-54 ..	1,202	41,378	3,143	4.3	134
1954-55 ..	1,266	45,734	3,486	4.3	150
1955-56 ..	1,412	54,352	3,563	4.3	155
1956-57* ..	1,466	59,711	3,508	4.2	149
1957-58* ..	1,217	43,726	3,449	4.1	143

* Drought year.

TABLE 2.

Age Group.	Cows.	Average Production per Lactation.		
		Milk (lb.).	Test (%).	Butterfat (lb.).
2-year-old	6,278	3,006	4.2	127
3-year-old	4,980	3,247	4.2	137
4-year-old	4,441	3,495	4.2	147
Mature	18,955	3,749	4.1	153
Unknown Age	9,072	3,219	4.1	133
Total	43,726	3,449	4.1	143

Average Production of Age Groups

Table 2 shows the number of cows, according to age groups, which completed recorded lactation periods of 300 days or less, and their average production.

Once again it is necessary to draw attention to the large number of cows of unknown ages. Some 9,072 cows representing 20.7 per cent. of the total cows which completed recorded lactations were of unknown age. This compares unfavourably with the 19.2 per cent. of last year and 14.8 per cent. in 1955-56. In herds which have been recorded for a few years, there should be no cows of unknown age. If this information has been recorded on the shed sheets it will be readily available for the recorder, who can enter it on the record sheet when the cow enters the milking herd each season.

Average Length of Lactation

A pleasing feature of this year's results was the average length of lactation. It was 247 days, the longest ever achieved. For some years the short lactation period of dairy cows has caused much concern to the dairying industry. It is to be hoped that the period will continue to increase from year to year. The average length of lactation each year since 1948-59 is given in Table 3.

TABLE 3.

Year.	Length of Lactation (Days).
1948-49	220
1949-50	223
1950-51	203
1951-52	209
1952-53	210
1953-54	211
1954-55	224
1955-56	229
1956-57	230
1957-58	247

The average length of lactation for each of the areas in the State is given in Table 4.

TABLE 4.

District.	Length of Lactation (Days).
Atherton Tableland	251
Mackay	257
South-Eastern Queensland	254
Eastern Downs	239
Western Downs	229
Central Burnett	260
Dawson-Callide	238
South Burnett	241
Port Curtis	253
Upper Burnett	254

Average Production in Each Group

The average production for each Herd Recording Group is shown in Table 5. The Groups are listed according to districts and the average production of each district is shown also.

TABLE 5.

District/Group.	Herds.	Cows.	Average Length Lact.	Average Milk (lb.).	Average Test (%).	Average Butterfat (lb.). 1957-58.	Average Butterfat (lb.). 1956-57.
<i>Atherton Tableland</i> ..	72	2,725	251	4,089	4.1	168.3	173.2
Malanda No. 1 ..	14	529	246	4,924	4.1	199.8	204.9
Malanda No. 2 ..	19	685	259	3,900	3.8	149.8	151.7
Malanda No. 3 ..	18	792	255	4,241	4.1	174.5	164.0
Millaa Millaa ..	21	719	244	3,487	4.5	155.8	174.5
<i>Mackay</i>	16	726	257	3,162	4.4	137.9	145.8
<i>Port Curtis</i>	60	1,793	253	2,667	4.5	119.3	123.2
Mount Larecom No. 1	14	406	240	2,384	4.2	100.5	123.6
Mount Larecom No. 2	11	250	253	1,951	4.5	88.0	104.8
Rockhampton ..	14	511	253	2,939	4.7	136.7	130.5
Rosedale	13	458	258	2,891	4.5	130.1	134.1
Wallville	8	168	268	2,982	4.3	129.3	121.3
<i>Dawson-Callide</i> ..	57	2,628	238	2,760	4.3	117.4	132.0
Biloela No. 1 ..	16	950	245	2,790	4.3	118.6	142.8
Biloela No. 2 ..	13	504	256	3,161	4.4	138.9	135.6
Biloela No. 3 ..	14	567	223	2,611	4.3	112.3	110.4
Wowan	14	607	230	2,552	4.0	102.5	128.9
<i>Upper Burnett</i> ..	36	1,416	254	2,852	4.4	124.5	141.6
Monto No. 1 ..	17	612	253	2,772	4.3	118.2	148.6
Monto No. 2 ..	19	804	255	2,912	4.4	129.3	134.0
<i>Central Burnett</i> ..	40	1,478	260	3,355	4.2	141.1	139.3
Biggenden	15	597	275	3,769	4.3	162.0	154.6
Mundubbera No. 1	6	300	255	2,969	4.2	124.0	114.6
Mundubbera No. 2	9	293	243	3,062	4.2	127.5	153.9
Mundubbera No. 3	10	288	253	3,200	4.0	129.6	136.4
<i>South Burnett</i> ..	213	8,136	241	3,453	4.0	137.3	148.5
Durong	9	728	240	4,247	3.7	156.4	176.7
Kilkivan	15	535	258	2,565	4.3	109.6	114.2
Kingaroy	22	756	231	3,773	3.8	141.5	162.2
Kumbia-Ironpot ..	16	954	238	3,861	3.6	140.7	131.1
Murgon	16	749	249	3,371	4.1	137.6	142.3
Nanango No. 1 ..	18	703	245	3,165	4.1	130.0	148.4
Nanango No. 2 ..	18	710	242	3,726	4.0	147.4	166.0
Nanango No. 3 ..	18	586	247	4,054	3.9	159.7	140.2
Proston No. 1 ..	11	440	235	3,158	4.3	135.4	161.9
Proston No. 2 ..	15	605	240	2,847	4.4	124.9	124.3
Tansey	20	473	242	2,676	4.3	116.3	133.6
Wondai	12	365	251	3,525	4.0	141.9	159.7
Wooroolin-Tingoora	23	532	221	3,154	4.1	129.3	143.0
<i>South-East Queensland</i>	452	16,500	254	3,314	4.2	138.8	139.7
Beaudesert No. 1 ..	10	576	246	4,138	3.7	153.9	150.4
Beaudesert No. 2 ..	13	518	235	2,979	4.2	125.4	132.7
Beechmont-							
Currumbin	19	753	248	3,156	4.2	132.8	123.7
Beenleigh	19	643	250	3,367	3.8	129.0	123.3
Boonah	20	682	253	4,141	4.0	163.9	178.2
Brisbane No. 1 ..	22	608	244	4,039	3.8	153.5	179.3
Brisbane No. 2 ..	20	854	260	3,568	3.8	134.9	130.8
Cedar Pocket ..	12	300	261	3,101	4.5	140.3	127.4
Cooroy	15	699	264	3,041	4.5	136.0	148.4
Esk No. 1	15	630	255	4,035	4.2	169.2	146.6
Esk No. 3	12	402	252	3,803	4.3	161.9	142.1
Gatton	16	441	233	3,276	3.8	124.5	150.9

TABLE 5—continued.

District/Group.	Herds.	Cows.	Average Length Lact.	Average Milk (lb.).	Average Test (%).	Average Butterfat (lb.). 1957-58.	Average Butterfat (lb.). 1956-57.
<i>S.-E. Q'ld.—cont.</i>							
Gympie No. 1 ..	14	529	246	2,631	4.4	116.3	124.2
Gympie No. 2 ..	15	852	268	2,879	4.9	140.5	139.0
Ipswich No. 1 ..	14	402	254	3,157	4.1	130.6	138.6
Ipswich No. 2 ..	19	522	248	3,400	4.1	138.2	141.0
Ipswich No. 3 ..	14	508	251	4,053	3.8	154.3	129.2
Kenilworth ..	17	641	269	3,636	4.2	153.3	161.5
Kilcoy	22	916	246	2,948	4.4	129.2	118.5
Laidley	8	129	232	2,342	4.5	104.8	142.4
Lowood	18	433	244	3,292	4.2	137.6	151.8
Maleny No. 1 ..	18	577	247	2,790	4.6	127.4	143.1
Maleny No. 2 ..	15	459	264	2,981	4.7	138.9	158.3
Maleny No. 3 ..	9	432	270	3,657	4.4	159.2	..
Maryborough ..	10	258	253	2,685	4.3	115.9	135.5
Merrimac—							
Mudgeeraba ..	15	845	253	3,619	4.0	144.7	139.7
Mooloolah—Kureelpa	20	667	260	2,708	4.3	116.9	137.4
Pomona	15	544	257	2,924	4.6	135.5	133.6
Wolvi	16	680	261	2,800	4.5	125.2	118.3
<i>Eastern Downs</i> ..	193	5,539	239	4,261	4.1	173.0	188.8
Allora No. 1 ..	16	446	219	3,936	4.1	160.9	194.0
Allora No. 2 ..	17	329	237	4,923	3.9	194.2	..
Crow's Nest ..	23	555	248	3,297	4.2	139.2	144.5
Goombungee ..	16	549	237	3,980	4.1	164.6	214.5
Oakey	19	832	247	4,179	4.1	170.2	180.6
Pittsworth No. 1 ..	20	677	244	4,845	4.0	195.2	224.8
Pittsworth No. 2 ..	6	185	249	4,385	4.4	192.5	230.5
Toowoomba No. 1	21	582	239	4,608	4.2	191.4	225.0
Toowoomba No. 2	24	632	241	4,262	3.7	159.0	172.6
Warwick No. 1 ..	20	548	228	4,236	4.1	174.1	180.5
Warwick No. 2 ..	11	204	236	4,653	4.1	189.2	188.5
<i>Western Downs</i> ..	78	2,785	229	3,580	4.0	143.6	166.4
Chinchilla No. 1 ..	15	570	231	3,610	3.9	142.2	165.7
Chinchilla No. 2 ..	14	373	228	3,754	4.1	154.3	180.3
Dalby No. 1 ..	19	685	224	3,673	4.1	149.5	187.1
Jandowae	17	740	232	3,669	4.0	145.5	154.7
Miles	13	417	229	3,125	3.9	122.5	148.7
<i>Queensland Figures</i> ..	1,217	43,726	247	3,449	4.1	142.5	148.9

Butterfat Ranges of Cows

The number of cows whose yields came within the various butterfat ranges is shown in Table 6.

TABLE 6.

Range of Butterfat.	Number of Cows.	Percentage of Cows.
Under 100 lb. ..	10,551	24.1
100-149 lb. ..	15,423	35.3
150-199 lb. ..	10,975	25.1
200-249 lb. ..	4,543	10.4
250-299 lb. ..	1,513	3.5
300-249 lb. ..	493	1.1
350-399 lb. ..	163	0.4
400 lb. and over ..	65	0.1

The percentage of cows which produced less than 100 lb. fat for a completed lactation increased from 22.5 per cent. in 1956-57 to 24.1 per cent. in 1957-58. This means that one cow out of every four produced less than 100 lb. fat.

Even allowing for the adverse seasonal conditions this is far too many. More attention must be given to these cows as they cannot be profitable to their owners. They should be culled to make room for more profitable animals or else fed adequately to ensure greater production.

TABLE 8.

Herd Owner.	Group.	Breed.	Number of Cows.	Average Production.			
				Milk (lb.).	Test (%).	Butterfat (lb.).	Length of Lactation (Days).
11-20 Cows.							
L. G. Weier	Allora No. 1	A.I.S.	19	9,345	3.6	340	273
K. M. and R. Laws	Malanda No. 1	A.I.S.	16	7,841	4.0	317	279
N. Sippel	Lowood	Jersey	15	6,246	4.6	290	278
21-50 Cows.							
A. Ruge and Sons	Biggenden	Guernsey	50	7,183	4.4	319	289
E. and V. Shield	Brisbane No. 1	A.I.S.	32	7,800	3.9	301	285
J. H. Fletcher	Warwick No. 1	A.I.S.	34	7,150	4.1	291	277
51-100 Cows.							
J. McInnes	Durong	A.I.S.	70	8,127	3.8	307	292
K. McIntyre	Pittsworth No. 1	A.I.S.	72	7,348	4.1	302	265
P. J. Donaghy and Sons	Malanda No. 1	A.I.S.	57	6,659	3.9	262	261
101 and Over.							
A. R. Reidy	Kumbia-Ironpot	A.I.S.	118	5,672	3.7	208	268
H. Seng No. 1	Durong	Mixed	104	4,722	3.6	172	241
P. E. H. O'Brien	Jandowae	Jersey	156	3,478	4.7	163	244
R. L. Harrison	Beaudesert No. 1	A.I.S.	118	4,509	3.6	163	247

Herds in Various Production Ranges

The numbers of herds in various butterfat production ranges are given in Table 7.

