QUEENSLAND AGRICULTURAL JOURNAL

VOL. 86 AUGUST, 1960 NO. 8

Registered at the General Post Office, Brisbane, for transmission by Post as a Newspaper

contents

COVER PICTURE: Bulldog and Bull at the Pasture Research Station, "Brian Pastures," Exhibit an Age-Old Enmity. The dog is "Granville," owned by Chief Agrostologist, Ross Humphreys.

EDITOR: *E. T. Hockings*

PUBLISHED BY THE QUEENSLAND DEPARTMENT OF AGRICULTURE & STOCK.

SUBSCRIPTION RATES (PAYABLE TO DIRECTOR-GENERAL, DEPARTMENT OF AGRICULTURE AND STOCK, WILLIAM STREET, BRISBANE):

QUEENSLAND FARMERS, SCHOOLS AND STUDENTS—5S. A YEAR; OTHERS—£1 A YEAR.

11 Points In Managing Irrigated Pasture

By C. A. SCHRODER, Assistant Irrigationist.

An experiment extending over three years was carried out at the Gatton Regional Experiment Station to examine the effects of a number of practices on an irrigated pasture consisting of the irrigation strain of white clover, cocksfoot, phalaris and H1 rye-grasses.

It was found that some treatments had disastrous results. They quickly lowered the growth rate and quality of the pasture and allowed it to become weedy and uneven. It was also found that high production, good quality and evenness of cover could be maintained for long periods by sound management practices.

As a result of the experiment, certain recommendations have been made. These have given excellent results at the station and may be taken as a guide for pasture growers. Their adoption will lengthen the life of the stand, ensure maximum return, maintain evenness of the pasture cover and provide efficient grazing of the pasture produced. The recommendations are:

(1) To maintain vigour, high production, evenness of sward and desirable grass/clover ratio, this type of pasture should be grazed as infrequently as possible. However, grazing spells should not be long enough to allow the pasture to lose food value or become unattractive to stock.

The length of spell should vary with the season. Twenty to 30 days is often quite satisfactory in spring and summer, while in autumn and winter six or eight weeks may be desirable.

Think of Lucerne

About eight grazings a year is a good figure. A good idea is to think of a lucerne crop. Farmers know well that for best results this crop should not be harvested until it has reached the right stage. A vigorous stand of irrigated lucerne usually provides eight or nine cuts a year, the length between cuts varying with season. Mowing before the lucerne is ready is detrimental to the crop—if done occasionally the harm is not great, but if persisted with, will soon ruin the stand by severely weakening the plants and allowing weeds and grass to take control. In this respect pasture and lucerne are alike. Grazing before the pasture has reached grazing condition is one of the commonest malpractices noticed.

(2) Efficient spreading of manure should be done as soon as possible after grazing.

This operation should not aim at any cultural effect, but should effectively spread a manure pat over a distance of eight or 10 feet.

(3) Particular care should be taken not to allow heavy defoliation at any time. Probably no other single practice will as quickly make an invalid out of a healthy plant. The combination of too hard and too frequent grazing is pasture enemy number one. Care against overgrazing is important all the year round but particularly so in hot weather when exposed soil can become hot enough to kill out many temperate plants. When that happens weeds and paspalum soon take over and the pasture loses its identity.

(4) A long spelling period with deferment of grazing or hay-making should be given each year if possible.

A long spell restores vigour and is particularly beneficial to weakened plants. It may be likened to an annual holiday; although it may not be considered necessary or desirable beforehand it is always attended by good results. It not only restores vigour but does a great deal to remedy any unevenness in the pasture cover.

Deferment of grazing in late summer and autumn actually increases the amount of grazing provided and at this period succulence and food value are maintained for long periods. Deferment of grazing is actually a short-term (8 to 12 weeks) fodder conservation scheme by which pasture grown in late summer and autumn can be held over on the stalk and grazed in winter. There are neither conservation nor feeding-out costs, while high nutritive value is maintained.

The inclusion of hay making in the pasture programme means that growth produced in the better growing portions of the year can be conserved until required. The irrigated pasture can thus play a part in the overall fodder conservation programme on a property. Hay making does not result in a loss of animal return to the pasture if the hay is fed back in the paddock. Good quality baled hay made from white clover, phalaris, cocksfoot and rye-grass is preferred to baled lucerne hay by both cattle and sheep on the Gatton station.

By deferment of grazing and hay making, the carrying capacity of a pasture can be evened out over the year.

(5) Every effort must be made to maintain evenness in the pasture cover at all times.

Maintenance of an even pasture cover should be regarded as the most important item in pasture management.

Efficient grazing can never be obtained while the pasture cover is uneven. Why plant, irrigate and grow pasture and then waste a lot of it by inefficient grazing? The evenness of the cover also very greatly influences persistence and production of the planted species, invasion by weeds, efficient use of soil moisture, and loss of soil moisture by evaporation.

It can safely be said that the whole condition of a pasture, its productivity, and the efficiency of the total management used are all evidenced by the evenness or otherwise of the pasture cover at any season.

(6) Pattern grazing, that is unevenness of cover, should be corrected as soon as it becomes evident.

For this correction, any manure pats present must be thoroughly spread, and the pasture given one or more fairly long spells followed by mowing if possible or very light grazing.

Evenness of pasture cover and efficient grazing are best maintained by a judicious combination of grazing, and hay making.

(7) When a heavy body of pasture is to be grazed, loss from trampling and fouling can be largely eliminated if grazing is controlled with an electric fence and stock allowed only a narrow strip at a time. As far as possible the stock should be forced to graze "under the fence" but too heavy grazing must be avoided.

(8) The need for fertilizer application must be watched, and timely application made according to the prevailing conditions.

Sound irrigation practices must be followed.

Look on it as a Crop

(9) The pasture grower would be wise to learn to regard his pasture as a sown crop and to manage it to obtain maximum returns. *This entails grazing it to suit the growth habit of the pasture.* Grazing whenever the animals require pasture regardless of the condition of the pasture should be regarded as a crime against decent pasture.

If sufficient irrigated pasture is not available to meet the full requirements of the animals, provision of unirrigated pasture, forage crops or conserved fodder is essential.

(10) The provision of an irrigated pasture does not reduce the necessity for good management of dry pastures nor do away with the necessity of conserving feed for periods of slow growth or drought.

(11) The development of an appreciation of weakened plants is necessary. Proper management will not only foster their recovery but will arrest depreciation of vigour generally.

Success In Dairying Through Sound Management

By R. T. WESTON, Dairy Adviser,
and N. J. DOUGLAS, Adviser in Agriculture.

A Kenilworth dairy farmer has doubled the production of his dairy herd in the last five years. Furthermore he has maintained a steady increase in production from year to year despite variations in seasonal conditions.

The farmer is Mr. S. Passlow, of Booloumba, near Kenilworth, and the average production of his herd has increased from 113 lb. to 254 lb. butterfat per cow. This is an increase of 125 per cent. and represents an estimated £1,120 better return for 1958-59 as against 1954-55.

Mr. Passlow's success is due to a comprehensive pasture improvement programme in association with herd recording. Correct pasture and herd management, individual feeding, cowmanship, and disease control have also played their part.

Herd Recording and Management

Mr. Passlow commenced herd recording five years ago. At that time the production of his herd was very low. As he considered this position was largely created by the use of inferior bulls and lack of suitable feed, a programme of pasture improvement and recording was initiated.

Culling has been strict; females are culled for low production and for short lactation.

The culling and feeding programme has been so effective that the average length of lactation for the herd has been increased from 175 days in 1954-55 to 278 days in 1958-59, an increase of 103 days.

Initially it was necessary to purchase animals to take the place of the disposals, but now sufficient heifers are available for normal herd replacements. It is noteworthy that the size of the herd has been maintained at a constant level throughout the five-year period.

It has been shown consistently by herd recording data that farmers who record their herds continuously over an extended period are able to make better use of the information provided. Those who record continuously are usually able to show better progressive production than farmers recording for only one or two seasons. The results achieved by Mr. Passlow (see Table 1) show that continuous recording pays dividends.

TABLE 1

—	1954–55	1955–56	1956–57	1957–58	1958–59
Average butterfat per cow (lb.) ..	113	161	205	218	254
Number of cows ..	39	37	40	38	41
Average length of lactation (days) ..	175	261	261	287	277

Mr. Passlow believes that the basis of sound herd management is production recording. He says that he could not have achieved the same

results without it. The information provided enabled him readily to assess the affect on productivity of his husbandry practices.

No Dry Paddocks

Perhaps one of the most important factors determining production on this farm is that there is no dry paddock used as such. All the dry cows are run with the milkers throughout the year. This means that each cow receives the same high class roughage irrespective of her stage of lactation or gestation.

the fat when the calf is receiving skim-milk only. Mr. Passlow aims to keep his calves on skim-milk until they are approximately 6 months old.

Calves are regularly drenched for the control of worms and the rotational grazing of paddocks helps to keep parasitic infestation to a minimum.

The Departmental Bull Proving Scheme, of which Mr. Passlow is now a member, has been responsible for the provision of 34 heifer calves on the property. These range from one month to three years. Five are already in production,

Plate 1

Controlled Grazing With Electric Fence, on the Property of Mr. S. Passlow, of Booloumba, near Kenilworth.

It has been shown that the condition of the cow at calving has a strong influence on the length of lactation. It also has a similar effect on production. By calving his cows in the very best of condition, Mr. Passlow is helping to ensure a profitable level of production as each cow is well equipped to commence her lactation.

A sound calf rearing programme has also been adopted. Each calf, having been with her mother for at least a full day, is fed with wholemilk at the rate of 1 gal. a day for one week. Thereafter, skim-milk is used to gradually replace the wholemilk. A concentrate is added to replace

and under Mr. Passlow's system of management these heifers will not be handicapped by adverse environmental conditions. They should be able to produce to the maximum of their inherited capacity.

Pasture Improvement

After growing maize and oats for 25 years, Mr. Passlow planted an initial 7 acres of pasture in 1955. At the present time, 5 acres of this original pasture are still producing high quality feed. In 1958, 2 acres of this original area were ploughed and planted with a lucerne/clover mixture.