TABLE 7.

Butterfat Production Range.	Number of Herds.	Percentage of Herds.
Under 100 lb. ..	222	18.2
100-149 lb. ..	566	46.5
150-199 lb. ..	297	24.4
200-249 lb. ..	102	8.4
250-299 lb. ..	23	1.9
Over 300 lb. ..	7	0.6

These results indicate that 65 per cent. or two out of every three herds, averaged less than 150 lb. butterfat. The present position of the industry demands economic production. This cannot be obtained unless the output per cow is increased.

Highest Producing Herds

The highest producing herds together with their production results are listed in Table 8. The herds are listed in sections according to the number of cows which completed lactations.

These results, obtained despite the drought, tell the story of careful farm planning and husbandry.

The proof of the value of continuous herd recording can be found on the numerous farms where progressive increases in annual production have been obtained by recording members. An excellent example this season was provided by the herd with the overall highest average production per cow. The 19 cows in this herd, which belongs to Mr. L. G. Weir, Allora, averaged 9,345 lb. milk and 340 lb. fat. When

first recorded in 1952-53 the average production of the then 16-cow herd was 6,220 lb. milk and 243 lb. fat. During this period the length of lactation has increased from 231 days in 1952-53 to 273 days this year.

This result and the overall manner in which recorded herds maintained their production in spite of the adverse drought conditions in 1957-58 season indicates that regular recording of cows provides a valuable yardstick on which producers can assess the success of their farm management and husbandry practices.

Field Day For Beekeepers



This home-built, boom-type, line loader was demonstrated by Mr. R. KELLOR, of Banyo, at the Beekeepers' Field Day (see page 140).

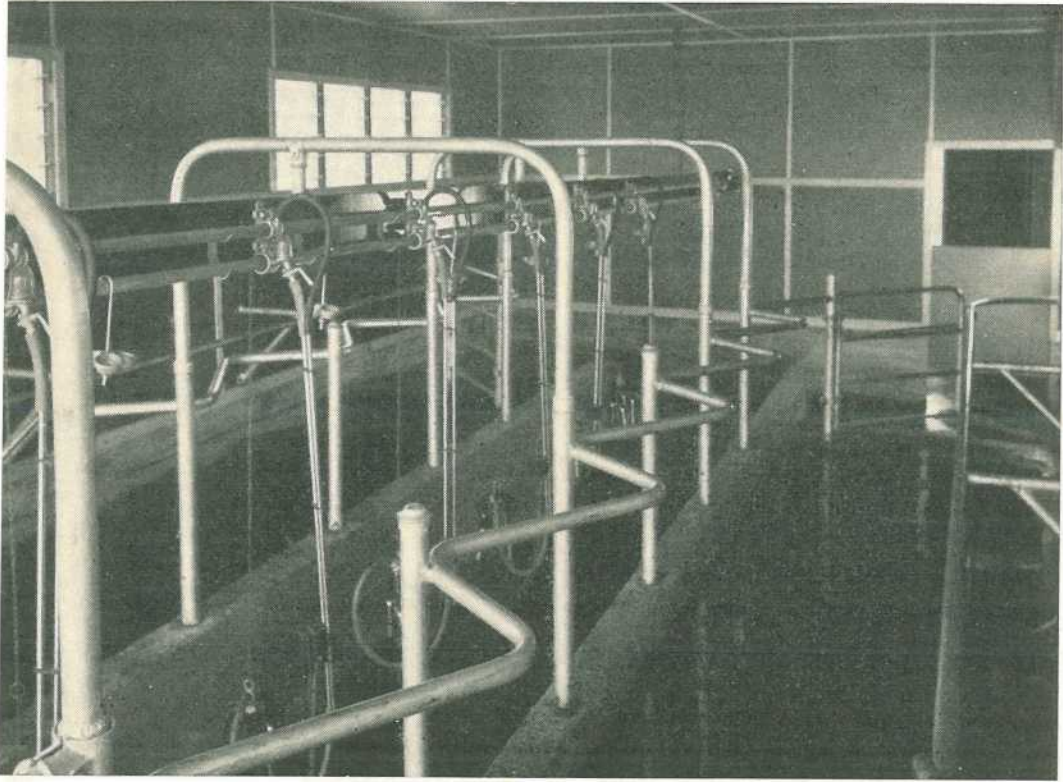


Plate 1.—A View of the Elevated Herringbone Milking Shed.

This Shed Milks Cows Quicker ... With Less Work

By J. D. ELRINGTON, Senior Adviser (Machinery).

If the object of building a new milking shed is to milk cows quicker and with less labour, then farmers must be interested in the "elevated herringbone" milking shed. Trials of shed designs to discover milking times have been made in New Zealand. These show that up to 60 per cent. more cows can be milked by each man each hour in one-man herringbone sheds than in other one-man sheds.

A few milking times have been taken in some of the herringbone sheds in Queensland, and these times all favour this design. The operator is not working so hard as formerly, either. The following table shows the comparative milking times taken on six occasions in sheds of the walk through and herringbone styles.

These times were taken from when the cups were placed on the first cow until they were taken off the last one.

Shed Design.	Milking Units.	Milkers.	Herd Size. (Cows).	Average No. of Cows per Man per Hour.	Average No. of Cows per Unit per Hour.	Additional Duties.
Farm A— Walk through ..	6	2	87	35	11.6	No feeding No hand stripping
Farm B— Herringbone ..	7	2	112	45	11.5	..
Farm C— Walk through ..	4 (1 double 2 single)	2	63	25	12.6	Meal fed in bails
..	..	2	64	21	10.7	..
Farm C— Herringbone ..	6	2	56	43	14.3	Meal fed in bails
..	6	2	56	40	13.7	..

There is no significant difference in the average number of cows milked by each set of cups, but there is a vast difference in favour of the herringbone bail in the average number of cows milked each hour by each man. While two men were necessary in the walk-through sheds, one man could have comfortably supervised milking in the herringbone sheds. In these latter sheds it was found that the two milkers were waiting on the machine for every race of cows to be milked. The job was much easier, because there were less visits to the cowyard, and there was no bending under each cow three or four times.

Back chains are eliminated. Leg-ropes or leg-hooks and chains can be used but, after installation, frequently lie idle. When used, the leg is drawn back towards the post which supports the zig-zag rail.

Very seldom does the herd divide evenly into the correct number of cows to completely fill the last race. A rail is kept in the milker's alley to

slide across the cow platform at the side of the last cow, to hold the last few cows in position.

HERRINGBONE CONSTRUCTION

This new type of milking shed is only different from the combined shed (walk-through type) in the milking section. The milk room, wash-up area, and engine room air space are the same, and the whole building is subject to the same requirements of the Dairy Produce Acts.

The floor of the whole building is on three levels and the drainage is toward the cowyard. The milker's alley and cowyard are on the same level. The floor of the milk room, air space and cow exit passage is 15 in. higher than the milker's alley, and the cow platforms are 15 in. higher still, that is, 30 in. higher than the milker's alley and cowyard.

The cows walk up a ramp rising 30 in. from the cowyard. This ramp can be fairly long, to reduce the

grade. If the concrete is roughened, the cows have no difficulty in walking up this ramp.

They stand diagonally across the cow platforms, heads to the outside wall, and heads and bodies inclined towards the milk room. The rail which is bent in a zig-zag fashion assists them to stand in the correct position. The milker works in the alleyway, and is not required to do any bending. He walks only 3 ft. (2 short paces) to move from one cow to the next and the teateups are suspended within easy reach.

Cows find it easier to walk up a hill than down it. As the exit path is 15 in. above the milker's alley floor, the cows only have to be brought down 15 in. from the cow platforms to the exit path. The down ramp can be fairly short, and is still not very steep. It should be grooved across the ramp with deep toeholds to minimise slipping. If cows still show a tendency to slip, a bag can be thrown on these ramps to afford a better grip but rough concrete and $\frac{1}{2}$ in. deep grooves are sufficient to arrest slipping.

Alternative Designs

There are alternative designs to the one shown in the Departmental plan. Sheds built to these alternative designs have been carefully examined, and the Departmental plan was drawn after this examination. Consideration of pleasant working conditions, drainage and ease of cow entry and exit influenced the adoption of the design chosen and described here. Construction offers no difficulties to any qualified builder, and farmers who have a sound knowledge of carpentry should be able to erect the structure themselves.

An architect's ground and elevation plan together with a complete list of

the materials and an order sheet can be supplied to intending builders. This material is available in every Departmental office where a Dairy Officer is stationed.

SITE AND SIZE OF SHED

Selection of the site, provision of water supplies, and design requirements are already adequately covered in the Division of Dairying Pamphlet No. 37, "Dairy Farm Premises." Minor variations dictated by the changed design are discussed here.

(a) Site

As excavations are necessary, the slope of a site can be used to advantage. As previously explained, the plan shows that the floor of the milk room, the engine room, and the end of the milking section nearest the milk room is 15 in. higher than the milker's alley and the cowyard. The floor of the milker's alley is at cowyard level. A site with a gentle slope from milk room to cow yard is advantageous.

(b) Orientation of the Building

The plan shows the ideal direction of the building for the majority of dairying districts in Queensland, that is open side to the north east, closed and protected side to the south west. This arrangement can be varied to suit local climatic conditions and the site, although it is advantageous to have as much sunlight as possible shining into the bails.

(c) Size of the Herd and the Herringbone Shed

A frequent question is, "How small a herd can be economically milked in a herringbone shed?" and a statement often heard is, "The herringbone shed is only suitable for large herds."

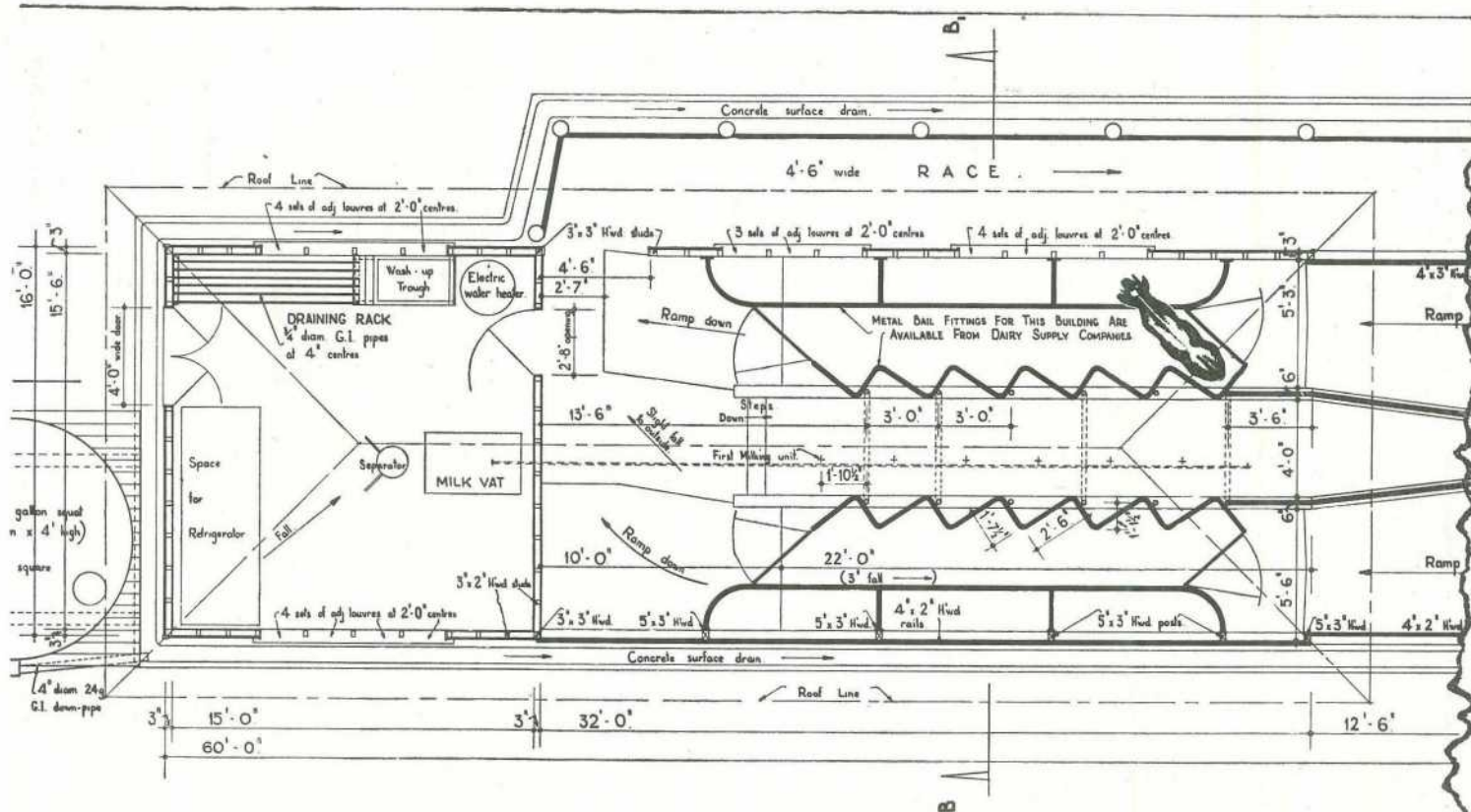


Plate 2.