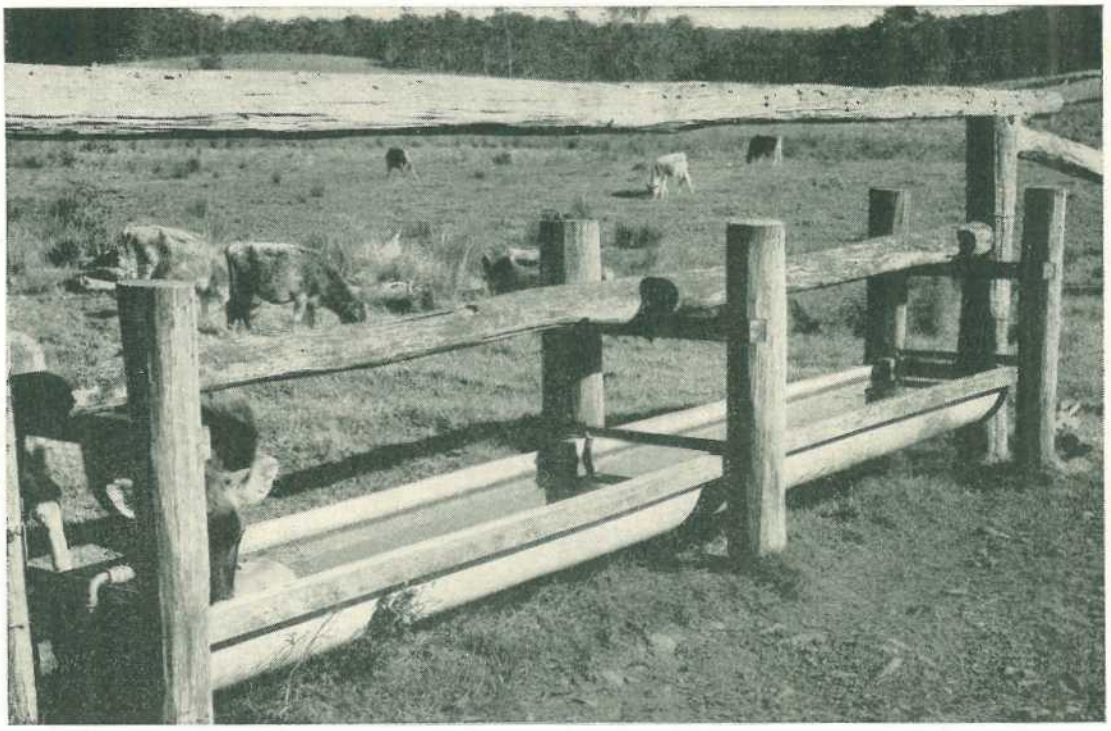


Plate 2
Well-Constructed Trough Serving Two Paddocks.

Each year after this initial planting, additional areas have been sown. In 1956, he planted 6 acres of pasture, in 1957, an additional 3 acres of lucerne. In 1958, 2 acres of lucerne/clover mixture were sown. Also in 1958, 8 acres of land were prepared for contour ditch irrigation and the original paspalum and white clover was oversown with Ladino and Montgomery clover.

The basic planting mixture used consisted of New Zealand and Ladino white clover, Montgomery red clover, lucerne and Hl ryegrass. In earlier mixtures cocksfoot and phalaris were also included.

Until 1957, the clovers were grown under dryland conditions but now Mr. Passlow shares an irrigation plant with his neighbour. This equipment comprises 11 chains of 4 in. main and 7 chains of 3-in. spray line. A 2½ to 3 in. centrifugal pump is driven by an economical 16 h.p. diesel engine. The quantity of water put on is dependent on weather conditions. During summer, when the rate of evaporation is high, the equivalent of 2 in. of rain is applied about every 10 days. Less water is necessary during the cooler months.

Thorough seedbed preparation has played a most important part in the successful establishment of these pasture species. After the initial ploughing, a fine tilth is obtained by discing the soil several times. In such conditions, moisture is retained for longer periods and maximum germination is assured. Mr. Passlow considers that the extra time spent on soil preparation can make all the difference between success and failure in pasture establishment.

Although Mr. Passlow has a total farm area of 240 acres, the bulk of the production comes from the 60–70 acres of creek frontage. The remainder of the farm is steep forest country.

Pasture Management

All pasture land was topdressed with ½ ton of lime and 1½ bags of superphosphate at planting time and each year all the pastures are topdressed with 1½ bags of superphosphate to the acre. This

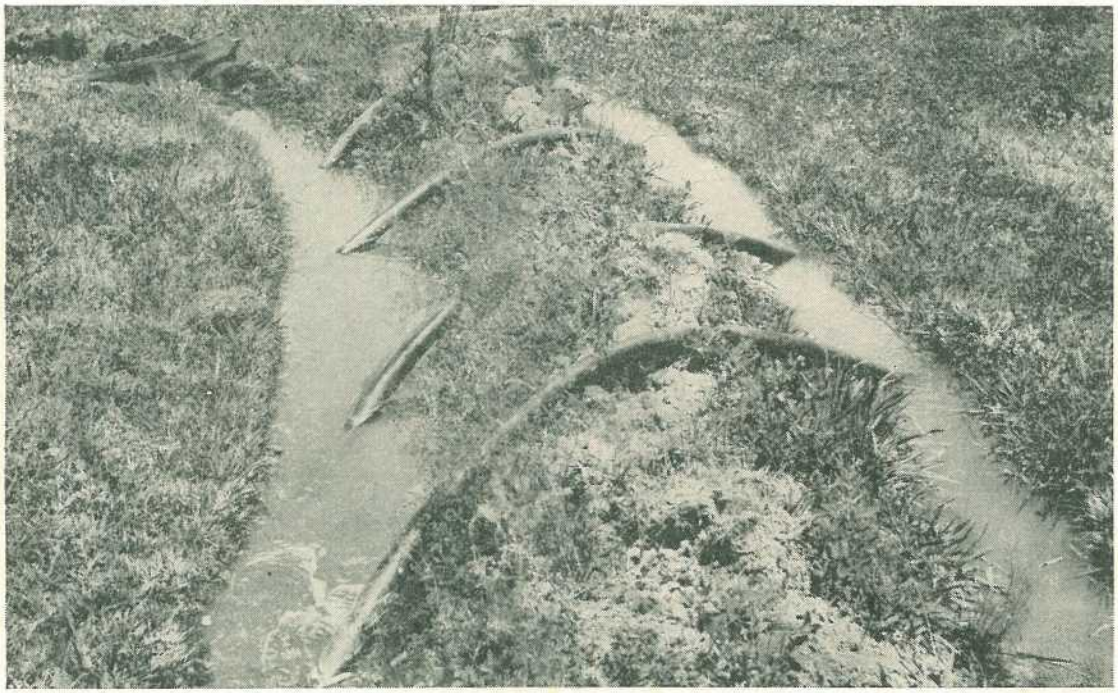


Plate 3
Contour Ditch Irrigation.

treatment is carried out each autumn, and involves the annual purchase of 60 bags of fertilizer. Mr. Passlow considers the outlay well worthwhile, thus ensuring a continuous supply of good quality pasture.

To use feed efficiently, both strip and rotational grazing have been adopted. Over-grazing is guarded against because of the major disadvantages of drop in pasture quality. This is an important factor where soil temperatures are high during the summer months. A quick regrowth is assured when over-grazing is not practised. Pastures are never grazed closer than 4 to 6 in. from the ground. By this means, soil moisture is preserved and weed growth kept to a minimum.

The pastures are subdivided into strips of two-thirds of an acre with semi-permanent electric fences. The electric fence unit is located in the milking shed and overhead wires carry the current to various paddocks of the farm.

These small strips are rotationaliy grazed approximately every 6 weeks. Each strip usually lasts 2 days, being grazed on an average of 1½ hours a day. Grazing is sometimes divided into three periods as a control against bloating, and the cows appear to consume more feed by this method. This system of management has paid dividends. It can only be used when there is sufficient pasture to provide continuity of feed. The average number of cows grazed is 45.

The pastures are mowed for weed control when warranted. If a strip is to be mowed, it is done immediately after grazing. The mower is also used for controlling rank growth in the open paddocks. It is a most valuable piece of machinery as far as pasture management is concerned because the palatability of the pasture is retained for a much longer period.

Apart from the area sown to improved pasture, the usable portion of the farm is divided into 8 paddocks. These provide supplementary grazing after the cows have obtained their main requirements from the highly improved pastures on the creek flats.

Feeding

The increase in production of this herd could not have been obtained without the provision of

suitable feed, and this is where the pasture improvement programme has indicated its value. By continuous pasture feeding during the day, combined with the supplementary feeding of concentrates in the bails, the herd has been able to produce at a high level.

About 5 acres of maize are grown each year to provide grain for the cows and pigs. Each cow receives a basic ration of approximately 3 lb. of crushed maize a day. Heavy producers receive an additional amount according to their level of production. When no maize is available a mixed dairy meal of approximately 18 per cent. protein is fed. Mr. Passlow finds that it is only necessary to feed this concentrate supplement for an average of 4 months each year.

In addition to grain supplements, a phosphate supplement is provided for all stock. This is placed in a number of wooden troughs conveniently situated near the milking shed, and each animal is able to obtain it at will.

One of the most valuable assets with which any dairy farm can be endowed is an ample supply of good water. Stock, especially milking cows, are unable to make the best of the fodder consumed unless a plentiful supply of water is readily available.

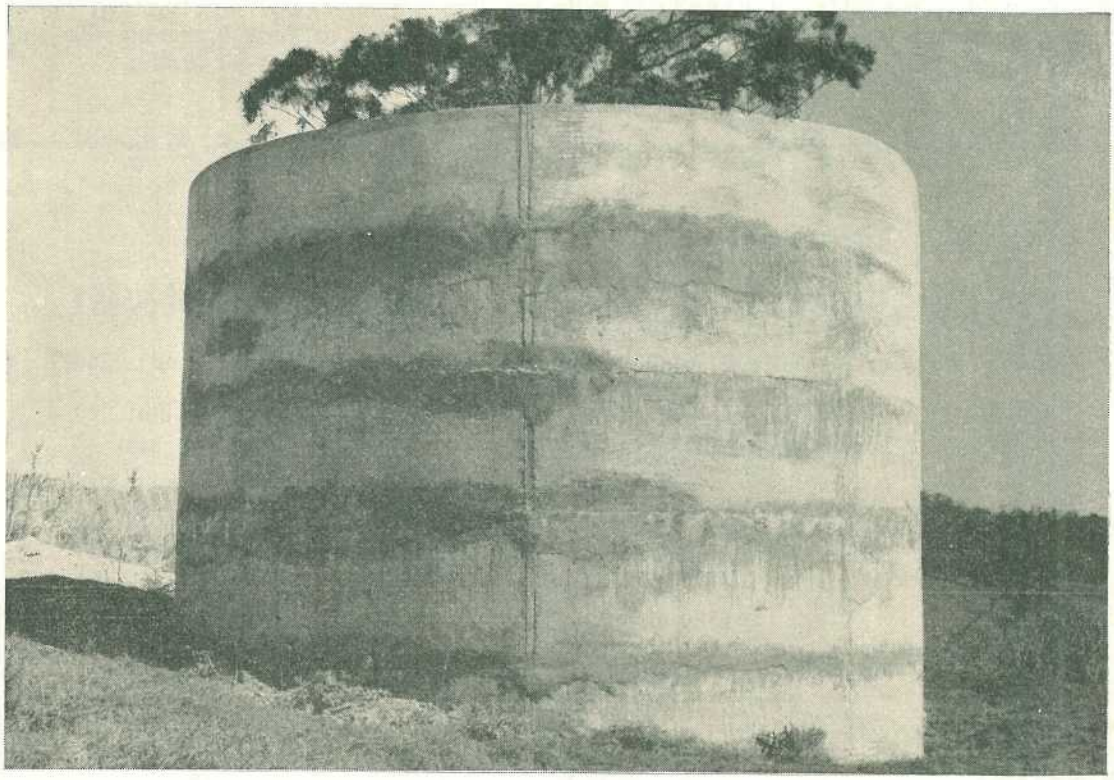


Plate 4

Water is Reticulated to Milking Shed and Troughs from this 11,000 Gal. Storage Tank.

Mr. Passlow's animals have access to water 24 hours a day. A windmill delivers water to a 11,000 gal. concrete tank situated on high ground near the house. Water is then reticulated to the milking shed and to a trough adjacent to the yard. This trough provides water for three paddocks. The provision of water in all paddocks ensures that stock are able to obtain sufficient not only for normal requirements, but the extra quantity necessary for high producing cows.

Cowmanship

Mr. Passlow is a great believer in "cowmanship". He realises that cows are creatures of habit and react favourably to regular practices. The handling of the stock during grazing, and their subsequent transfer to other paddocks, are performed without undue haste or bustle.

A visitor to the farm soon realises that the herd is well managed. Cows pass through the bails quickly and smoothly on a well-ordered system. There is no doubt that the handling of the herd during milking and at all other times has contributed to the present high level of production.

The provision of adequate quantities of good quality pasture, carefully managed, has undoubtedly been a major factor in attaining the present level of herd production. Continuous herd recording has provided the information necessary for best use of available fodder resources, and the history of each animal is being gradually built up to form the basis of a future breeding programme. This, together with care and regularity in all farm operations, has proved to be a basis for successful farming.

Save On Costs of Fertilizer For Pineapples

By R. C. CANNON, Senior Horticulturist.

Pineapple growers can now cut their fertilizer costs by as much as 50 per cent. Experiments at Maroochy Experiment Station show that less fertilizer and less labour are required when a pre-planting mixture is used followed by regular urea sprays after planting.

The time-honoured method of fertilizing pineapples by applying fertilizer to the base leaves of pineapples will, before long, give place to an easier and more efficient method. Power sprays will do a job that for many years has been done by hand, and one more back-breaking task will disappear from the pineapple grower's routine. Less fertilizer will be wasted and money will be saved.

Base leaf fertilizing is convenient when the work has to be done by hand, but has no other special merits. Practically none of the fertilizer is absorbed directly through the leaf bases; it has first of all to be carried to the soil by rainwater collected in the trough-like leaves and then taken in by the roots. As a method of side-dressing, there is less risk of fertilizer being washed away than when it is thrown on to the surface of the soil. Very little rain is needed to dissolve the fertilizer and carry it down to the soil.

Urea foliage sprays are a cheap and efficient way of supplying nitrogen to pineapples and have several advantages over base leaf applications of sulphate of ammonia. Phosphorus and potassium are rarely applied as sprays and are usually put into the soil as a basal dressing or as side-dressings. The latter have been used in pineapples primarily because of the necessity for frequent applications of nitrogen, which is included in the mixture.

The possibility of applying potassium fertilizer in a pre-planting mixture was recently investigated at the Maroochy Experiment Station.

Less Potassium

Being the main constituent of pineapple fertilizer mixtures, potassium was the first to be investigated. The work is not yet complete, but sufficient information has already been obtained to indicate that a pre-planting application of sulphate of potash is not only satisfactory, but also commercially desirable. When applied directly to the soil in a basal dressing, much less was needed to produce the same tonnage of fruit in the plant crop than is used in regular base leaf applications. Plants that received no potassium other than the pre-planting application made better growth and gave a slightly higher yield.

Ratoon crop results are not yet complete but the indications so far are that the amount used in this trial will prove sufficient for a ratoon crop as well. Even when these results are known, further trials will be necessary to determine the minimum requirements for different soils and for different plant spacings. However, from what is already known, an estimate has been made of the maximum amount necessary for a full cycle.

In the trial, the fertilizer was spread over the surface of the planting bed by hand and worked lightly into the soil with fork hoes. This is a fairly quick and easy way of putting on the fertilizer. With a little ingenuity, growers will soon devise better methods, using fertilizer distributors where the area warrants it. The fertilizer can be worked into the soil with disc harrows or other implements already available on the farm.

Pineapples need a great deal of potassium, and growers want to get the most they possibly can out of every pound they use. The economy in fertilizer, quite apart from the saving in labour, is worthwhile.

Plate 1

Pineapples on the North Coast. The crop is planted on the contour. Note waterway in the foreground.

Urea Foliage Sprays

Urea sprays are not new; they have been used on a limited scale in Queensland for some years. They can be applied quickly and easily with power spray equipment which is used on most pineapple farms for weed spraying. Even with a knapsack spray, a man can cover twice the area in a day that he could fertilize by hand.

Because urea is taken in directly through the leaves, the spray acts almost immediately. Base leaf applications of sulphate of ammonia, on the other hand, need at least some rain after they are applied before the nitrogen becomes available, and it may often be weeks before the plants get any benefit. Even in the usual dry winter when growth is normally slow, urea foliage sprays are moderately effective.

A further advantage of urea spraying is that it does away with the acidifying effect on the soil of sulphate of ammonia. On many farms, continued use of this fertilizer over a long period has made soils too acid even for pineapples and growers have to apply lime to correct excess acidity. The principle of foliage spraying is to put on just enough to wet the leaves, with a minimum of run-off to the soil. Even if some of the spray does run down to the ground, the urea does not acidify the soil like sulphate of ammonia.

Because of the limited amount that can be put on at a time, urea foliage sprays have to be applied every two months. This is more often than base leaf applications of fertilizer are usually

made, but the ease and speed of spraying more than compensate for this. Although it appears to be expensive, urea is actually a relatively cheap source of nitrogen. One ton of urea contains as much nitrogen as two and a quarter tons of sulphate of ammonia.

The New Way

Although investigations are not yet complete, pineapple growers can take advantage of what is known, bearing in mind that present recommendations are only tentative and may have to be modified later.

Plate 2

A Full Crop of Pineapples Shortly Before Harvesting. A crop like this is the reward of good management, one phase of which is the efficient use of fertilizers.

An 0-4-37 fertilizer mixture is now available commercially. For most soils 1,000 lb. to the acre of this pre-planting mixture will be sufficient for a plant and one ratoon crop. This supplies 200 lb. of superphosphate and 750 lb. of sulphate of potash to the acre. In areas subject to "crookneck" the addition of 28 lb. each of copper sulphate and zinc sulphate is necessary. These ingredients may be included in the fertilizer mixture applied before planting.

The only fertilizing necessary from then on can be done by means of urea sprays applied every two months. Commercial urea contains an impurity known as biuret, which causes yellowing and withering of the leaf tips of pineapples. It is, therefore, advisable to see that the urea you use has a low biuret content, preferably not over one quarter per cent. The usual spray concentration used for pineapples is 10 per cent., that is, 1 lb. of urea to 1 gal. of water.

The spray is applied as a fine mist to thoroughly wet all the leaves, but no more. Should there be any excess to run off, it will not do any harm and will be utilized by the roots in the same way as any other nitrogen fertilizer in the soil. However, absorption through the leaves is the basis of this method.

The quantity of spray to the acre will depend on the size of the plants. As a guide, young plants will take about 30 gal. to the acre, and this amount will go up to about 50 gal. for fully grown plants. This means that, as the plants grow and their needs increase, they automatically receive more nitrogen at each spraying.

In areas such as the Mary Valley, where iron sprays are used to correct a manganese-induced iron deficiency, iron sulphate can be included with urea in the spray. The usual quantity of 5 oz. to 1 gal. may be added to the 10 per cent. urea spray. Where iron is included, however, special care is necessary to avoid any run-off, which may cause burning.

Big Saving

The new method of fertilizing pineapples is much less costly than the old. At present prices, about £50 an acre will buy the pre-planting fertilizer and urea needed to produce a plant and one ratoon crop. Under the old system of base leaf fertilizing the cost would be something like £100 per acre, or even more with close spacing between plants.

Every pineapple grower wants to save as much fertilizer as he can, provided he can be reasonably sure of not losing tonnage. Trial results show that this can be done and that you can save labour into the bargain. It will not be long before every pineapple grower adopts these improved methods of fertilizing his crop. Those who have already made the change are enthusiastic.

Tuberculosis-Free Cattle Herds

(As at 1st August, 1960)

Aberdeen Angus

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

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D., "Wamba", Chinchilla
Dennis, L. R., Diamondvale A.I.S. Stud, Mundubbera
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
Evans, E. G., Lauraven A.I.S. Stud, Maleny
Green, D. B., Deloraine A.I.S. Stud, Fairdale
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K., Greenmount
Henschell, W., "Yarranvale", Yarranlea
H. M. State Farm, Numinbah
Littleton, H. V., "Wongalea", Hillview, Crow's Nest
Marquardt, A. C. & C. R., "Cedar Valley", Wondai
McShane, A. H., Handford Road, Zillmere
Mears, G. S. & E., "Morden", M. S. 755 Toogoolawah
Moore, S. R., "Sunnyside", West Wooroolin
Neale, D. G., "Groveley", Greenmount
O'Sullivan, Con., "Navillus", Greenmount
Pinwill, A. A., Gaylands A.I.S. Stud, Gayndah
Power, M. F., "Barfield", Kapaldo
Messrs. Mitchell and Mulcahy, Rosenthal
Queensland Agricultural High School & College, Lawes
Radel, R. R. & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm," Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae" A.I.S. Stud, Kingaroy
Scott, W. & A. G., "Walena" A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Estate Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros., "Valera", Pittsworth
Sullivan, D., "Bantry", Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H., "Alfavale", Nanango
Webster, A. H., "Millievale", Sabine, via Oakey
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

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

Friesian

Behrendorff, E. C., Inavale Friesian Stud, M.S. 786, Boonah
Macdonald, S. E. G., "Freshfields", Marburg
Naumann, C. H., "Yarrabine", Yarraman
Pender, D. J., Lytton Road, Lindum
Stumer, A. O., Brigalow, Boonah

Guernsey

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

Jersey

Beckingham, C., Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. N., Box 23, Wondai
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, Westbrook
Fowler, P. & Sons, "Northlea", Coalstoun Lakes
Harley, G., "Hopewell", M.S. 189, Kingaroy
H.M. State Farm, Palen Creek
Hutton, D. R., "Bellgrath", Cunningham, via Warwick
Johnson, H. G., Windsor Jersey Stud, Beaudesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba
Matthews. E. A., "Yarradale", Yarraman
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
Meier, L. E., "Ardath Stud", Boonah
Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
Porter, F., Conondale
Q.A.H.S. & College, Lawes
Ralph, G. H., "Ryecome", Ravensbourne
Scott, Est. J. A., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell" Jersey Stud, Mulgildie
Smith, J. A. & E. E., "Heatherlea" Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden" Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hill, W. W., Mathalla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
Maller, W., "Bore View", Pickanjinnie
Maller, W., "Bore View", Gowrie Junction
McCamley, E. W. G., "Eulogie Park", Dululu
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi
Yamburgan Pastoral Company, Noondoo

New Drugs Aid Rearing Of Table Chickens

By P. D. RANBY, Veterinary Officer.