Plan of the Elevated Herringbone Milking Shed. This is a reduced section of the full Departmental plan.

In the herringbone shed, one man is required for six sets of cups, and each set of cups can milk 10 to 12 cows an hour. The man is working at a reasonable pace because this shed reduces the effort required to milk the cows. With the walk-through design, one milker can only supervise up to four sets of cups satisfactorily.

There is no doubt that in large herds a reduction in milking time, labour and effort is obtained ("labour" refers to the number of persons required). With the herringbone design, one man can milk about 70 cows an hour. An examination of the number of cows per man per hour in the sheds listed in the table would suggest this number is high, but as explained earlier the two milkers in sheds B and C were not fully occupied during milking.

The herringbone design is also recommended for small herds, even when no more than three sets of cups are required, because of the reduced effort necessary at every milking. The Departmental plan can easily be modified by adding to or subtracting from the length of the building in the plan 3 ft. for every set of cups more or less than the six shown.

COMPARATIVE COSTS

A 6-unit herringbone bail building (holding two rows of six cows, air space and 15 ft. 6 in. x 15 ft. (inside) milk room requires 53 ft. 9 in. x 16 ft. overall dimensions, plus the ramps from cowyard to the milking platforms (860 sq. ft.).

A 6-unit walk-through bail building for a similar size herd requires 63 ft. 2 in. x 15 ft. overall dimensions, the milk room being 14 ft. 4 in. x 14 ft. 3 in. inside (947½ sq. ft.).

The difference in costs in these two buildings built to the same standards would not be very great, because of the more complicated floor structure, but cheaper bail structure, of the herringbone bail.

There is little difference in overall floor area between the two designs with herds of a smaller size. In a three-unit walk-through shed, the milking section is 23 ft. x 15 ft., while in the herringbone shed of similar capacity it is 23 ft. x 16 ft. With the herringbone design, however, the ramps, the formwork and the filling of the platforms are extra and require the expenditure of additional capital. This additional cost is considered to be justified by the reduction of effort during the many years the shed will be in use.

FEEDING

Many producers find it necessary to feed cows to maintain milk production, particularly in the low production winter months. However, a full ration cannot be fed in the bails because the cow does not have time to eat it. At a milking rate of 12 cows an hour per set of cups, each cow is actually in feeding position for only about 7½ minutes. If concentrates are to be fed during milking, one of two alternative constructions can be arranged in sheds of this design. The first one is to increase the overall width of the milking section by 6 ft. to allow a 3 ft. feeding passage between the heads of the cows and the outside wall, on each side. This arrangement adds considerably to the overall cost of the building. Where feed troughs of this type are installed, two people are necessary in a 6-unit shed, as the feeds must be put into the troughs after the cows have been bailed. If the feeds are put out prior to bailing, the first cow up the ramp will probable stop at the first feed trough.

The other alternative is to attach the feed troughs to the wall in the correct position so that the cows can drop their heads to them comfortably. The trough nearest the milk room would need to be slightly beyond the restraining gate, and the troughs then

would be spaced at 3 ft. (centre to centre) distances. Above each trough there could be placed a feed hopper of about 4 gal. capacity, with a chute leading to the trough, the feed being controlled by a slide in the chute.

All the slides are attached to one long $\frac{1}{2}$ in. round mild steel rod by means of a curved piece of round mild steel rod. The long rod running the length of the cow platform is attached to a lever, with sufficient travel to open and close the chutes, and long enough for easy and convenient operation. The lever can be at either end of the cow platforms.

Before milking, the hoppers are filled. After the cows are bailed, one pull on the lever will release feed into all the troughs, and when enough feed has fallen, the lever is pushed to close all the slides.

A 4 gal. capacity hopper should be sufficient for several milkings. With six sets of cups and 60 cows, there are only five rations taken from each hopper each milking. This is a much cheaper and faster method of feeding concentrates in the bails.

The practice of feeding in the milking bails means special precautions should be observed to protect milk quality. Because of bacteria and parasites associated with feed, every endeavour should be made to feed in a separate building other than the milking shed.

The herringbone bail makes it possible for a dairyman to milk a maximum number of cows in the shortest possible time, and still give his cows some individual attention. By bringing in a number of cows on each trip to the yard, standing them on an elevated platform so that the continual bending is eliminated, and arranging the cows so that the udders are only 3 ft. (one pace) apart, the effort required to do the milking is reduced considerably. In addition this arrangement permits a better inspection of each cow.

Several of these sheds are in operation in this State, and farmers thinking of building new sheds should contact their fellow farmers if any doubts exist about the suitability of the herringbone type milking bail for speedy and efficient milking.



Pasture For Charters Towers

"V.R.," of Charters Towers has inquired if Rhodes grass and green panic grass would be suitable for the sandy country in that district.

Answer: The conditions prevailing in the Charters Towers district would probably favour the sowing of buffel grass rather than Rhodes grass or green panic grass. When conditions are favourable the latter two grasses could out-produce buffel grass in the initial stages but they are not so resistant to hard conditions as buffel.

It may be worthwhile planting Townsville lucerne in the area. The seed should be inoculated before planting. Inoculum is available free of charge from the Department and is supplied with full instructions for its use. It should be ordered about a week or a fortnight before the date planned for sowing.

The best time to sow these plants is during the early wet season. Planting after the first storm rains often results in seedlings being killed off during the hot dry spells that frequently follow.

How much milk do beef cows give?

By J. ARBUCKLE.

Senior Adviser in Cattle Husbandry.

Growth-rate studies of cattle grazing on native pastures in different parts of Queensland have revealed a typical pattern. Daily gains are usually highest following heavy storm rains in late spring or early summer. By April-May, gains have ceased and a weight loss occurs during the winter months. The time when weight gain commences after winter depends largely on available soil moisture and varies from September to November in most seasons. The lack of feed, either in quality or quantity, is responsible for weight losses.

If we are to turn off the good quality, lightweight beef which commands the best prices, it is most desirable that animals make continual weight gains. At the same time this objective has to be achieved in an economical manner. The first step is to make the best use of the feeds at hand. These are the native pastures and the milk supply from the beef cow mother.

We now have a general knowledge of the beef-producing potential and characteristics of native pastures but have very few facts concerning milk production of the beef cow. How much milk does she produce? Can the calf make best use of it? What is the influence of subsequent pregnancy on milk production? One could go on asking questions. But, during the last two years, work has been done in

finding answers. Results to date are interesting and reveal the need for further investigation.

Where the Work Was Done.

In order to record how much milk a beef cow produces, an investigation was commenced on Mr. J. Black's property, "Hillview," Glen Geddes, 40 miles north of Rockhampton, in November, 1956. The second year's work began in September, 1957, and is reported to July, 1958.

The milk production was measured over 24 hours at about monthly intervals by the following method:

Cows and calves were yarded at 4 p.m. The calves were allowed to suckle to make sure all milk was extracted from the udder. All calves were then locked up for the night and the cows were weighed and returned to their paddock. Early next morning, cows were mustered, calves weighed, allowed to suckle and then re-weighed. By deducting the before-suckling weight from the after-suckling weight, the amount of milk taken in by the calf was calculated.

This process was repeated in the afternoon to obtain the milk consumed for the 24 hours.

In the 1957-58 season the opportunity was taken to record the performance of 2 and 3 years old heifers which calved in September, together



Plate 1.

Calves Suckle Readily After Being Held in the Yard Overnight.

with mature cows calving in November. These groups are referred to as "Early Calved" and "Late Calved" respectively.

Soil and Vegetation.

The soils and vegetation on "Hillview" are typical of large areas of central coastal Queensland. The soils could be described as grey, powdery, clay podsols with an original tree cover of iron bark.

The natural pastures found in the paddock include Bunch or Black spear grass (*Heteropogon contortus*) with several species of Blue grasses (*Dicanthium* and *Bothriochloa* spp.) and white spear (*Aristida* spp.). The grasses are deficient in available phosphate after seeding in April-May.

About half the paddock was ring-barked. The stocking rate was one cow to 10 acres.

Seasonal Conditions.

Rainfall in points at "Hillview" since July, 1956, was:

	1956.	1957.	1958.
January ..	..	200	506
February ..	..	411	993
March ..	..	..	198
April ..	..	..	526
May ..	..	..	..
June ..	..	30	776
July ..	213	364	103
August ..	80	200	..
September ..	90	..	..
October ..	..	500	..
November ..	199	105	..
December ..	970	234	..
Totals ..	1,552	2,044	3,102

The "wet" season for 1956-57 was very light, with high day and night temperatures. These high temperatures extended into late March.

By June, drought conditions were being experienced.

Unexpected rain in July and August relieved the position somewhat and the 500 points in October ensured a good spring.

Rainfall for 1957 was about half the normal rainfall for the year.

With 3,079 points to the end of September, seasonal conditions for 1958 could be considered normal. However, the total of 776 points in June was unseasonal and combined with a mild winter, tended to give a better year than average.

It is too early to draw definite conclusions. Seasonal conditions were different in the two years and the state of pregnancy of the groups has also differed between the years. Both these factors influence milk production. However, it is desirable to point to trends observed to date.

In all cases there has been a steep fall in milk production after April. The decline has been at about the same rate for cows calving in either September or November. Decline in pasture quality and advancing lactation would seem to be the reasons for this drop.

Time of Calving.

Cows which calved in November of each year produced over a gallon of milk daily to the end of January. It should be noted that the cow is credited only with the quantity of milk taken by the calf. During early lactation when the calf is comparatively small, it is quite likely that the cow produces more milk than the calf can drink. Under conditions of good feed, the cow adjusts her top production to the quantity taken by the calf. As lactation advances, milk production drops despite the fact that the requirements of the calf increase.

The heifers which calved in September, 1957, reached peak milk production in January, which was the fourth month of lactation. Although the feed supply may be only fair, animals

which calve in good condition in September will produce at a medium level, as shown by the 1957-58 early-calved group. This is because the cow is able to convert some of her accumulated bodyweight (or "condition") into milk production. There is a natural tendency to do this.

Young, green grass is a suitable feed for milk production. Its influence is clearly shown by the rise in production by January. September calvers tend to have a more uniform level of production for the first six months, even though there is no high flush or peak. November calvers tend to combine the physiological flush with the pasture flush and probably are capable of producing more milk than the young calf can handle. As pasture quality declines, the late calvers drop in milk production in a similar manner to the early calvers.

It would appear clearly that cows which are not in calf again will milk for a much longer period than their pregnant mates. In the 1956-57 group the only two cows still milking in September, 1957, were both non-pregnant. The higher winter milk production of the 1957-58 group can be attributed to better-than-average pastoral conditions and the fact that 14 of the 23 cows are not in calf again.

Milk Requirements of Calves.

For the first three weeks of its life, the calf is entirely dependent on milk. The quantity required daily varies from 10-12½ per cent of the body weight of the calf. Thus a 70 lb. calf (about the average weight of a normal beef calf) would require from 7 to 9 lb. of milk daily. As the calf grows it can drink and use correspondingly greater quantities of milk if available.

At three weeks to one month of age the calf will nibble at pasture. Since its appetite and capacity to handle bulky feed are limited, the pasture

The Results Obtained

The results are set out in table form:

TABLE 1.
1956-57 SEASON.
(Average of 19 head of cows plus their calves.)

	28-11-56.	25-1-57.	4-3-57.	17-4-57.	17-5-57.	10-7-57.	10-9-57.
(a) Milk Production							
Daily yield (lb.)	12.2	10.05	6.84	4.2	2.6 (2 dry)	0.78 (4 dry)	(17 dry)
Estimated average total milk production = 129 gal. (Range 72-186 gal.).							
(b) Calf Weights (lb.) (11 females, 8 males)	103 (av. age 15 days)	203	260	309	317	302	330
Rate of gain (lb./day)			(i.) Whole period 0.83 lb.				
			(ii.) November-April 1.47 lb.				
			(iii.) April-September 0.14 lb.				
(c) Body Weights of Cows (lb.)	767	803	810	838	792	674	692
Body Weight Changes of Cows—					lb.	lb./day.	
Whole period (November-September)					-75	-0.26	
November-April	..	..	..	..	+71	+0.51	
April-September	..	..	..	..	-146	-1.00	
Pregnancy state (10-9-57)—pregnant 17, non-pregnant 2.							