New drugs for preventing coccidiosis could change the method of rearing chickens for table purposes in Queensland. When slaughtered at 2½ to 3½ lb. body weight, these chickens are known as broilers by poultry farmers.

With the aid of nicarbazine and zoalene, these chickens can now be reared on the ground as successfully as on wire floors. Ground rearing of table chickens in intensive pens has certain advantages over the use of wire floors.

Coccidiosis has always been a hazard in ground rearing of chickens. This disease is caused by minute animal parasites which attack various parts of the intestine. Although there are seven species of coccidia in the domestic fowl, only three of them cause harm to the birds under ordinary conditions. Immunity is developed to each species but immunity to any one affords no protection against the others.

The main forms of coccidiosis are:—

(1) *Caecal Coccidiosis.*—Caused by *Eimeria tenella* which attacks the two caeca or blind-pouches of the bird, causing severe bleeding. Chickens are affected usually at 4 to 8 weeks. These young birds appear very depressed (see Plate 1), huddle together with drooped wings and pass blood in their droppings. Losses may be high.

(2) *Intestinal Coccidiosis.*—Caused typically by *Eimeria necatrix* which attacks the small intestine, especially in its middle third. The disease is acute in younger chickens (acute intestinal coccidiosis), resembling caecal coccidiosis except that blood is scanty or absent in the droppings. As in the caecal form, deaths are a feature. The form seen in older chickens is chronic intestinal coccidiosis which is associated with unthriftiness and loss in weight.

(3) *Duodenal Coccidiosis.*—Caused by *Eimeria* acervulina which attacks the duodenum (first portion of the small intestine). This form is not so severe as the caecal and intestinal forms but causes a growth depression and affects food conversion adversely in older chickens.

The remaining species inhabit the small intestine but ordinarily cause little or no ill-effect.

Coccidia are ingested by the birds from the litter in the form of oocysts which are resistant, egg-shaped bodies. Inside the intestine of the bird, coccidia pass through a complicated cycle. Since this cycle takes about one week, and one oocyst reproduces several hundred thousand in one cycle, a build-up of coccidia may soon occur.

How Drugs Work

Coccidiostats, or drugs which prevent coccidiosis, are supplied continuously in the mash until the birds are ready for slaughter. These drugs act by hindering the development of coccidia in the intestine of the chicken so that coccidiosis does not occur. It is of note, however, that the different species of coccidia respond differently to the various drugs. Thus *Eimeria necatrix* infection responds more effectively to nicarbazine and nitrofurazone, whilst these drugs are inferior to the sulphonamides in combating *Eimeria acervulina* and *Eimeria maxima.*

Since table chickens are maintained on the drug continuously, the development of immunity should be of no consequence.

Drugs Used

Nitrofurazone (sold under different trade names) was first used as a coccidiostat here about 5 years ago and results have been variable. This drug may not be so effective where a heavy build-up of coccidia has occurred.

Nicarbazine was the first really effective drug available to prevent coccidiosis, and has been used by poultry farmers in Queensland for more than two years. More recently, zoalene has appeared and seems to be as effective as nicarbazine. Zoalene has the advantage that it can be used either as a preventive or at higher doses for treating outbreaks. Nicarbazine is a preventive only.

Some other recent drugs have appeared overseas but may not be marketed here unless they have advantages over the ones already available. One of these new coccidiostats called glycarbylamide gave excellent results at first, but fell into disrepute when it was found that coccidia quickly developed a resistance to it.

Prevention Preferred

In table chickens, prevention of coccidiosis outbreaks is preferred to treatment. Even though drugs used for treatment (zoalene and the sulphonamides) may reduce the number of deaths and check an outbreak, the birds still suffer a setback. Such a setback must be avoided at all costs in the case of table chickens owing to the smaller margin of profit.

Effect on Rearing Methods

In south-eastern Queensland, table chickens have been reared mainly on wire floors. The wire floor rearing is of two types: colony cages (especially in the case of table chickens under 2½ lb.) and wire-floored intensive houses holding large flocks (up to 500 birds). The colony type cages may be in a shed or in the open. This method of management has been adopted mainly to avoid coccidia.

On the central coast, ground rearing of table birds on litter has been practised for many years, while on the far north coast a swing to chicken raising by this method has taken place over the last few years. Coccidiosis has proved to be troublesome under these conditions. However, with the advent of nicarbazine, several large chicken producers claim almost complete success in coccidiosis control. Previously nitrofurazone had been used but an occasional "break through" the drug by coccidia occurred while regularly 20 percent. of each batch were undersized at slaughter time.

With the more recent use of nicarbazine, coccidiosis has been practically eliminated and the chickens dress out much more evenly at slaughter.

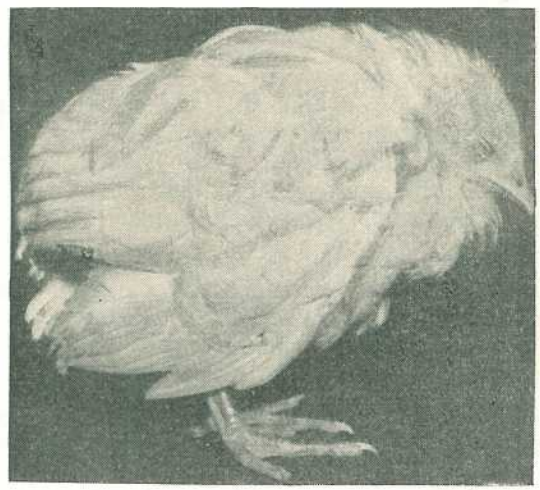


Plate 1

This Chicken was Affected by Caecal Coccidiosis Due to the Parasite *Eimeria tenella*. Note the sleepy, depressed appearance and drooped wings which is typical of the disease. This form of the disease is associated with the passing of bloody droppings and deaths.

The effectiveness of the new drugs has already started a trend back to rearing table chickens on the ground. With the market expanding, a further shift in management method can be expected. Roundworm infestation could be troublesome in chickens reared on the ground, especially if the same litter is used for more than one batch, but effective drugs are available for this parasite.

Some Caution Required

One should be cautious in placing complete reliance on the newer drugs for table chickens. Do not expect these drugs to always "mask" poor

husbandry practices. The coccidia may "break through" the drug barrier under the following conditions:—

(1) Intercurrent diseases (more than one disease at the one time).

(2) Poor litter management.

Intercurrent Diseases.—When table chickens are affected by chronic respiratory disease (C.R.D.) or chick nephritis (uraemia), their appetite may be greatly reduced. Hence their intake of medicated mash may be decreased to levels insufficient to prevent the coccidia developing. It is likely that debilitated birds eat more of the litter material than healthy birds and hence more coccidial oocysts from the litter. A moderate attack of intestinal and duodenal coccidiosis in a proportion of the birds has been observed in the Brisbane area under these conditions where flock appetite was impaired.

Where intercurrent diseases occur that reduce the food intake of the birds, it would be wise to supply the drug in the drinking water.

Poor Little Management.—Dry litter considerably reduces the life of coccidial oocysts on the ground. The litter should be 6 to 8 in. deep for chickens over one month old. If it is stirred occasionally, oocysts are dispersed through it.

Where chickens are overcrowded and the litter is not stirred periodically, packing and hardening of the surface layer will occur. Wet droppings from the birds then collect on the surface, offering ideal conditions for a coccidial build-up.

Even under insanitary conditions, the two main pathogenic types of coccidia (E. *tenella* and E. *necatrix*) may be still fairly well checked by nicarbazine and only occasional mild outbreaks occur. However, duodenal coccidiosis (E. *acervulina*) has proved to be a problem on several chicken farms near Brisbane, despite the use of medicated mash containing nicarbazine. However, in these cases, poor litter management and overcrowding appeared to be contributing factors. It may be recalled that this form of coccidiosis is relatively resistant to nicarbazine (and nitrofurazone) experimentally. Where duodenal coccidiosis is a problem, other drugs may need to be used.

The newer drug zoalene requires further evaluation as a preventive. For example, its action against E. *acervulina* of duodenal coccidiosis warrants investigation. The situation is even approaching where we may need to know coccidiosis in terms of coccidial species when advising on these problems.

Chicken rearing for table purposes usually involves greater intensiveness and population stress, and it is not surprising therefore that special problems may arise as a result.

Special Meat Chickens

Much has been published recently about the special meat chickens being bred in the Southern States. Some Queensland hatcherymen have been quick to realise that unless the same is done in this State many of the chicken orders will go to Southern hatcheries. At least five Queensland breeders have already commenced on breeding programmes to produce special meat chickens.

However, it takes time to establish a new breed.

These special meat chickens will be bred to grow quickly, and they will have plumper breasts than the birds available at present. They should be much more attractive to the housewife and could result in an increased demand for table poultry.

It is fortunate that the breeding of meat chickens is more simple than breeding birds for egg production. In breeding for egg production, only one generation can be reared and tested in a year. With broilers, two generations can be reared and tested in about 14 months. This helps to give more rapid progress. So the broiler grower can expect to see some new breeds on the market within the next few years. These birds will be especially suited to his market, and it is not too far fetched to imagine that within a short space of time he will be selling birds two weeks younger but as heavy as, or heavier than, his birds at present.

—B. W. MOFFATT, Poultry Adviser.

Brucellosis-Tested Swine Herds

(As at 1st August, 1960)

Berkshire

Bernoth, B., Wyreema
Clarke, E. J., Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
Handley, G. R. "Lochlyn" Stud, Lockyer
James, I. M. (Mrs.), "Kenmore" Stud, Cambooya
Kath, E. E., "Topcamp", via Toowoomba
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
O'Brien & Hichey, J., "Kildurham" Stud, Jandowae East
Orange, L. P., "Eula", Flagstone Creek
Pfrunder, P. L., Pozieres
Potter, A. J., Ascot, via Greenmount
"Tayfield" Stud, Taylor
Q.A.H.S. & College, Lawes
Regional Experimental Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Rosenblatt, G., Rosevilla, Biloela
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smyth, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florida" Stud, Kalbar
Thomas & Sons, F., "Rosevale" Stud, Laravale
Traves, G., "Wynwood" Stud, Oakey
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr.), W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Behm, A. M., "Aleun", Wondai
Bishop, C. E., Beerwah
Butcher, Dr. B. J. & Parnwell, A. J., Plunkett, via Tamborine
Clark, L. D., Greens Creek, Gympie
Coller, R. H., "Relloc", Tallegalla, via Rosewood
Duncan, C. P., "Colley", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J., "Delvue" Stud, Cawdor
Garawin Stud Farm Pty. Ltd., 657 Sandgate Rd., Clayfield
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguilar
Heading, J. A., "Highfields", Murgon
Hickson, K. L., "Warra", Calliope
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajea" Stud, Cabarlah
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., "Karajoy", East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
"Marcliff", Wecker Rd., Mt. Gravatt
Neilsen, L. R., "Sunny Hill," Ascot, via Greenmount
Neilsen, A. R., Ascot, via Greenmount
Palmer, V. P. & Son, "Remlap", Greenmount
Pampling, G., Watch Box Rd., Goomeri
Port Curtis Co-operative Dairy Association Ltd., Stud Piggery, Biloela
Postle, R., "Yaralla" Stud, Pittsworth
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Radel, R. M., Coalstoun Lakes
Regional Experimental Station, Biloela
Robinson, O. R. & O. J., "Linvale", Argoon, Biloela
Rosenblatt, G., Rosevilla, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Lanherne" Stud, Tansey, via Goomeri
Stehn, L. W., "Hodgson Vale", via Toowoomba
Stewart, L., Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnow, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Coller, R. H., "Relloc", Tallegalla, via Rosewood
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L., "Hillbanside", Bahr Scrub, Beenleigh
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Wellcamp
Regional Experimental Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephen, T., "Withcott" Stud, Helidon
Thomas & Sons, F., "Rosevale" Stud, Laravale
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