TABLE 2.
1957-58 SEASON.

EARLY CALVED (Averages of 11 head of 2- and 3-years-old cows plus their calves).

	10-9-57.	10-10-57.	22-11-57.	31-1-58.	22-4-58.	28-5-58.	8-7-58.
(a) Milk Production							
Daily yield (lb.)	8.1	6.8	7.0	9.1	5.4	2.4 (1 dry)	1.1 (6 dry)
Estimated average total milk production = 186 gal. (Range 122-264 gal.).							
(b) Calf Weights (lb.) (7 females, 4 males)	75 (av. age 12 days)	107	140	253	351	412	395
Rate of gain (lb./day)			(i.) Whole period 1.06 lb.				
			(ii.) September-November 0.89 lb.				
			(iii.) November-April 1.40 lb.				
			(iv.) April-July 0.57 lb.				
(c) Body Weight of Cows (lb.)	532	592	614	709	773	737	709
Body Weight Changes—					lb.	lb./day.	
Whole period (September-July)					+177	+0.59	
September-November	..	..	..	..	+82	+1.12	
November-April	..	..	..	..	+159	+1.05	
April-July	..	..	..	..	-64	-0.83	
Pregnancy state (28-8-58)—pregnant 3, non-pregnant 8.							

TABLE 3.
1957-58 SEASON.

LATE CALVED (Averages of 12 head of mature cows plus their calves).

	22-11-57.	31-1-58.	22-4-58.	28-5-58.	8-7-58.
(a) Milk Production					
Daily yield (lb.)	10.6	11.4	7.0	3.4	2.04 (4 dry)
Estimated average total milk production = 162 gal. (Range 113-225 gal.).					
(b) Calf Weights (lb.)	86	197	304	332	340
(8 females, 4 males)	(av. age 8 days)				
Rate of gain (lb./day) {	(i.) Whole period			1.11 lb.	
	(ii.) November-April			1.44 lb.	
	(iii.) April-July			0.47 lb.	
(c) Body Weights of Cows (lb.) ..	664	751	782	769	739
Body Weight Changes—				lb.	lb./day.
Whole period				+75	+0.33
November-April				+118	+0.78
April-July				-43	-0.56
Pregnancy state (28-8-58)—pregnant 6, non-pregnant 6.					

needs to be of good quality for best results. The digestive tract of the calf develops with age so that it is able to handle progressively greater quantities of pasture.

Growth Rate.

All calves in the investigation have grown fairly quickly during the November to April period. The typical slowing down has occurred during winter. Although they were receiving slightly less milk, the early-calved calves gained almost as quickly as their mates in 1957-58. This suggests that they were able to make better use of the summer pasture because of their greater age.

After April, the early-calved calves have made better weight gains than their mates—again probably because of their age. On a daily-rate-of-gain basis the late-calved calves are superior to the September-calved group. However, the September group are

55 lb. heavier and their performance since April suggests that they may be able to maintain this advantage.

Bodyweight Changes in Cows.

It is obvious that seasonal conditions, through their influence on feed supply, have a marked influence on bodyweights. In 1956-57 the cows calved in good condition in November and weighed 767 lb. They were 75 lb. less the following September. In 1957-58 the cows were about 100 lb. lighter after calving than in the previous year. However, they were able to gain 75 lb. to July, 1958. The early-calved 2 and 3 years old cows in 1957-58 were only 532 lb. after calving but gained 177 lb. during lactation. No doubt they were helped by the favourable pastoral conditions.

There is a severe drop in bodyweight after April. The average daily rates for the three groups were 1 lb.; 0.83 lb. and 0.56 lb. In view of the



Plate 2.

Mowing Lucerne in the Rockhampton District. The hay will be used as a supplement for breeders or weaners.



Plate 3.

The Portable Weighbridge Makes Possible Investigations Such as that Described in this Article.

comparatively low milk production after May, one wonders about the effect on the cow of weaning in May, even if it meant some form of supplementary feeding of weaners. A dry cow could be expected to winter much better than a cow in milk with a calf at foot. The dry cow would have a better chance to build up condition before her next calving. This could make earlier calving possible and ensure that the best use was made of any supplement which was fed either to the breeders or weaners.

Acknowledgments.

Thanks are due to Mr. J. Black and his staff for their co-operation in carrying out these observations, also Messrs T. Alderdice, formerly of the Cattle Husbandry Branch, and P. C. Davidson, Adviser in Cattle Husbandry for their capable assistance.

Eradicate This Disease

The left testicle of this boar is grossly enlarged because of inflammation. The right is normal in size.

You can see how big the swelling is. The testicle felt hot and harder than normal. The skin over it was red and thickened.

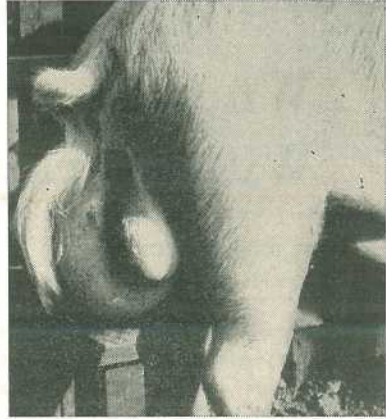
This boar had no contact with brucellosis before he was introduced into the piggery, which was known to be infected with it.

The inflammation is due to infection with *Brucella* germs.

This boar would almost certainly be infertile. Inflammation and infertility in boars is only seen occasionally even where *Brucella* infection is heavy.

The main symptom of brucellosis in pigs is that *sows* are infertile, that is, they are hard to get in pig.

Eradication is the only answer to this disease.



Infected pigs are detected by blood test and can be culled. Our Department fosters a brucellosis test scheme to ensure that pigs can be purchased free from this disease. Departmental officers or veterinary surgeons will co-operate in this way to eradicate it from a piggery.

If your sows are hard to settle, find out why. If brucellosis is the cause, eradicate it and keep it out by buying animals known to be free.

GGGGG

Townsville Lucerne

"J.M.," of Maleny, requests some information on the performance of Townsville lucerne in his district.

Answer: Townsville lucerne has been established successfully on the loose sandy ridges in the Gympie district. In particular, successes with this legume have been noted in the Woolooga and Oakview areas.

The planting method found most suitable was disc harrowing or tilling the soil and then lightly broadcasting the seed on the broken soil surface. Harrowing in the seed was found to be detrimental as it involved covering the seed too deeply, and the result was a reduced strike.

Townsville lucerne is an annual legume. The seed starts germinating in spring and early summer. It is

advisable to commence planting in early summer when early storm rains may be expected.

About 2 to 4 lb. of seed will be required to an acre for satisfactory development in the native pastures which grow on these ridges. It is recommended that the seed be treated with the appropriate inoculum immediately before planting. This inoculum can be obtained free of charge from the Department upon receipt of the following:

Amount of seed to be planted and approximate date of planting together with your name and address.

It will generally be found that Townsville lucerne does not require fertilizing, as it has the capacity of establishing well on soils of low fertility.

When You See A Pig With Paralysis . . .

By B. PARKINSON,
Divisional Veterinary Officer.

Most pig farmers will at one time have seen pigs affected by paralysis of the hindquarters or an inco-ordination in movement. Such trouble is quite common to pigs, and can account for fairly severe economic loss. The causes are unfortunately so many and so obscure that very often it is impossible to make an accurate diagnosis of the condition. It is just as hard, in a lot of cases, to recommend any satisfactory treatment.

The various conditions are best dealt with under certain headings:—

(1) PARTURIENT DISEASES.

Parturient diseases are associated with the immediate after-farrowing period, and, of course, affect brood sows only. Fortunately they are all usually readily diagnosed, taking into account history and other symptoms.

(a) Metritis.

Metritis, or infection of the womb, occurs quite commonly after farrowing. The sow is visibly sick and has no appetite. She usually lies down and is not inclined to rise. Milk flow is considerably reduced, the piglets suffering accordingly. Fever with temperature up to 105 deg. F., is also common. A brownish discharge comes from the breeding passage.

The use of stilbestrol (to produce contraction of the womb and expulsion of the contents), plus antibiotics such as penicillin, streptomycin, oxytetracycline (Terramycin), or sulphonamide drugs gives good results in treatment.

(b) Mastitis.

Except that there is no discharge from the breeding passage, mastitis symptoms are much the same as for metritis. The udder is hard, inflamed, and painful. The sow frequently will not allow the suckers to nurse. Treatment with sulphonamides or antibiotics is satisfactory.

(c) Milk Fever.

Milk fever usually occurs very shortly after farrowing. Most cases show lack of appetite and decreased milk secretion. Sows become drowsy, and if untreated, progress through the stages of recumbency, paralysis and coma, to death. Occasional cases may show excitement, with staggy gait and paralysis of the hindquarters. There is no fever in an uncomplicated case.

The injection of calcium borogluconate ($\frac{1}{2}$ to 1 oz. dissolved in water) under the skin usually produces satisfactory recovery. It may be repeated every 6-8 hours if necessary.

(d) Acetonaemia.

Acetonaemia is due to a deficient diet and excessive drain on the sow to produce milk for the litter. Sows are affected about 2 weeks after farrowing and suddenly go off their feed, lose condition and show a wobbling gait and unsteadiness of the hindquarters. If they dry off they may recover. If not, paralysis and death usually follow.

The condition is prevented by correct feeding to ensure there is not a severe drain on the system. Treatment with injections of calcium borogluconate (as for milk fever) and 3-4 oz. of glucose in water twice daily usually produces recovery in several days.

(2) INFECTIOUS DISEASES.

All of the infectious diseases of swine, such as paratyphoid, erysipelas and pneumonia, in their very acute form, will cause staggering and partial paralysis. This is really more of a prostration, through general collapse. Laboratory aid is usually necessary in diagnosing these conditions.

Other conditions may be considered.

(a) Encephalomyelitis.

Encephalomyelitis, an inflammation of the brain and spinal cord, thought to be caused by a virus infection, has occurred on some occasions. Similar diseases are known to occur in European countries. In one outbreak affected pigs showed a stiff, proppy gait, with swaying of the hindquarters. The sequel depends on the severity of the disease, some recovering. There is no specific treatment.

(b) Leptospirosis.

Leptospirosis may cause a type of meningitis in pigs with similar symptoms to encephalomyelitis.

(c) Abscess Formation.

Abscess formation within the spinal cord may occur and lead to a progressive onset of paralysis of the hindquarters. Such a condition is usually only fully recognised on post-mortem examination.

(3) NUTRITIONAL.

Mineral and vitamin deficiencies seem to be of prime importance as a cause of trouble in pigs.

(a) Calcium Deficiency.

Pigs seem quite prone to a deficiency of calcium, whereas with cattle,

a phosphorus deficiency is more common. Calcium deficiency leads to bone weakness. Stress factors, such as service of a sow by a heavy boar, standing on fences, or jumping, may initiate a fracture of the spinal column, pelvis or thigh bone. In these cases, the onset of a complete flaccid paralysis of the hindquarters would be sudden.

The use of high cereal diets alone could produce a calcium deficiency, particularly where there is a restricted milk supply for pigs. During dry times, when milk is in short supply, quite often the older pigs miss out on their milk, which is the main source of calcium on many farms. Deficiency could easily occur and account for some of the problems seen in adult pigs.

(b) Copper Deficiency.

Copper deficiency has been suspected as a cause of paralysis, particularly in New Zealand.

(c) Vitamin A Deficiency.

Vitamin A is an essential vitamin. Pigs deprived of such will show symptoms of nightblindness and a staggering gait. Posterior paralysis occurs, and pigs can only get about by sliding on their hindquarters. The onset may be quite sudden, and recovery can occur only in the early stages.

Vitamin A deficiency is most likely where there is a shortage of green feed, which is usually the main natural source of the vitamin to pigs.

(4) POISONINGS.

Mineral and plant poisons will cause inco-ordination and paralysis, but they are too numerous to consider here. When investigating this trouble in pigs, history of access to any poisons must be considered.

(5) PARASITES.

Kidney worm infestation has been blamed for many cases of paralysis. Unfortunately this is not always the

answer. Under most conditions of management, an infestation of kidney worms takes several years to build up to a damaging level. Thus heavy infestations are rare in young pigs. Trouble from kidney worm infestation is not due to the effect of the worms burrowing in the loins as is popularly believed. Their actual effect is one of kidney damage, producing abscess formation or infection of the abdominal cavity, leading then to paralysis.

(6) MISCELLANEOUS.

(a) Chorea.

Chorea is a disease of pigs between the ages of 10 days and 4 weeks. Affected piglets characteristically tremble and shiver throughout the head, trunk and limbs. The cause is probably congenital. Recovery usually takes place unless the piglets die of starvation through inability to suckle.

(b) Photosensitization.

Photosensitization occurs in white pigs only, when they are running out on fresh, green shoots of grasses and weeds on sunny days following rain. A characteristic dipping of the back just behind the shoulder is seen, the pigs knuckling over on their forelegs. Symptoms are seen particularly well a few minutes after they are chased into the sun after lying in the shade. The condition soon passes off. Pigs up to 5-6 months old are usually affected.

(c) Scrub Tick.

Scrub tick paralysis must always be considered where there is any possibility of such tick infestation.

(d) Constipation.

Constipation may be a possible contributing cause under some conditions.

(e) Injuries.

Injuries have been mentioned under deficiency, but can occur in well-nourished animals through misadventure.

(f) Arthritis.

Arthritis, with swollen joints, or sore feet may cause weakness and disinclination to rise.

TO PREVENT OR CURE.

Some of the major possible causes have now been discussed. Each case must be considered on its history, so that many possible causes can then be eliminated. It is hard to make a positive diagnosis in any one outbreak.

Most cases are usually beyond treatment once they are seen to be paralysed. Thus little satisfaction is obtained from many recommended treatments. Preventive measure for the future must be emphasised and these are mainly in association with dietary causes.

Check the ration. A change may do a lot of good. A milk and maize diet seems prone to cause trouble. Add other grains if possible.

Make sure you have an adequate supply of vitamin A. The use of a vitamin A concentrate supplement is essential if pigs do not have access to fresh young green feed, or lucerne hay is not fed in the diet. If trouble occurs, supply vitamin A concentrate liberally for a few weeks.

Check on the mineral status of the ration. Calcium is all-important. Particularly if milk is scarce, add ground limestone to the ration. This is also needed if a high cereal diet is fed. The ratio of calcium to phosphorus must be considered, for an unbalanced ratio with excess phosphorus (as is likely to occur with high cereal rations) may precipitate a calcium deficiency. Bonemeal supplements may be used if the ratio of calcium to phosphorus is not too wide.

The addition of copper sulphate may also be recommended.

If the pigs are likely to be constipated, they should be dosed with linseed or paraffin oil or epsom salts.

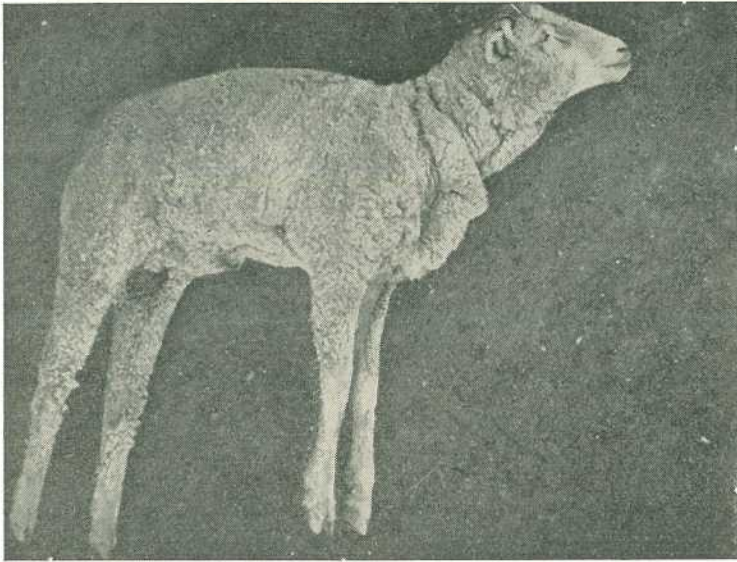


Plate 1.

This is the Typical Appearance of the Carcass of a Lamb Which Has Died of Tetanus.

Are you losing Sheep from Tetanus?

By G. LeGros,
Adviser in Sheep and Wool.

How many of your sheep die from tetanus each year? Are you sure that those dead sheep found after crutching, shearing, mulesing, lamb marking and dipping were not tetanus victims?

Tetanus is very widespread throughout Queensland. It is responsible for deaths ranging from a few sheep to several hundred. Tetanus is generally fatal. Sheep, horses, cattle, and human beings may be affected.

Characteristic tetanus symptoms usually show up from about the fourth day after infection to about the 14th

day. In exceptional cases, symptoms can be observed earlier than the fourth day and up to four weeks. The early tetanus symptoms in sheep are stiff gait, hind legs spread and head and tail elevated. The sheep soon go down and exhibit rigidity of the legs and the head is arched backwards. The jaws are often, but not always locked. At this stage sheep are easily excited. A very characteristic symptom is the protrusion of the third eyelid across the eyeball from the inner corner. The death rate in sheep is nearly 100 per cent.

This common disease occurs after routine sheep work. At shearing, crutching, lamb marking, mulesing,

and on dipping heavily grass infested sheep, the animals can pick up tetanus spores which often live for years around sheep yards, shearing shed, dips, and horse yards. Infection takes place through wounds, particularly deep ones, and when it has gained entrance the tetanus germ produces a poison which affects the nervous system. Tetanus can also enter the navel cord at birth or through mouth wounds caused by sharp teeth.

The treatment of valuable animals with anti-serum and antibiotic injections is sometimes carried out, but with only limited success. Under field conditions flock sheep suffering from tetanus should be destroyed humanely.

Preventing Tetanus

The well-known proverb, "Prevention is better than cure," applies very strongly to tetanus. Before shearing

and crutching the board should be well scrubbed with disinfectant. Lamb marking and mulesing tools should be continuously dipped in a disinfectant solution during operations. If tetanus cases occur after lamb marking and mulesing, be warned, and next time mark your lambs in temporary yards well away from the infected area. This improved hygiene around the shed and yards and reduction of dust by watering will reduce tetanus infection.

Tetanus anti-serum gives immediate immunity which lasts about 14 days. Tetanus toxoid takes about two weeks to give permanent immunity. Both these injections can be administered at the one time with two separate injections. Another injection of tetanus toxoid 12 months after the original injection will ensure a life-time protection.

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A Collapsible Hive Stand

By C. ROFF.

Adviser in Apiculture.

Giant toads may congregate near apiaries and weaken colonies by snapping up bees entering or leaving the hives. These pests can be checked by placing the hives on stands about 2 ft. high.

The important feature of the stand from the migratory apiarist's viewpoint is the ease with which it can be put together and dismantled in the field. Furthermore, when dismantled, the components are readily packed on a motor vehicle for transport to a new apiary site.

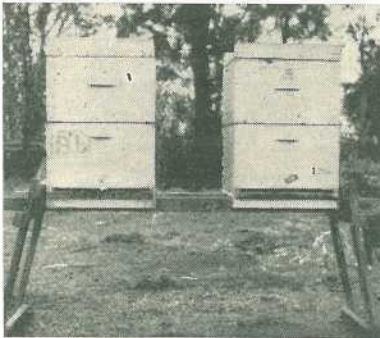


Plate 1.

Two Hives Positioned on a Collapsible Hive Stand at Mr. O. C. Barnes's Apiary, Tinana.

The complete stand to carry two hives is constructed of grey ironbark timber. The five parts of each support are nailed together with $2\frac{1}{2}$ in. galvanized flat-headed nails through drilled holes with the nail ends clinched. (Plate 3.)

The timber required is as follows:—

Runners:

2 pieces each 60 in. x 2 in. x $1\frac{1}{2}$ in.

Supports:

4 pieces each 25 in. x 2 in. x 1 in.

6 pieces each 21 in. x 2 in. x 1 in.

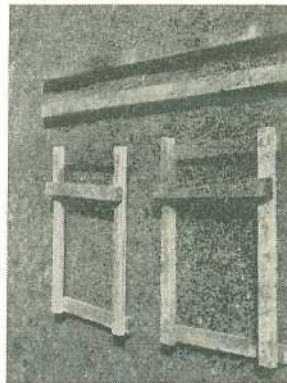


Plate 2.

The Two Supports and Two Runners of the Collapsible Hive Stand.

As the supports are slanted outwards (Plate 1), stability of the stand is assured by the weight of the hives locking the runners in the opening formed by the top cross-pieces. The bottom cross-pieces prevent the stand from sinking into the ground.

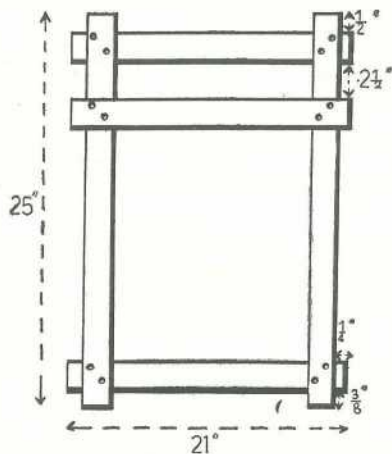


Plate 3.

Each Support Comprises Five Wooden Parts Assembled As Shown in This Plan.

Brucellosis-Tested Swine Herds

(As at 1st March, 1959.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
 J. L. Handley, "Meadow Vale" Stud, Lockyer
 O'Brien and Hickey, "Kildurham" Stud,
 Jandowae East
 G. C. Traves, "Wynwood" Stud, Oakey
 Westbrook Farm Home for Boys, Westbrook
 H.M. State Farm, "Palen" Stud, Palen Creek
 A. R. Ludwig and Sons, "Beau View" Stud,
 Beaudesert
 D. T. Law, "Rossvill" Stud, Trouts road,
 Aspley
 R. H. Crawley, "Rockthorpe" Stud, *via*
 Pittsworth
 F. R. J. Cook, Middle Creek, Pomona
 Mrs. I. M. James, "Kenmore" Stud, Cambooya
 H. L. Stark, "Florida," Kalbar
 H.M. State Farm, Numinbah
 G. L. Gabanko and R. H. Atkins, "Diamond
 Valley" Stud, Mooloolah
 L. Puschmann, "Tayfeld" Stud, Taylor
 C. E. Edwards, "Spring Valley" Stud,
 Kingaroy
 V. F. Weier, "La Crescent," Clifton

N. Rosenberger, "Nevrose," Wyreema
 L. P. Orange, "Hillview," Flagstone Creek
 W. Young, Kybong, *via* Gympie
 E. J. Clarke, Mt. Alford, *via* Boonah
 G. McLennan, "Murcott" Stud, Willowvale
 C. F. W. and B. A. Shellback, "Redvilla"
 Stud, Kingaroy
 J. C. Lees, "Bridge View" Stud, Yandina
 F. Thomas, "Rosevale" Stud, M.S. 378,
 Beaudesert
 A. C. Fletcher, "Myola" Stud, Jimbour
 Q.A.H.S. and College, Lawes
 E. F. Smythe, "Grandmere" Stud, Manyung,
 Murgon
 E. R. Kimber, Block 11, Mundubbera
 A. J. Potter, "Woodlands," Inglewood
 Regional Experiment Station, Hermitage
 J. W. Bukowski, "Secreto" Stud, Oxley
 R. Astbury, "Rangvilla," Pechey
 L. Pick, Mulgildie
 D. G. Grayson, Killarney
 A. French, "Wilson Park," Pittsworth
 P. L. Pfrunder, Pozieres

Large White.