Ashwell, J., "Green Hill", Felton South
Cooper, G. J., Neumgua
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Rd., Kuraby
Kingsford, D., "San Antone", Toowoomba
Kruger & Sons, "Greyhurst" Stud, Goombungee
Law, D. E., "Homevale", Goombungie
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara
"Wattledale" Stud, 432 Beenleigh Rd., Sunnybank

Landrace

Ashwell, J., "Greenhill", Felton South
Behm, A. M., "Aleun", Wondai
Crawford, G. L., "Glenvillan", Manneum
Crothers, B. M., "Booligar", Clifton
Duncan, C. P., "Colley", Flagstone Creek
Fowler, K. P., "Northlea", Coalstoun Lakes
Grayson, D. G., Killarney
Itzstein, R. A., "Hyde Park", Gooroolba
Jensen, A. P., & Grace, V. S., Theodore
Kath, E. E., "Topcamp", via Toowoomba
Kingsford, D., "San Antone", Toowoomba
Law, D. J., Rossville Stud, Aspley
Lush, P. B. I., Westbrook
Neilsen, A. R., Ascot, via Greenmount
Neilsen, L. R., "Sunny Hill", Ascot, via Greenmount
Orange, L. P., "Eula", Flagstone Creek
Semgreen, A. L. & D. T., "Tecona", Kingaroy
Stehn, L. W., "Hodgson Vale", via Toowoomba
Stummer, K. F., French's Creek, Boonah

Large Black

Pointon, E., Goomburra

How Far Does The Egg Spread When Broken Out?

By B. W. MOFFATT, Poultry Adviser.

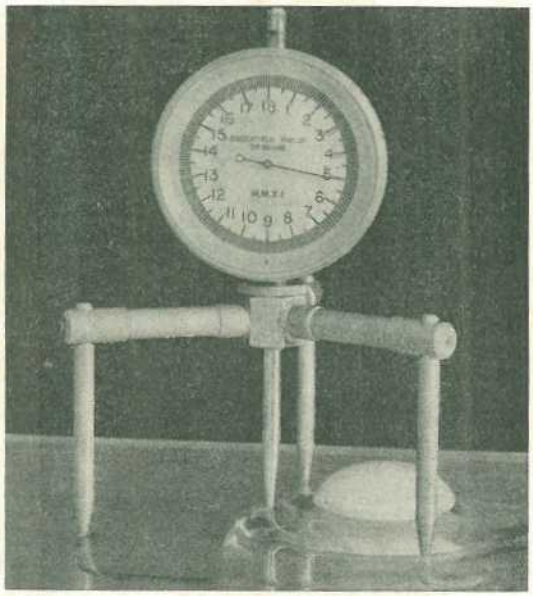


Plate 1

This Micrometer, Graduated in 0.1 mm, is Used to Measure the Height of Thick White in an Egg.

The housewife judges the quality of an egg largely by the amount of thick white in the egg, or, in other words, how far the egg spreads when broken out.

Much work will be done in Australia in the next few years to try to improve the quality of eggs being marketed. New handling and marketing methods will be tested and eventually the poultry breeder who is breeding for better egg quality may be involved.

For this type of work an accurate method of evaluating egg quality must be available. A method which involves opinions is of little use because different operators will have varying opinions. Fortunately a number of reasonably accurate methods of determining egg quality have been developed in other countries.

One of these methods has been in use in Queensland since early 1959 and has proved very effective. It is called the Haugh Unit Method, being named after the American refrigeration engineer who formulated it. The theory behind it is somewhat complex but it is an easy method to use.

In America it is considered one of the most useful ways of evaluating egg quality because it gives a close approximation of what a housewife sees in an egg. The housewife judges an egg largely by the amount of thick white in the

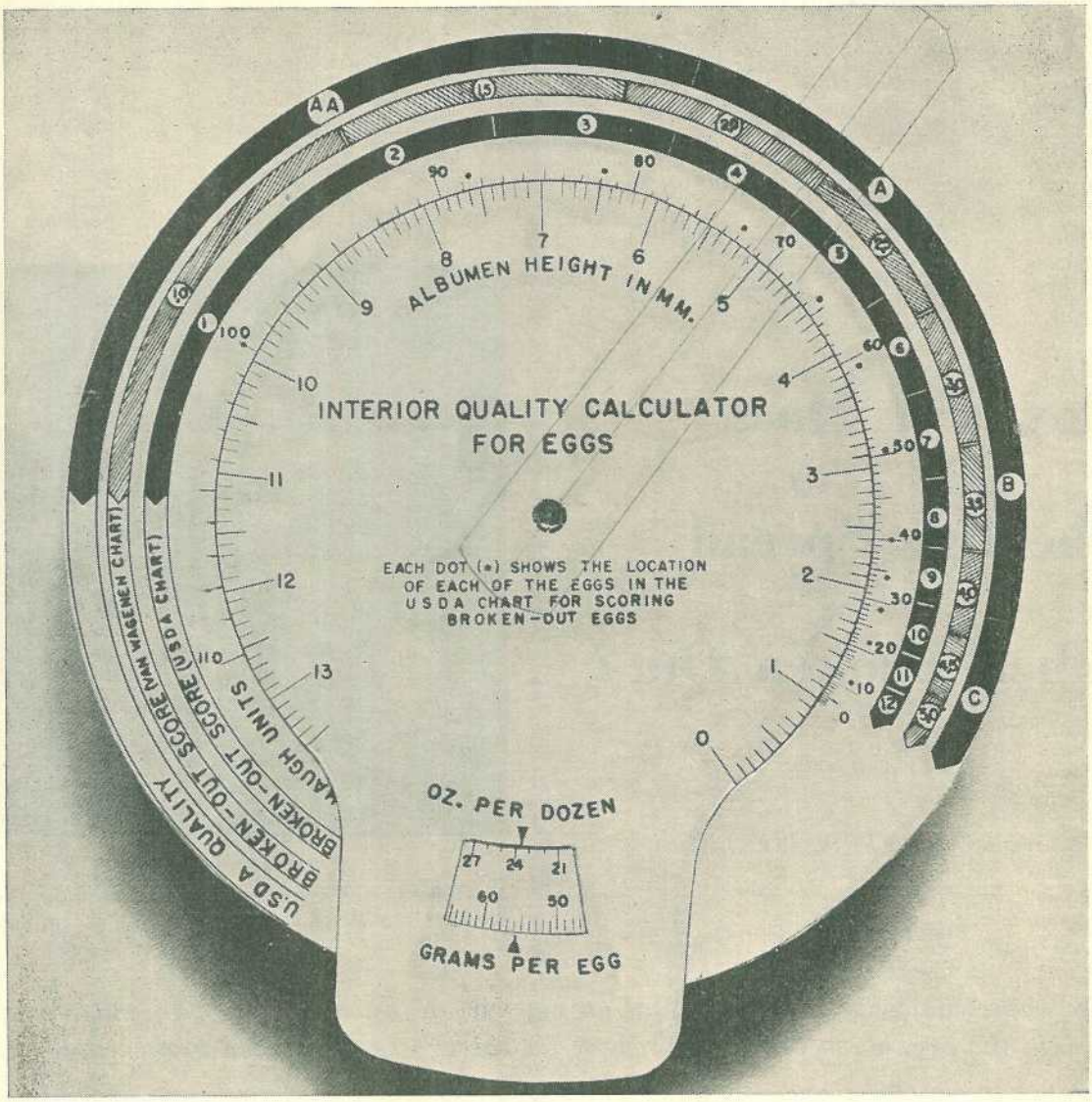


Plate 2

The Interior Quality Calculator Indicates the Quality of an Egg in Haugh Units. The egg in Plate 1 weighed 56 grams (2 oz.) and had a thick white height of 5.1 mm. Its Haugh Unit value is shown as 71.5 units. This is a first quality egg.

egg, or, in other words, how far the egg spreads when broken out.

How to Measure Quality

Haugh units are a measure of the thick white in an egg, related to the size of the egg. When the egg is first laid, it contains a large amount of thick white and, as it ages, this thick white breaks down to watery thin white. Naturally, there is more thick white in a large egg so the size of egg must be taken into consideration.

Thus the first step in measuring Haugh Units is to weigh the egg in grams (28 grams=1 oz. approximately).

The egg is then broken out onto a level sheet of glass. A micrometer (see Plate 1) is used to measure the height of thick white. The micrometer measures in millimetres with an accuracy of 0.1 mm (25 mm=1 in.). The measurement is usually taken on a flat area of the thick white halfway between the yolk and the edge of the thick white. In a very fresh egg there is no flat area but the reading is made at the same place. Thus we have the weight of the egg in grams and the height of the thick white in millimetres. These figures are then entered on a calculator (see Plate 2) and the value of the egg's quality in Haugh Units can be obtained.

The Haugh Unit value can range from 1 for a very stale egg to 110 for a very fresh egg.

This calculator also indicates the grade of the egg by United States Department of Agriculture grade standards. An egg 79 units and above is AA quality, 55 to 78, A quality, 31 to 54, B quality and below 31 C quality. In Queensland first quality would include eggs above 55 units and second quality eggs below 55 units.

It is quite obvious that this method of testing egg quality does not involve opinions and can give a fairly accurate evaluation. It is very useful where small differences in quality are to be detected.

Breeding for Improved Quality

In some overseas countries this method of evaluating egg quality is used in improving egg quality by breeding.

It is an established fact that interior egg quality can be improved by breeding. A few eggs from each hen being tested are broken out and their quality measured in Haugh Units. It is usually found that a hen lays an egg of a certain value so that if three eggs are measured the readings in Haugh Units will be very close. Each bird is therefore given an average score and the birds with the highest scores are used for breeding. In this way egg quality gradually improves.

At the present time it is doubtful if this amount of work is warranted under Queensland conditions. However, in the near future it may prove worthwhile. At least one breeder in the Queensland Poultry Improvement Plan is expected to undertake this work in a small way in the very near future.

Its Use in Market Surveys

Most manufacturers have a quality control staff on their payroll. Their job is to check the quality of goods being sold by testing a sample of goods from each batch. If quality falls below a certain standard they notify the production line so that steps can be taken to correct any faults. A similar procedure could apply to the marketing of eggs. The Haugh Unit method would be useful in evaluating egg quality at wholesale (the marketing authority) and retail (the shops) points and if faults are found then these can be traced back in the production line. In this way the poultry industry would be assured that its product reached the market with a guaranteed quality. This could prove a big incentive to the housewife to buy more eggs. She could buy with confidence.