H. J. Franke and Sons, "Delvue" Stud,
 Cawdor
 Garrawin Stud Farm Pty. Ltd., 657 Sandgate
 road, Clayfield
 J. A. Heading, "Highfields," Murgon
 R. Postle, "Yarralls" Stud, Pittsworth
 B. J. Jensen, "Bremerside" Stud, Rosevale,
via Rosewood.
 E. J. Bell, "Dorne" Stud, Chinchilla
 L. C. Lobegeiger, "Bremer Valley" Stud,
 Moorang, *via* Rosewood.
 H. R. Gibson, "Thistleton" Stud, Maleny
 H.M. State Farm, Numinbah
 S. T. Fowler, "Kenstan" Stud, Pittsworth
 W. Zahnov, Rosevale, *via* Rosewood
 Regional Experiment Station, Biloela
 G. J. Hutton, "Grajca" Stud, Cabarlah
 H. L. Larsen, "Oakway," Kingaroy
 A. Palmer, "Remlap," Greenmount
 G. I. Skyring, "Bellwood" Stud, *via* Pomona
 G. Pampling, Watch Box road, Goomeri
 M. Hall, "Milena" Stud, D'Aguiar
 K. B. Jones, "Cefn" Stud, Pilton road, Clifton
 Barron Bros., "Chiltern Hill," Cooyar
 K. F. Stumer, French's Creek, Boonah

Q.A.H.S. and College, Lawes
 R. S. Powell, "Kybong" Stud, Kybong, *via*
 Gympie
 C. Wharton, "Central Burnett" Stud, Gaydah
 S. Jensen, Rosevale, *via* Rosewood
 V. V. Radel, Coalstoun Lakes
 H. R. Stanton, Tansen, *via* Goomeri
 L. Stewart, Mulgowie, *via* Laidley
 D. T. Law, "Rossvill" Stud, Trouts road,
 Aspley
 O. J. Horton, "Manneum Brae" Stud,
 Manneum, Kingaroy
 Dr. B. J. Butcher and A. J. Parnwell,
 684 Logan road, Greenslopes, Brisbane
 R. Kennard, Collar Stud, Warwick
 A. C. H. Gibbons, Mt. Glorious
 A. Kanowski, "Exton," Pechey
 L. C. and E. Wieland, Lower Cressbrook
 P. L. and M. T. D. Hansen, "Regal" Stud,
 Oaklands, Rangeville, Toowoomba.
 J. C. Lees, "Bridge View" Stud, Yandina
 R. Rhodie, Clifton
 C. Assenbruck, Mundubbera
 A. J. Mack, Mundubbera
 J. & S. Kahler, East Nanango
 C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaim-
 killenbun
 A. C. Fletcher, "Myola" Stud, Jimbour
 Salvation Army Home for Boys, "Canaan"
 Stud, Riverview
 Department of Agriculture and Stock,
 Regional Experiment Station, Kairi
 F. N. Hales, Kerry road, Beaudesert
 T. A. Stephen, "Withcott," Helidon
 W. F. Kajewski, "Glenroy" Stud, Glencoe
 A. Herbst, "Hillbanside" Stud, Bahr Scrub,
via Beenleigh

F. Thomas, "Rosevale" Stud, M. S. 373,
 Beaudesert
 H. J. Armstrong, "Alhambra," Crownthorpe,
 Murgon
 R. H. Collier, Tallegalla, *via* Rosewood
 D. V. and P. V. Campbell, "Lawn Hill,"
 Lamington
 S. Kanowski, "Miecho" Stud, Pinelands
 N. R. Potter, "Actonvale" Stud, Wellcamp
 L. C. and E. Wieland, Lower Cressbrook
 J. D. Booth, Swan Ck., Warwick

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud,
 Goombungee
 C. R. Smith, "Belton Park" Stud, Nara
 D. T. Law, "Rossvill" Stud, Trouts road,
 Aspley
 J. B. Dunlop, "Kurrawyn" Stud, Acacia
 road, Kuraby
 M. Nielsen, "Cressbrook" Stud, Goomburra

G. J. Cooper, "Cedar Glen" Stud, Yarraman
 "Wattledale" Stud, 492 Beenleigh road,
 Sunnybank
 Kruger and Sons, "Greyhurst," Goombungee
 A. Scott, "Wanstead" Stud, Grantham
 G. C. Burnett, "Rathburnie," Linville
 A. J. Mack, Mundubbera
 J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Facts On Fertilizers

By N. D. IRWIN and

A. R. HUGHES, Standards Branch.

STUDIES in plant nutrition have revealed that there are at least 15 elements essential for plant growth. These are nitrogen, phosphorus, potassium, sulphur, calcium, magnesium, iron, manganese, boron, copper, zinc, molybdenum, hydrogen, oxygen and carbon.

Nitrogen, phosphorus, and potassium are the plant foods used in largest quantities; hence it is usual for the soil to become deficient in these elements first when there is continued cropping or exposure to leaching.

Sulphur, calcium and magnesium are required in moderate quantities but are less liable to be present in the soil in less than favourable amounts. However, at times it becomes necessary to add these elements to the soil. When lime is used to correct soil acidity, calcium is added, while if dolomite is used as the neutralising agent, both calcium and magnesium are added. Sulphur is applied in considerable quantities when fertilizers such as superphosphate or sulphate of ammonia are used, as this element forms part of the chemical constitution of these compounds.

A third group of elements often found deficient in the soil are iron, manganese, boron, copper, zinc, and molybdenum which are referred to as micro-nutrients or "trace" elements as they are required by plants in very

small quantities. Some of these may be applied to the soil to correct a deficiency while others are more effective when applied to the foliage as a spray. Used in excess, most of these elements are toxic to plant life which means that care should be taken to avoid over-dosage.

Of the remaining three essential elements, carbon and oxygen are obtained from the air in the form of carbon dioxide, and hydrogen from water in the soil solution.

COMMERCIAL FERTILIZERS.

Fertilizer is a material used to supplement the supply of plant foods in a soil and as the three plant foods which are most likely to be deficient are nitrogen, phosphorus and potassium, commercial fertilizers usually contain at least one of these elements in substantial amounts.

The materials used can be grouped into two broad classes—organic and inorganic. Organic fertilizers are derived from animal or plant sources and inorganic from mineral sources. The latter are often referred to as chemical fertilizers. Two synthetic compounds used as fertilizer, namely urea and calcium cyanamide, are classed by chemists as organic compounds, but when considered as fertilizers, they could well be included in the inorganic group as they are not of animal or plant origin.

The fertilizers available in Queensland are—

<i>Organic.</i>	<i>Inorganic.</i>
Dried blood	Nitrate of soda
Bone dust	Suphate of ammonia
Meatworks fertilizer	Urea
	Rock phosphate
	Superphosphate
	Sulphate of potash
	Muriate of potash

In practical agriculture, commercial fertilizers are used largely in the form of mixtures of several of the foregoing materials in various proportions. These are known to the trade as mechanical mixtures or mixed fertilizers and are formulated to provide the correct balance of plant foods for particular crops or soil types.

NITROGENOUS FERTILIZERS.

Nitrate of Soda.

The chemical formula of nitrate of soda is NaNO_3 . Commercial grades of this material are used extensively as fertilizer to supply readily available nitrogen of which they contain approximately 16 per cent. Nitrate of soda is produced by mining crude deposits but it may also be manufactured synthetically.

Sodium nitrate is readily soluble in water and on application to a soil immediately becomes available to crops. This same property, and the fact that the nitrate is not held in the soil, renders it subject to leaching. The salt itself is neutral in reaction but on breakdown, it has an alkaline effect and can, therefore, to some extent, reduce the acidity of the soil. The breakdown results in a tendency to form a compact rather than an open soil structure. The continuous application of large quantities of sodium nitrate to some soils may, therefore, result in a poor physical condition and restricted movement of soil moisture.

Sulphate of Ammonia.

The chemical formula of sulphate of ammonia is $(\text{NH}_4)_2\text{SO}_4$. The commercial grades of this material used as a fertilizer contain from 20 to 21 per cent. of nitrogen.

Sulphate of ammonia sold as fertilizer comes from two sources—

- (1) A by-product of the destructive distillation of coal and
- (2) From synthetically produced ammonia.

Ammonium sulphate is soluble in water and is readily available to plants. It does not leach from the soil as readily as nitrate of soda. The application of sulphate of ammonia causes an increase in soil acidity and if used regularly, the resultant build up in acidity should be corrected periodically by the use of lime or other neutralising material. Except in the case where plants which thrive under acid conditions are being grown, it is considered that approximately the same quantity of lime as the sulphate of ammonia applied is required to maintain a desirable soil reaction.

Urea.

The chemical formula of urea is NH_2CONH_2 . The fertilizer grade of urea contains approximately 46 per cent. nitrogen which is considerably higher than that in other nitrogenous fertilizers.

Under humid conditions, crystalline urea absorbs moisture from the air which action can cause problems in packaging and handling. This is now overcome by pelleting and surface treatment.

Urea is freely soluble in water but indications are that when soil applications are made, nitrogen is not absorbed by plants to any extent in the form of urea. A short time after application, it most probably becomes

converted to ammonium carbonate which compound later absorbs oxygen in two stages to be transformed into nitric acid and ultimately into nitrates. Thus after the initial stages of reaction in the soil, urea largely passes through the same forms and reaches the same end product as sulphate of ammonia does before becoming available for absorption by plants. If urea remained unchanged after application to the soil it would be rapidly leached out of the root zone by rain or irrigation water, but as it quickly changes to an ammonium salt which is adsorbed by the soil colloids, leaching is resisted and the fertilizer remains in the upper soil layers where it is in a better position to be used by plants.

Immediately on application, urea would have an alkalisng effect on the soil but as it has no residual base, over a period of time, the ultimate effect would be to render the soil slightly acid. This acidity can be corrected in the normal way by the application of lime.

Urea may be applied to foliage as a spray to supply nitrogen to crops and when applied in this way, absorption is very rapid.

When urea is heated above its melting point, it decomposes, one of the products of decomposition being biuret $\text{HN}(\text{CONH}_2)_2$. During the process of manufacture, this material is often formed and so occurs as an impurity in commercial urea. This chemical is toxic to plant life particularly when applied as a foliage spray, therefore, urea which contains excessive quantities of biuret as an impurity should not be used for this purpose.

ORGANIC FERTILIZERS.

Dried Blood.

Dried blood is frequently used as a fertilizer to supply nitrogen of which it contains approximately 12 per cent.

This fertilizer is obtained from slaughter houses where the blood is collected from the killing floor, dried and ground.

Nitrogen is present in organic fertilizers in the form of protein and must be converted into the nitrate form by soil organisms before it can be utilized by plants. This conversion goes through several stages each of which takes a certain time to complete, the protein is first converted to other organic products such as amino acids which are changed to ammonia and the ammonia in turn changes through nitrite to nitrate.

Meatworks Fertilizer.

Meatworks fertilizer, also known as blood and bone fertilizer, contains the plant foods nitrogen and phosphorus. The content of these constituents varies according to the raw ingredients used in its production; for instance, if the original material contains a high proportion of bone, the resultant product will be high in phosphoric acid and low in nitrogen. Various processing plants produce material in which the percentage of nitrogen ranges from 3.5 to 6 and that of phosphoric acid from 14 to 24.

Waste from carcasses of animals slaughtered for human consumption and also, on some occasions, whole

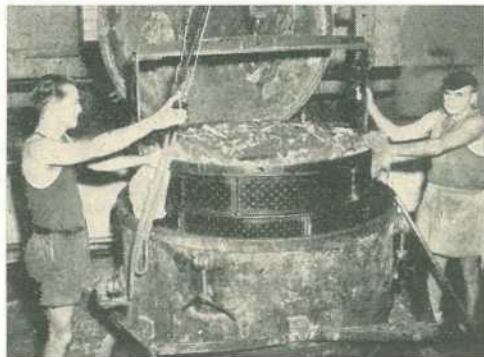


Plate 1.
Centrifuge Loaded With Meat and Bone
from Digester.

carcasses which have been condemned for human consumption are heated in closed steel vats known as digesters. The heat is usually supplied by steam, either by passing the steam directly into the vat or through a jacket enclosing the vat. These processes are known as wet and dry rendering respectively.

During heating, fat is released from the bone, meat and offal in the digesters and is separated off and sold as tallow. The residue is dried, ground and sold as meatworks fertilizer. The digestion process sterilizes the tankage and destroys any disease organisms which may be present. Bone, after being subjected to this treatment, becomes somewhat brittle and offers little resistance to grinding.

The availability of the nitrogen in meatworks fertilizer is of the same order as that in dried blood and the phosphoric acid availability is comparable with that of bone dust.

Bone Dust.

Bone dust is primarily a source of phosphoric acid but it also contains a small quantity of nitrogen. Analyses show that it may contain up to 3.5 per cent. nitrogen and from 23 to 26 per cent. phosphoric acid.

Bone dust is composed of calcium phosphate and organic material consisting of fatty substances and a small amount of gelatinous material containing nitrogen. Bones are collected from abattoirs and butcher shops and cooked in digesters in the same way as tankage for meatworks fertilizer. Tallow is separated and marketed and the bones are ground to a powder and sold under the name of bone dust.