Principles and Methods of Animal Breeding, by R. B. Kelly.

Published by Angus and Robertson, of Sydney, in their Agricultural and Livestock Series, this book is now in its third edition. The first edition was published in 1946 so that the book has been before the public for 14 years, an indication of its general acceptance. Originally written with the interests of breeds of livestock in mind, subsequent additions have taken into account the needs of students of animal genetics. In addition to covering principles of breeding and evolution the book deals with phenotypic and genotypic selection at some length and in the course of three chapters on modern animal breeding with such topics as artificial insemination, family selection, heterosis, bull proving, progeny testing and selection indices. With it all the book recounts the methods used by outstanding breeders of the past. For the student especially, the appendices on coefficients of inbreeding and relationship and on biometrics will be found useful. There is a worthwhile six-page glossary of technical terms used in animal breeding and an eight-page index, the number of pages in the book as a whole being 358. The price is 48s.

Cotton Growing In Queensland—2

By Officers of Agriculture Branch.

Cultivation of the Crop

The yield and quality of the seed cotton produced are dependent largely on the efficiency of cultivation, especially during early growth. Good clean fields are also highly desirable if crops are to be picked mechanically. Because mechanical pickers offer an opportunity for sound development of the cotton growing industry in Queensland, growers should ensure the efficient and trouble-free operation of these machines. Weed-free fields are an important factor.

If the first cultivation is delayed until the plants are 4 to 5 in. high, considerable development of pigweeds and summer grasses may occur, especially when early showers are experienced. It then becomes very difficult to destroy this growth without hand labour, even with the most efficient cultivators. This not only increases the cost of production but depletes soil moisture which otherwise would be available for the growth of the crop. Furthermore, certain important cotton pests may commence their attacks from weeds.

It is a good practice to harrow after the rain before planting, and cultivate close to the row as soon as the seedlings are 2 to 3 in. high, using a cultivator equipped with tines 2¼ in. wide and guards to prevent the soil covering the plants. This eradicates weed and grass seedlings, establishes a nice mulch around the plants, and helps to prevent any further growth of weeds in the row.

Discs should not be used, as they have to be set to cut the soil away from the young plants. This would leave the plants on a narrow ridge, the sides of which would be so exposed that the soil would set hard enough to restrict growth. To overcome this, another cultivation would have to be made soon after, with the discs reversed to throw the soil back to the plants.

If rain falls before thinning time, it will be necessary to cultivate again, especially on old cultivations; otherwise this will not be necessary until the thinning is done. A careful cultivation is given after thinning to re-establish the mulch between the rows and around the plants, and this should be done as soon as possible.

If the cotton plants are from 3 to 5 in. high when a second cultivation is required, thinning can be achieved very cheaply and efficiently by harrowing across the rows with a spike-tooth harrow or tine cultivator. Before doing this, make sure that the stand of cotton plants is good and that the field is fairly level and free of trash, such as large pieces of grass, cotton roots and sticks.

If cotton is grown in rotation with grass, not more than three or four cultivations should be required after the one immediately following the thinning. More may be required on old cultivations. At each of these operations, the soil should be worked to the plants. Not only does this help to control weed and grass growth but a firm brace is established around the plants which assists in preventing them from being blown over during severe storms.

Where the rows are planted on the level contour across the slope, this firm bracing of soil around the plants will also assist in retarding the run-off of storm-water.

Plate 5

High-Clearance Scarifier Suitable for Late Cultivation.

It is an advantage with mechanical picking to have the plants lightly hilled up.

A high degree of efficiency should be aimed at in the cultivation operations. Most farms are now equipped with light, high-speed tractors fitted with their own particular cultivating equipment. This equipment allows quick coverage of the crops and if properly used can hold the weeds in check satisfactorily. Weeds allowed to get out of control, however, force the grower to use tedious and expensive hand-hoeing to save the crop.

It is advisable to continue cultivation as late as possible, so as to allow maximum penetration of storm rains (Plate 5). If the last cultivation is made when the surface soil is dry and crusted enough to break up into clods, it will be all the better for retarding the run-off of storm rains.

Tractor equipment can give excellent results if properly used. In endeavouring to cultivate a large daily acreage, the tractor is frequently driven so fast that the cultivating attachments push the loose soil aside excessively. Then they have to be set well away from the row to avoid the covering of small cotton plants. Such setting does not facilitate the destruction of weed and grass seedlings close to the plants. Tractors, therefore, should be equipped with suitable guards when cultivating small cotton plants. This will prevent the soil covering the seedlings and efficient work can be done.

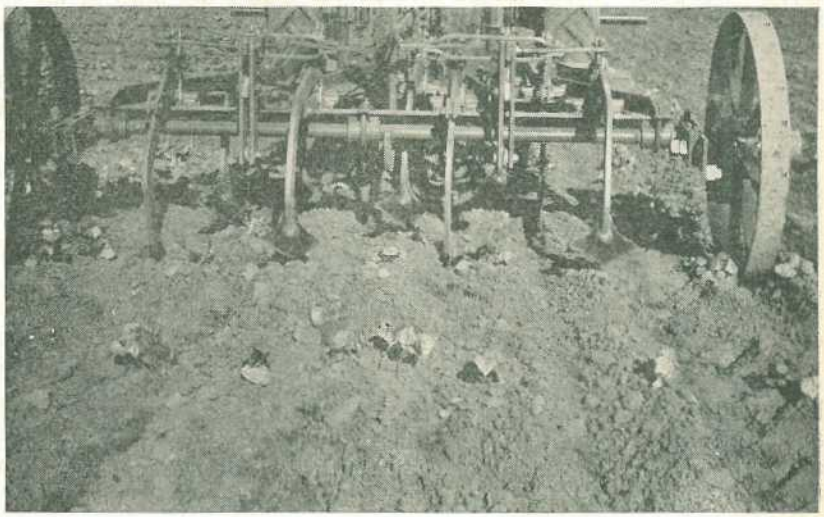


Plate 6

Thinning With a Cultivator.
The tines are spaced according to the stand of seedlings.

Trials with pre-emergence weedicides have, at the time of writing, not been successful in Queensland.

Thinning

The shortage and cost of rural labour has resulted in some changes in the methods of thinning cotton. In order to reduce the costs, cross-cultivation is recommended. Where sufficient seed has been used to give a thick stand of seedlings, and where the surface of the field is relatively free from trash, cross-harrowing when the plants are about 4 in. high with a spike-tooth harrow or tine cultivator (Plate 6) is advisable. This will eliminate many of the seedlings without adversely affecting the stand.

In addition to thinning the seedlings, cross-harrowing reduces weed growth adjacent to the plants much more than inter-row cultivation. If the original stand is good, two or even three such harrowings can be made before the plants are 5 in. high. The aim is to leave a spacing of 1 or 2 plants per foot of row.

It is important that the desired spacing rate be attained before the plants become too far advanced because, with the light rains that are often experienced in the spring, competition for moisture becomes acute in unthinned cotton. On the other hand, for various reasons, terminals of the cotton seedlings may become deformed early in their growth. Hence growers are loth to thin too early, especially in seasons when cutworms are present in large numbers, for fear of losing their stand of well-formed plants after thinning.

However, if left until the plants have developed a firm hold in the ground, thinning by cross-cultivation is almost impossible. This is because the tines of the implements tend to slide off the firmly rooted plants unless a sharp cutting edge is maintained. Even with such an edge many seedlings will be only partially removed and, as a consequence, there will be a very considerable proportion of mutilated plants in the stand capable of making, at best, only a ragged uneven growth.

Under these circumstances, hand chopping must be resorted to. For this purpose a light type of goose-neck garden hoe should be used instead of the heavy chipping hoe. Not only can the strokes be guided more accurately when using the lighter hoe but they can be made with much less fatigue, resulting in a greater daily acreage of chipping, as hand thinning by hoe is often called.

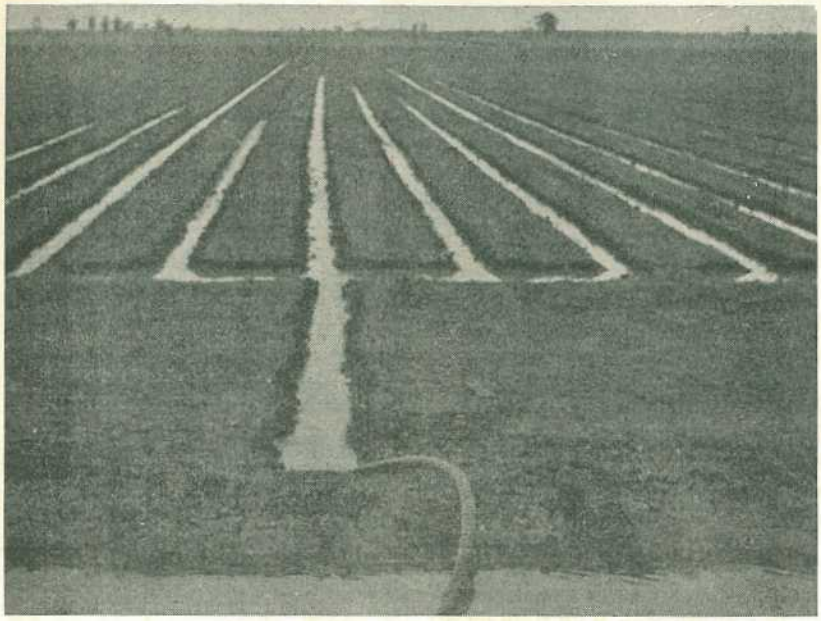


Plate 7

Pre-planting Irrigation in the St. George District.

Irrigation

Most cotton crops in Queensland are rain-grown, but an increasing acreage is being produced with supplementary irrigation. Considerable local experience indicates that a large area of cotton could be profitably grown with supplementary irrigation.

Cotton is very suitable as a pioneer crop on a newly established irrigation area. It requires a good supply of subsoil moisture at planting time, and a pre-planting irrigation of 3 or 4 in. is advisable when subsoil moisture is depleted (Plate 7).

Planting usually follows this initial irrigation, and no further watering is required until the plants square or produce flower buds about six weeks later. Excessive moisture during the pre-fruiting period tends to stimulate vegetable growth and delays crop formation. Deferring irrigation restricts early vegetative growth and causes the development of a small, well-structured plant which makes an early crop of bolls.

After crop formation has commenced, irrigations should be timed to prevent the checking of growth and loss of crop from shedding.

Borings will give an indication of the reserve of soil moisture in the soil, but the cotton plant itself shows easily recognisable symptoms of low soil moisture. As the supply of available soil moisture becomes depleted the leaves darken in colour and begin to droop and wilt. Flowering occurs towards the tops of the plants and the reddish colour, which is normal on the older woody portions of the stalks, approaches and may even reach the terminal buds.

Irrigation should be applied when the flowers and reddish stem colour are about 9 or 10 in. from the tops of the plants, otherwise cessation of plant growth and loss of crop will occur. Application of water when the terminal shoots of the cotton plants are soft and sappy will induce rank plant growth, as plants in this condition indicate ample available soil water.

The quantity of water required at each irrigation is governed largely by the soil type, but the aim should be to replenish soil moisture to a depth of 2 ft. This usually necessitates a 3-in. application. Irrigation is influenced by rainfall, but often two or three irrigations are necessary in addition to the pre-planting irrigation.

The critical period in the main cotton-growing areas is during the summer heat waves, when early planted crops are fruiting heavily. Stress conditions on many soil types can occur quickly under these conditions, and the need for timely irrigations should be anticipated so that the whole area can be irrigated before shedding occurs.

Cotton is mainly furrow irrigated, but sprays are used for areas where the soil type and topography are not suitable for the furrow method.

Experiments with furrow versus sprays show that where land is graded to give a uniform flow of water, yields are similar with both methods. In the case of very sandy soils, however, spray irrigation gives a better distribution of water. On the other hand, less labour is required for furrow irrigation, as no changing of spray lines is necessary.

Queensland experiments with irrigated versus non-irrigated cotton have demonstrated the soundness of growing cotton with supplementary irrigation during years of irregular rainfall. Only in two seasons out of 12, when the seasonal rainfall was higher than average, and soil moisture was adequate for crop production, did rain-grown cotton outyield irrigated cotton. The overall average for all seasons was 1,478 lb. of seed cotton on the irrigated areas as against 757 lb. on the non-irrigated areas.

Harvesting Cotton

The harvesting of cotton is the most expensive item in the production of this crop, and the degree of efficiency displayed in picking, packing and forwarding the cotton has a decided effect on the quality of the lint produced.

When to Pick. One of the most important points to observe is that cotton should not be picked either when it is wet from exposure to rain or when it is green (Plate 9). Cotton is green until the bolls have been open long enough to allow the fibres to dry out thoroughly. Not only is it difficult to clean leaf and trash out of cotton in either condition, but during the ginning operations the saws cut the wet fibres very badly, and also tend to leave them in a twisted, ropy state. Lint of this nature is easily detected, and the buyers penalise it heavily, for much waste comes from such cotton during the spinning operations.

Hand picking may be done while the dew is still present, but the cotton should be spread out

in the sun to dry during the morning, after which it can be baled with the rest of the day's picking. It is not necessary to dry the cotton which is picked after the dew is off, provided green cotton is not included.

Another important point when harvesting cotton is to guard against leaving the cotton exposed too long to the weather (Plate 10). When the bolls first open, cotton has a richness of colour, or bloom, as it is termed. Cotton without this bloom will not be placed in the higher grades of the regular universal standards, although it may, in other respects, be of good quality. When cotton is left unpicked for several weeks, the bloom is lost through the bleaching action brought about by repeated wetting with dew and subsequent drying by the sun.

The affect of adverse weather on cotton ready or nearly ready for picking is worse than that of dew. Its colour is changed to a dull, greyish tinge, and even to a light-bluish tinge when rain lasts several days. When rain occurs cotton should not be picked until there have been several days of sunshine to assist in bleaching out the stains, and to enable the breeze and the heat to fluff out the fibres. This greatly improves the appearance of the lint, and raises both the lint and seed cotton by at least a half-grade. The delaying of picking after a storm until the cotton has improved in appearance means firstly that the cotton is of greater value, and secondly that picking costs are not inflated by moisture in the weight tallies.

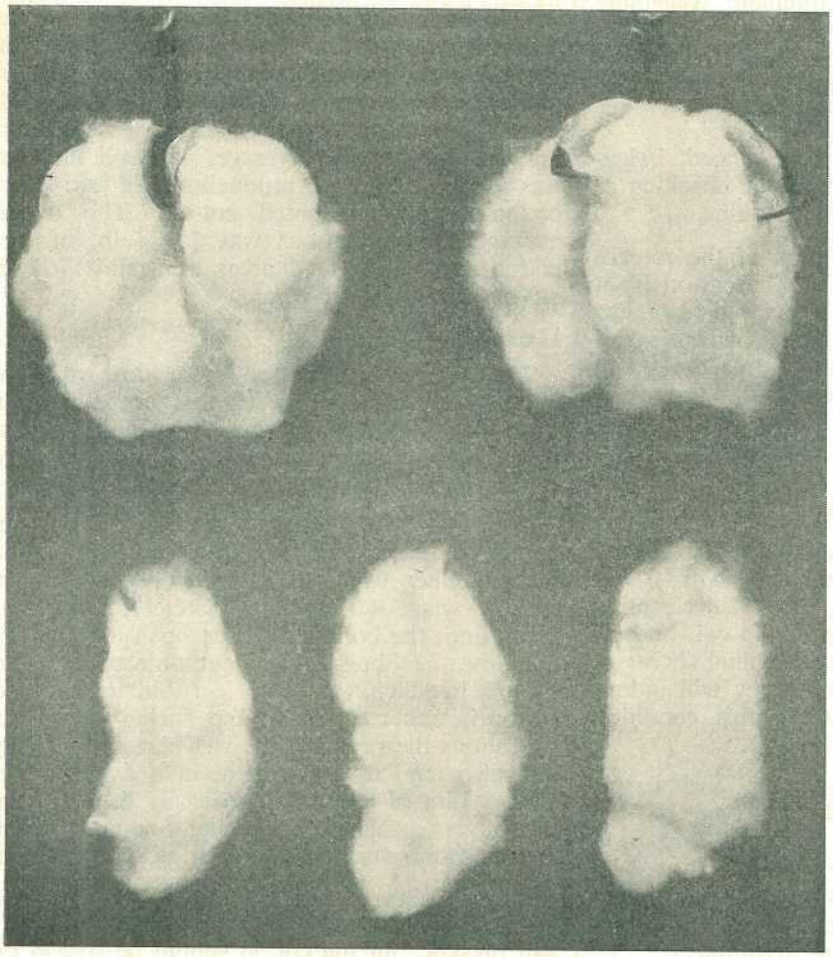


Plate 8

Fully Opened Bolls Containing Locks of Mature Cotton Suitable for Harvesting and Ginning.

The picking of cotton should not be delayed too long, as strong winds may cause considerable deterioration in its quality. With the continuous movement of the plants in windy weather, the locks tend to hang out of the bolls in a long, stringy condition. This not only allows the cotton to dry out excessively, thus losing weight and adversely affecting the character of the fibres, but also makes the seed cotton difficult to gin properly.

This is due to a considerable proportion of the locks being in a twisted, rope-like condition which gathers up pieces of broken bracts and leaves in windy weather, especially if severe frosts have occurred. It is difficult to clean such trash in the ginneries, for the smaller pieces are generally twisted in amongst the fibres.

In addition to these disadvantages, much greater loss on to the ground occurs in wind-blown cotton during heavy storms than when picking is done at proper intervals.

Where the harvesting is done by hand by the grower and his family, it will pay to make several pickings in a good crop, the number depending on the season. Where labour is employed it has to be remembered that sufficient bolls must be open to allow the picker to make a reasonable tally. It has been found satisfactory to make one good picking and then a clean-up in fields of light to medium yield, and two pickings and a clean-up in good crops.

Hand Picking. Picking is done by using both hands working independently of each other, but guided by the eye in each case. This enables the picker to fill both hands before emptying their contents into the sack and saves many movements during the day. Generally a sack is strapped around the waist so that the bottom rests on the ground and the mouth is open, thus enabling the cotton to be put in quickly.

With the cleaning machinery installed at the ginneries it is not necessary to pick only clean cotton. A certain amount of the bracts, the leaf like parts surrounding the boll, may be included provided they are not in twisted cotton. These bracts are removed in the cleaning machinery before the cotton is ginned.

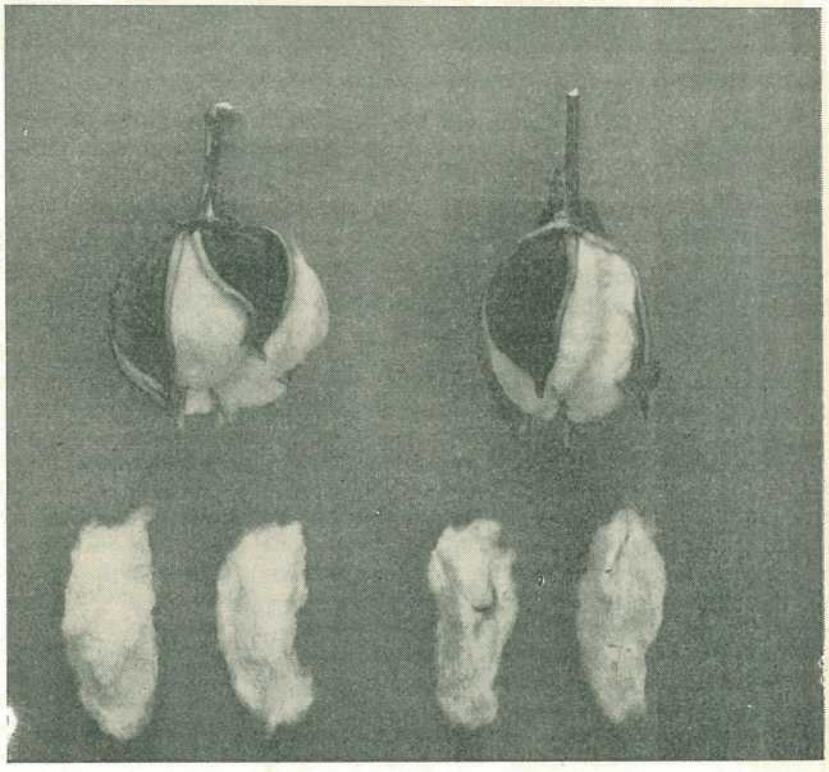


Plate 9

Green Cotton. The four locks in the lower row are comparable with the locks in the two partly opened bolls. Their fibres are wet and matted together, giving them a shiny, satiny appearance. Such green cotton cannot be ginned satisfactorily. If left to open fully, however, these bolls would contain fibre similar to that shown in Plate 8.