In Queensland standards for fineness are prescribed under the Agricultural Standards Act. Meatworks fertilizer and dried blood must be ground to such a size that the whole of it is

capable of being passed through a sieve with square apertures of $\frac{1}{16}$ in. and bone dust must be fine enough to pass through a sieve with square apertures of $\frac{1}{16}$ in.

The labels attached to bags of these fertilizers must show percentages of fine and coarse material. Fine material is that which will pass through a sieve with square apertures $\frac{1}{50}$ th in. wide and coarse material is that retained on this sieve. Thus in the case of bone dust coarse material consists of particles less than $\frac{1}{16}$ in. and greater than $\frac{1}{50}$ th in., fine material is less than $\frac{1}{50}$ th in. For dried blood and meatworks fertilizer coarse material is less than $\frac{1}{16}$ in. and greater than $\frac{1}{50}$ th in., fine material is less than $\frac{1}{50}$ th in.

PHOSPHATIC FERTILIZERS.

When discussing phosphatic fertilizers, it is the practice to express the phosphorus content as phosphoric acid (P_2O_5). This is not chemically correct as phosphoric acid has the formula H_3PO_4 . The correct name for P_2O_5 is phosphorus pentoxide or phosphoric anhydride, that is, it is the anhydride of phosphoric acid which means that the addition of water to this anhydride would give phosphoric acid, H_3PO_4 . This method of expression gives a common comparison for all phosphates and is useful for evaluation purposes.

The phosphates most frequently found in quantity in fertilizers are monocalcic phosphate— $CaH_4(PO_4)_2$, dicalcic phosphate— $Ca_2H_2(PO_4)_2$, and tricalcic phosphate— $Ca_3(PO_4)_2$. Monocalcic phosphate is soluble in water and is the water-soluble portion of superphosphate. Dicalcic phosphate is not water-soluble, but is soluble in citric acid solution. A small quantity is present in superphosphate and represents the 0.5 per cent. citrate soluble phosphoric acid in this fertilizer. Tricalcic phosphate

is insoluble both in water and citric acid solution. It is present in phosphate rock and bone.

Rock Phosphate.

Rock phosphate used in Queensland is obtained from Nauru, Ocean or Christmas Islands. The phosphates on these islands are replacement phosphates, that is, limestone deposits which have been converted to calcium phosphate by the action of phosphate solutions. These solutions come from guano deposited on the limestone over a long period of time. However, all phosphate deposits are not formed in this way and much of the world's commercial phosphate deposit is of sedimentary origin. Marine organisms die and fall to the bottom of the sea. Through the ages, the organic matter in these organisms decomposes, the more soluble carbonates are leached out and a deposit rich in calcium phosphate remains.

The phosphate in rock phosphate is mostly in the form of tricalcic phosphate— $\text{Ca}_3(\text{PO}_4)_2$, which is insoluble and therefore, is not readily available to plants. For this reason, very little rock phosphate is used in its original form as fertilizer in Queensland. When it is used, it must be pulverised to a fine powder, as in this way the availability is increased somewhat. The phosphoric acid content of the material being marketed ranges from 37 to 39 per cent.

Superphosphate.

Superphosphate is the fertilizer most commonly used in modern agriculture to supply phosphorus. It usually contains approximately 20.5 per cent. water soluble, 0.5 per cent. citrate soluble and 1.0 per cent. insoluble phosphoric acid. It is manufactured from rock phosphate by converting the insoluble phosphate contained

therein to a soluble form readily available to plants. The manufacturing process involves treating rock phosphate with sulphuric acid.

When superphosphate is applied to soil, some of it reverts to insoluble phosphates by combination with soil minerals. The rate of reversion which is often referred to as fixation is governed by the type of soil and the degree of admixture with the soil. Heavy soils usually have higher fixing powers than light soils and the elements mainly responsible for phosphate fixation are iron, aluminium and calcium; iron and aluminium in acid soils and calcium in alkaline or neutral soils. The reverted material is, however, in a fine state of division and so it becomes available more readily than the phosphate in the original rock phosphate. Phosphate applied to the soil as superphosphate is not leached out freely but fixation limits the amount of the added soluble phosphate that is absorbed by crops. For this reason, it is advantageous to place superphosphate as close as possible to the root zone of the plants for which it is intended such as when sowing seed, in a band close to where the seed is planted. When granulated or pelleted superphosphate is used, fixation is retarded as the surface area of the superphosphate in contact with the soil is reduced.



Plate 2.

Heap of Phosphate Rock.

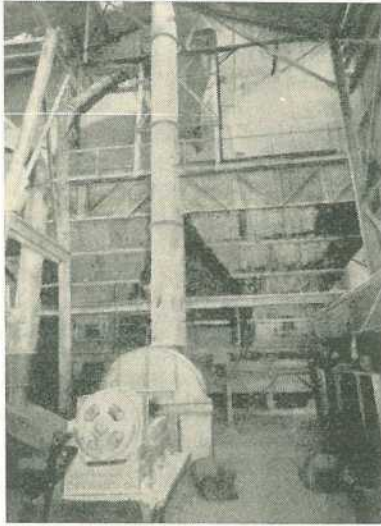


Plate 3.

Mill to Pulverise Phosphate Rock.

The effect of superphosphate on the pH of the soil solution is negligible, and in this respect it can be considered to be neutral. Although superphosphate is not sold specifically to supply sulphur to the soil, it contains approximately 11 per cent. of this element and thus in practice appreciable quantities of sulphur are added to the soil in this way as superphosphate is often applied in liberal amounts.

POTASH FERTILIZERS.

The fertilizers used to supply potassium to the soil are potassium chloride and potassium sulphate. The quantity of potassium chloride used is far greater than that of the sulphate, the main reason being that the sulphate is more expensive. When a fertilizer is spoken of as containing a certain percentage of potash, the figure referred to is the percentage of potassium oxide (K_2O). This is a means of expression used by the analyst as a basis of comparison and it does not mean that the fertilizer actually contains potassium oxide as such. Potassium chloride, often referred to as muriate of potash, has

the chemical formula KCl . Two grades are available as commercial fertilizer, one containing approximately 50 per cent. potash (K_2O) and the other approximately 60 per cent. potash (K_2O). The grade at present available in Queensland contains 60 per cent. potash. Potassium sulphate has the chemical formula K_2SO_4 and contains approximately 48 per cent. potash (K_2O).

Potash fertilizers are obtained by mining deposits of soluble potassium salts occurring in Central Europe, Palestine, and America. It is thought that these deposits were laid down throughout geological ages by areas of sea being cut off and formed into lakes. The water in these lakes evaporated and the salts in solution were deposited.

Most of the potash used as fertilizer is applied in the form of chloride. However, in Queensland, potassium sulphate is used in tobacco mixtures as the chloride intake of this crop must be kept low. It is also preferred in pineapple fertilizers which are to be used on mature plants.

When used as fertilizer neither potassium chloride nor potassium sulphate have any appreciable effect on the pH of the soil. Both of these fertilizers after being added to the soil dissolve and ionize. Some of the potassium is adsorbed by the soil colloids in an exchangeable form, some goes into the soil solution and is taken up by plants and the remainder is leached to lower soil levels. Its movement through the soil is not as rapid as is the case with nitrogen but it moves more freely than phosphorus.

MIXED FERTILIZERS.

In practical agriculture it is often necessary to apply more than one nutrient at a time to the soil in order to achieve optimum results and the most convenient method of doing this is to use mixtures of two or more of the materials already described.

Ready-to-use mixed fertilizers are available from all fertilizer companies. These products contain appropriate proportions of nitrogen, phosphorus and potassium balanced to suit particular crops and soil types.

Compounding mixed fertilizers presents its own problems as it is not always easy to prepare mixtures which reach the farm in a free flowing condition. It is interesting to note that when sulphate of ammonia is included in fertilizer mixtures containing superphosphate, the mixture may set hard, due to a chemical reaction between the ammonium sulphate and the mono calcium phosphate. When these two fertilizers are combined in a mixture, time should be allowed for curing to enable completion of this reaction. The gypsum formed has two molecules of water of crystallisation one of which is obtained from free moisture in the fertilizer. This gives a dry mixture and once the reaction is completed, setting from this cause will not occur again. The inclusion of conditioning agents such as absorbent organic matter in a mixture will help to reduce caking.

Grade Formula.

The "grade formula" is a term regularly used in connection with mixed fertilizers and refers to the percentages of nitrogen (N), phosphoric acid (P_2O_5) and potash (K_2O) contained in a mixture in that order. The grade formula is usually shown on fertilizer labels.

Granulation.

A number of fertilizers are now prepared in a granulated form. This process produces a fertilizer which is free running thereby facilitating application by mechanical distributors. Granulated fertilizers also have less tendency to cake or set hard which is an advantage in humid climates.

There are several processes which may be used to granulate fertilizer but rotary drying or spraying are the methods generally used. For materials such as urea and nitrate of soda, which can be melted, the spraying method produces a pellet of uniform size. The molten material is sprayed upwards through jets to form droplets, during their passage through the air these droplets solidify into pellets. The rotary drying process may be used to granulate fertilizer mixtures. When using this process, the fertilizer is first mixed and then the moisture content adjusted to the optimum for granulation. The mixture is introduced into a rotary kiln and granulated, the granules are set by drying.

Legislative Control.

In Queensland the sale of fertilizers is governed by Regulations under "*The Agricultural Standards Act of 1952*" and "*The Agricultural Standards (Fertilizer and Lime) Regulations of 1956*" whereby fertilizers must be registered before being offered for sale.

The Queensland primary dealer is required to submit to the Standards Branch, Department of Agriculture and Stock an application for registration which shows details of the ingredients used in producing a specific formula. The information



Plate 4.

Bulk Handling Fish Meal.

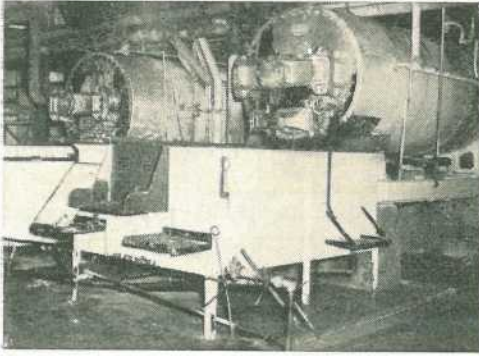


Plate 5.

Digesters for Dry Rendering.

supplied in the application is carefully scrutinized to see that the formula is practical and accurate. The guaranteed analysis shown on the label attached to every bag is required to specify amounts of available nutrients present in the fertilizer. Registration of all fertilizers offered for sale in Queensland is undertaken to ensure that due attention is given to these points.

Fertilizers offered for sale are regularly sampled and analysed by

Departmental officers to ensure that they conform with the specifications shown in their guaranteed minimum analysis.

Labels.

The label attached to, or printed on, each package of fertilizer sets out the following information:—

- (1) The name of the fertilizer.
- (2) The net weight of the fertilizer.
- (3) The guaranteed analysis.
- (4) The name and address of the manufacturer or Queensland primary dealer.

From the farmer's point of view, perhaps the most important of these items is the guaranteed analysis which helps to prevent materials of low analysis being sold at prices above their actual value. It shows the active constituents of a fertilizer and enables the farmer to select a product to suit his particular requirements.

Fellows, Furrows, and Fallows



Farmers' field days help to promote free discussion and exchanging of ideas.

Orchard and Garden

NITROGEN, one of the most important substances required for tree growth, is, unfortunately, the one most frequently deficient in our own citrus soils. Citrus trees require a certain amount of nitrogen at all times of the year.

Since sulphate of ammonia, the fertilizer commonly used to supply nitrogen, is readily leached out of the soil, regular dressings of fertilizer are needed. A good supply of nitrogen is required just before blossoming and in early summer to assist fruit setting and fruit growth.

In addition, a further dressing containing nitrogen should be applied after the wet season to replace the losses from leaching. Early maturing varieties such as the Washington Navel will require the fertilizer late in February to benefit the maturing crop. Valencia Late oranges, Ellendale mandarins and other varieties can receive their dressing in March or April.

—*E. L. HASTIE,*
Horticulture Adviser.

LEAF pruning is necessary in strong-growing varieties of grapes like the Muscat Hamburg. A dense canopy of leaves in and around the developing bunches tends to promote uneven growth of the berries, hampers disease control and interferes with harvesting.

Leaf pruning pays off even though it's a tedious job. In Muscat Hamburg grapes, leaf thinning should start soon after the bunches have set and the berries are about $\frac{3}{8}$ in. in diameter. It's a "peacemeal" job in which leaves in and around the bunches are removed at fortnightly intervals as the berries develop. Sudden and severe

leaf pruning may cause loss of fruit from sunburn. The standard rule is to start leaf pruning early in the season and to do it in easy stages.

—*C. N. MORGAN,*
Senior Adviser in Horticulture.

GROWERS wanting to sell planting material of Lady Finger or Sugar bananas during the 1959 planting season, which commences on August 1, 1959, are reminded by the Banana Industry Protection Board that permits to remove planting material of those varieties are granted only when the source of supply is an Approved Plantation.

To qualify for approval, a plantation must be well managed, free from Panama and Bunchy Top diseases and the plant type must be up to recognised commercial standards. Two inspections of each nominated plantation will be made by officers of the Department of Agriculture and Stock.

The first inspection must be carried out some time between March 1 and May 31. Any plantation which is not inspected during that period will not be eligible for approval. Application to the Board should therefore be made early enough to ensure that the first inspection can be carried out within the appointed period.

The second inspection will be carried out in the spring when applications to remove planting material are received.

Application forms may be obtained from the district offices of the Department of Agriculture and Stock, and the completed forms should be lodged with the Board's agents as early as possible and not later than March 31, 1959.

for the junior farmer

By J. PARK,
State Organiser,
Queensland Junior Farmers' Organisation.

IN subsequent issues we shall discuss the function of club officers, and the rules for the conduct of meetings. Before doing so it is advisable that members should be familiar with some of the more common terms used in meeting procedure.

"Ad hoc".—A committee that is appointed to carry out a particular task, and that automatically ceases to exist when the task is completed, is an "ad hoc" committee. Compare this with a standing committee.

"Agenda".—The business to be carried out at any meeting is the "agenda" of that meeting.

"Amendment".—Any alteration to a resolution or motion. (See definition of resolution and motion.)

"Ballot".—Voting in such a way that those taking part are in ignorance of one another's opinion: for example, a "paper vote" or "secret" ballot.

"Carried".—When a resolution is passed, that is, the majority vote is in its favour, it is said to be "carried". (See motion.)

"Casting vote".—The chairman usually has the right to give, under certain circumstances, a vote that is additional to the one he has as a member. This is his "casting" vote. The chairman gives his casting vote only if the voting in which he has taken part is equal. If, however, in spite of

equal voting, the chairman decides not to exercise this right, the matter must be laid aside, and cannot be dealt with again at that meeting. It should be noted that the chairman does not use his casting vote unless he has already used his vote as a private member.

"Circulate".—To send round to all members. Sometimes the minutes of the last meeting are "circulated" before the next one is held.

"Convene".—To summon members to a meeting is to "convene" that meeting.

"Co-opt".—If a committee, when it is appointed, is given power to "co-opt", it must add to its number by inviting a stated number of other people to join in the work. A committee may not co-opt additional members unless the resolution or rule appointing them says so.

"Eligible for re-election".—An officer or a member of a committee is elected to serve for a definite period—usually a year—and when that period comes to an end he retires, and there is an election. If the rules allow him to be elected again for a further period, he is "eligible for re-election".

"Ex-officio".—By virtue of office. It is usual for the club Leader to be "ex-officio" a member of all sub-committees.

"Honorary".—When used as in "Hon. Sec." (honorary secretary) it means "unpaid".

"In order".—If a member stands and says "Am I 'in order', Mr. Chairman, if I ask whether . . ." he means that he is asking if the chairman will allow him to put this question, or whether some article in the constitution, or some rule of procedure, or the chairman's own ruling, forbids it. Similarly the chairman may rule a member "out of order" if his actions or words infringe some article of the constitution, some rule of procedure, or the chairman's own ruling. Upon being ruled "out of order" the member concerned must immediately desist.

"Minutes".—The written record of what took place at a meeting.

"Motion".—Before a resolution is passed it should, strictly speaking, be called a "motion." When passed, a motion becomes a resolution. In these articles, however, the word "resolution" is used in both senses, and the word "motion" is used infrequently.

"Move".—To move a resolution or motion is to propose it.

"Nominate".—To nominate a person is to propose that he shall be put up for election to office or to a committee.

"Point of order".—If any member thinks that one of the rules of debate or procedure is being broken, he may rise to his feet and say, "Mr. Chairman, on a 'point of order' . . . so and so . . ." The chairman must at once consider this objection even though it interrupts a speech. His ruling (decision) is final, and may not be discussed.

"Proxy".—One who takes the place of, and is empowered to act for, another.

"Put the resolution or motion".—To put it to the vote, that is, to ask the members to vote on it.

"Quorum".—The minimum number of members needed for a meeting to be held.

"Rescind".—To rescind a resolution is to cancel it. As no resolution that has been dealt with can be discussed again at the same meeting, a resolution passed cannot be rescinded until,

at the earliest, the next meeting, and then only if notice is given before the next meeting.

"Resolution".—A resolution is either a proposal that something shall or shall not be done, or an expression of opinion by the meeting that passes the resolution.

"Ruling".—At a meeting, final authority is in the hands of the chairman. If he orders that something shall or shall not be done, he has made a ruling to this effect.

"Second".—At least two members must indicate that they wish to have a resolution discussed before discussion by the remainder may be permitted. The first of these two members will stand and say "Mr. Chairman, I move (propose) that . . . because . . ." This member is known as the "mover" or "proposer". The second member stands when the mover has finished speaking and says, "Mr. Chairman, I wish to second this resolution (motion), because . . ." A resolution may be seconded "pro forma" without the seconder giving argument in favour. (In this case the resolution is seconded to prevent it from "lapsing for want of a seconder".)

"Standing Committee".—A permanent committee. Even though its members may change from year to year, the group remains in being.

"Standing orders".—These are the rules that govern the way in which a meeting shall be conducted. (A club's standing orders might well be drawn up from the articles which will appear here.)

"Sub-committee".—Routine matters of club management are usually in the hands of the officers or the executive committee, but other committees are often set up to deal with special matters. These committees are sub-committees of the executive committee, hence their name.

"Taken as read".—If the minutes of a meeting are circulated to members before the next meeting, they are not usually read out by the secretary. The

chairman asks "Is it your wish that the minutes of the last meeting be 'taken as read'?"

"Terms of reference".—These are the instructions given to a sub-committee when it is set up.

"Ultra vires".—If a meeting makes decisions on matters over which they have no authority, these matters are described as "ultra vires" in so far as that meeting is concerned. Such would be the case if the executive committee, without instructions from club members, made important decisions regarding the club programme. They would thus be acting "ultra vires".

"Unanimous".—Voting is unanimous when all those persons entitled to vote at a meeting do so, and when all vote the same way.

"Urgency, matters of".—These are matters upon which decisions are needed at once. They may arise during

the course of a meeting or between meetings.

"Verbatim".—Word by word. A speech that is recorded "verbatim" is written down exactly as it is spoken.

Hints For Club Members

The financial year of the Junior Farmers' Organisation ends on March 31, and all annual meetings and elections of club officers must be conducted during April. Copies of the club leader's annual report and the financial statement and balance sheet must be sent to the State Organiser.

The Annual State Conference of the Junior Farmers' Clubs will be held this year at the National Fitness Camp, Burleigh Heads, from April 27 to May 1 inclusive. This is the most important function in the junior farmer calendar, and each club should be represented by a delegate and an observer.

Bush Book Club's Good Work

WHEN the Bush Book Club was formed 36 years ago the small group of six women who formed the original committee did not conceive that their link of friendship between city and country would grow into a chain stretching from Cape York Peninsula to the borders of New South Wales in the south and the Northern Territory in the west.

"That original ideal of sending out literature as a gesture of friendship from friends in the city to all in the country who are beyond the reach of Public Libraries is still our guiding thought and during the past year we have distributed well over 20,000 books to members as well as many hundreds more to deserving organisations.

"As our parcels go on from reader to reader instead of coming back to headquarters each time it is not

possible for us to have a catalogue so that members may choose their own books but we pack always to a definite plan. Each parcel contains ten books and as many magazines as we can spare. First a book chosen for better reading, then romances, thrillers, westerns so as to give as wide a selection as possible for family reading. If the parcel is worn when it reaches the third or fourth reader (for books naturally tend to wear with so much travelling) we send a supplementary parcel on request to bring it to full strength again.

"We do not now regularly include children's books in all parcels but send them when asked for or when we know there are children in a family."

—Extract from the Annual Report of the Queensland Bush Book Club, by the honorary general secretary, Mrs. A. GOLDSMITH.

The Farm Family

Looking After Old People

Given enough years of living, we shall all know what it is to be old. Shall we, by our understanding and consideration of old folk today, have earned for ourselves the right to a happy tomorrow?

The physical needs of old people are usually not great, and the best general guide is moderation in all things. However, we must not go to the other extreme and underestimate the things needed to keep the elderly person fit and well. Here are the main points:

Food

Old people are inclined either to over-eat (frequently through lack of other interests) or to subsist so meagrely that they are undernourished. Too many are apt to confine themselves to a diet of tea and bread and butter.

Old people, as well as younger folk, need a varied diet, including a little of each of the good foods. It is better for meals to be small and fairly frequent, rather than bulky and at long intervals. It must be remembered that over-eating means overweight, one of the greatest dangers to health in old age! Drinking plenty of water will help to avoid the cramps of old age.

Clothing

Old people need to be well-wrapped in cold weather, so they are not tempted to rely for warmth

on stuffy rooms. Being dressed in outdoor garments, rather than gowns and slippers, will encourage them to seek the fresh air and mild exercise.

Activity

Moderate activity is far better for old folks than inertia. Performing small household tasks and taking walks will help provide healthy exercise and a wholesome mental attitude. However, the elderly person must never try to repeat the physical feats of his younger days. Especially to be guarded against is hurry, which imposes dangerous strain on the heart and circulatory system. Moderate activity in old age is good, provided a calm, unhurried attitude is cultivated.

Rest

Sometimes old people worry unnecessarily about the fact that they don't sleep so much at night as they once did. This is quite normal, and to be expected, especially if they follow the wise habit of having a daily doze after lunch. As a general rule, old people should have small rests frequently.

Safety

We must remember that old people don't see and hear so well as the young, and their muscular reactions are slower. All furniture, rugs and household equipment should be examined with an eye to accident

prevention, especially the preventing of falls. Stairs should be well-lighted and have hand-rails. Safety in the bath for old folk demands hand-rails and a rubber mat.

Warning Symptoms

In the care of old people, keen observation is needed. Tell the doctor without delay about any sudden change in condition. It is especially important to report a persistent cough, sudden loss or gain in weight, bleeding from any part of the body, spells of dizziness, vision disturbances or a thickness of speech.

It cannot be too strongly emphasised that the old person is not a machine, to be satisfied by mere physical maintenance. There are probably many more old folk made unhappy through mental rather than through physical causes.

Attitude of Aged

Much depends on the attitude of the old person himself. If there is a secret of "How to be happy though old," it lies in having a purpose in life. This calls for a positive outlook by the old person. The way to look at retirement is to retire not "from" something, but "to" something. It should be seen as a release from the worries and business of money-making; a new freedom to follow a bent, to do things so long dreamed of "when I have time."

There are some old people full of enthusiasms, always finding something fresh and interesting, especially

in the way of helping others. They enjoy life. Yet often their contemporaries, sometimes as much as 10 years younger, simply sit around waiting for the end! In idleness there is nothing but decay. But, however restricted physically, the old person need never be mentally idle. We can be happy in old age if we continue to look out on the world rather than in on ourselves.

Attitude to Aged

We must never forget that old people need desperately a sense of belonging and usefulness. As much as possible, they should be allowed to help in small ways, and made to feel that their help is appreciated.

Old people should be encouraged to make contact with the outside world. It will help them to keep alert mentally and physically, and help to prevent boredom. We should remember that for old people it is a "day of small things," all of which help to keep life interesting. In case of forced inactivity, the radio can be a boon.

Privacy and personal belongings are very precious to old people. A room of their own, with some family possessions about them, can give them a much-needed sense of security. They should be encouraged to have their own friends and allowed to make some decisions regarding such things as their clothes. This will help them from feeling completely dependent.—*Contributed by Queensland Health Education Council.*



New Book Out

THE Honey Flora of South-Eastern Queensland, by S. T. Blake and C. Roff. Outstanding features of this book are the large number of excellent illustrations, as well as descriptions of trees and plants of interest to apiarists, farmers, graziers, and naturalists.

The price is 15s. A reduction of 20 per cent. is allowed for registered apiarists, university students of botany, and booksellers. To those outside Queensland, the price is £1.

The book is obtainable from the Under Secretary, Department of Agriculture and Stock, Brisbane.