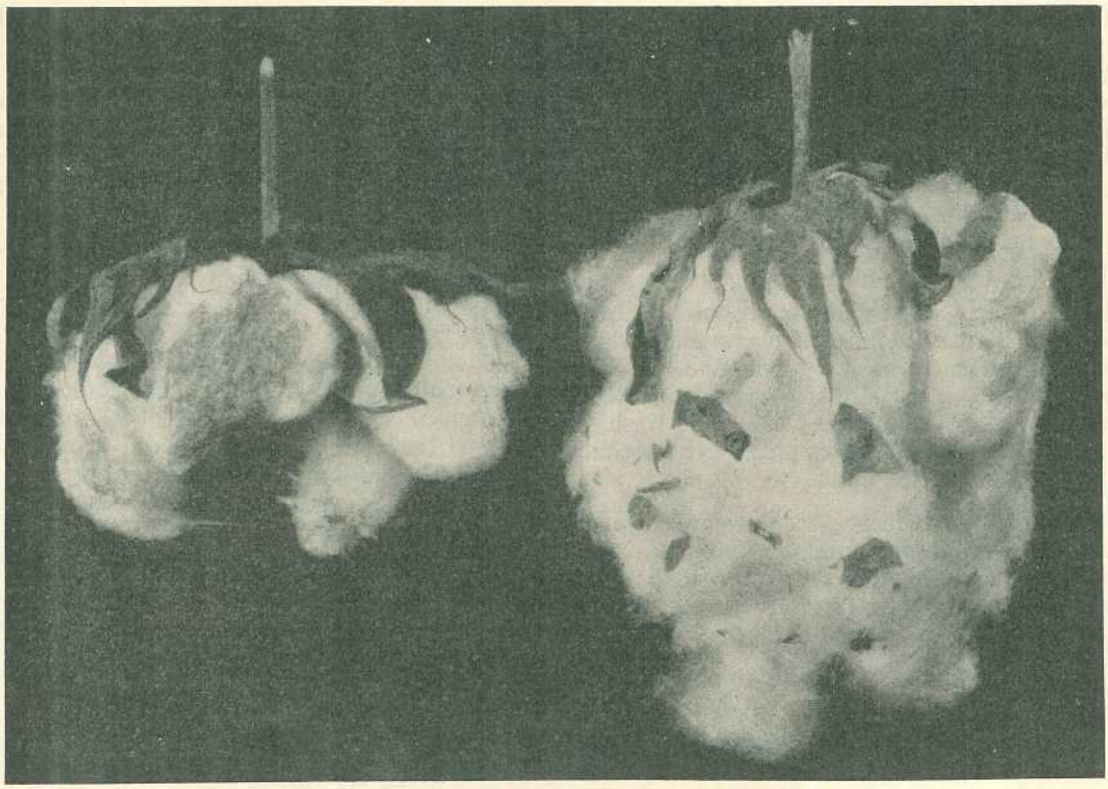


Plate 10

Boll on Right Shows Cotton that Has Been Left Unharvested Too Long. Boll on Left is Unsuitable for Harvest. Note dark surface centre lock.

The amount of stained cotton should be kept to a minimum, however, for the stained fibres are soft and weak and are cut up in the ginning. Their colour lowers the value of the rest of the lint.

Hard and diseased locks should not be included, for these lower the grade of the cotton.

The most difficult matter to remove from the cotton lint is grass and weed seed, especially spear grass seed, and every effort should be made to clean the fields at the last cultivation so that no grass or weed seed will be produced. On old cultivations, even where good farming practices have been followed, there is always a danger of tall-growing weeds in the rows setting seed late in the season, and it pays to chop out such weeds before harvesting commences, especially if mechanical pickers are employed.

Mechanical Picking. Several types of mechanical pickers have been developed but the only ones in operation in Queensland belong to the spindle type (Plate 11). This type is designed to pick cotton from the open bolls by means of spindles, fingers or prongs, and to do this at any time during the harvesting season, without damaging unopened bolls or branches.

About half the machines at present in this State are owned and operated by the Cotton Marketing Board, to whom requests for their use should be directed. The number privately owned is increasing and most owners will carry out some contract picking.

All the precautions necessary to obtain the highest quality seed cotton should be adhered to when these machines are used. Seed cotton should not be left too long in the field but should be harvested as soon as there is sufficient crop

open to warrant the use of the mechanical picker, a yield of approximately 500 lb. of seed cotton to the acre or more being satisfactory for machine operation.

Under Queensland conditions a mechanical picker averages 500 lb. of seed cotton an hour, but the rate varies according to the amount of seed cotton open. Since the speed of the machine is constant, and the picking percentage is also somewhat constant, the cotton picked in a given time will be proportional to the amount of open cotton on the plants. Therefore the machine operates with maximum economy in high-yielding crops.

Rankly grown cotton plants are undesirable for mechanical picking because the development of a large number of branches on them prevents the spindles engaging the open bolls of seed cotton as they pass through the plants. Where heavy plant growth does occur it may be necessary to repick the rows, working in the opposite direction.

For the successful operation of a mechanical picker, close attention must be given to cultural practices so that at harvesting time the field is as free as practicable of weeds, grasses, sticks, stones and rubbish. The presence of sticks, stones and rubbish can be instrumental in causing long delays as well as possible serious damage to the machine.

The use of defoliants for reducing the amount of leaf on the plant and therefore the trash in mechanically-picked cotton is receiving attention. Experiments are being conducted to examine the economics of this practice under Queensland conditions.

Hand v. *Mechanical Picking.* The saving in labour effected by mechanical pickers is a distinct advantage and their introduction is likely to have an important influence on the development of the cotton-growing industry in Queensland. Experience has shown that provided a field of cotton has received proper cultural care, is free of sticks, stones and rubbish, and the plants have grown normally, a mechanical picker will pick seed cotton satisfactorily and efficiently. Each machine can do the work of at least 20 hand pickers.

On the other hand, it is clear that, on the average, hand-picked seed cotton is usually a

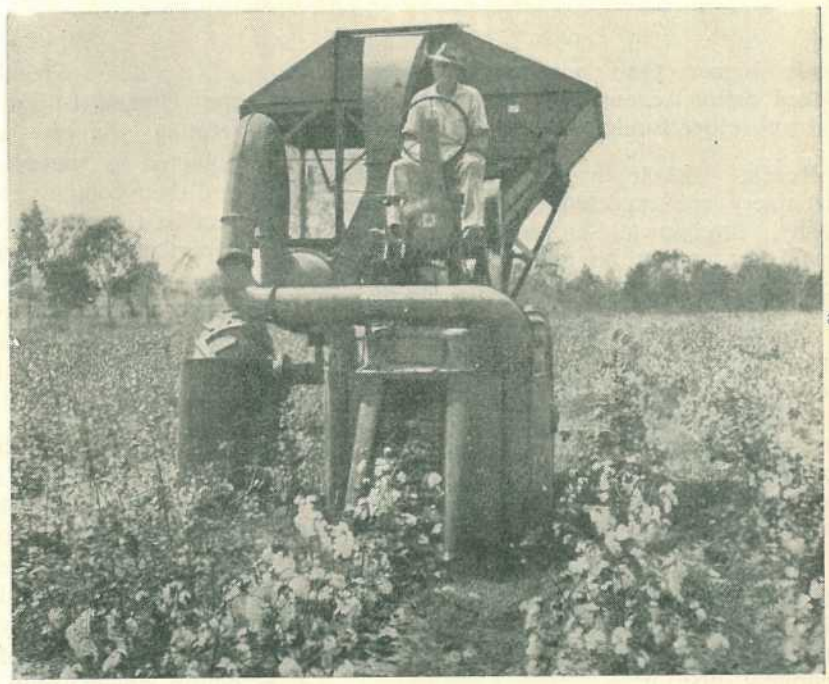


Plate 11

A Mechanical Picker Showing Cotton Plants Entering the Spindles.

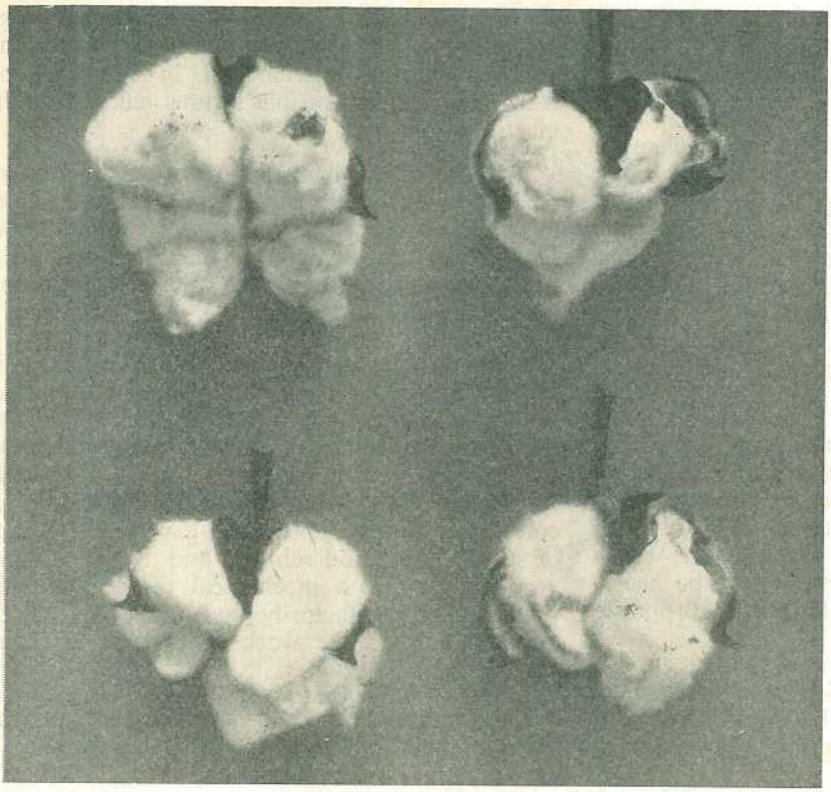


Plate 12

Upper Row: Boll on Left Suitable for Hand Picking; Boll on Right Suitable for Snapping. Lower Row: Boll on Right should not be Snapped; Boll on Left Suitable for Snapping.

grade higher than comparable mechanically-picked cotton because of the greater amount of leaf and other foreign matter in the latter.

Recent developments in lint cleaning machinery are expected to raise the grades of trashy, mechanically-picked cotton, but such machinery cannot be expected to improve the colour, strength and length of the cotton fibres.

The amount of cotton mechanically picked varies from 85 to 95 per cent. of the open crop. Tests carried out in the field during harvesting operations, however, have shown that much of the seed cotton left on the plants by the machine consists of weak immature fibre in partly diseased locks which, if picked, would lower the grade of the seed cotton harvested and so reduce its value.

Under ideal conditions, hand picking would not be a great deal more efficient than mechanical picking, but when the plants carry rank growth the performance of hand pickers may then be definitely superior.

Snapping. Cleaning machinery is installed at the Glenmore and Whinstanes ginneries for treating snapped cotton. Snapped cotton is obtained by snapping or jerking the whole bolls and their contents from the plants. It should be practised only after heavy frosts have been experienced, because, prior to such frosts, some green plant material is removed with the snapped bolls. As a consequence sweating will occur in the containers when the cotton is forwarded to the ginnery and this adversely affects cleaning and ginning.

Snapping undoubtedly lowers the grade of most of the mature cotton of high quality to the point where the full value of the lint cannot be obtained. On the other hand, snapping the top crop of bolls (Plate 12), which usually contain cotton of lower quality, not only does not lessen the value materially but makes practicable the cheap harvesting of a considerable amount of cotton which would not otherwise be picked.

Only bolls containing marketable cotton should be snapped, for dry, hard, diseased bolls contain no worthwhile cotton, and are removed in the cleaning machinery before the seed cotton is weighed. In addition, the weak and wasty fibres of partly-developed bolls are so badly gin-cut as to lower the quality of the whole bale.

Under no circumstances should wet or even damp snapped cotton be forwarded to the ginnery. Only lint of the lowest grades can be obtained from it, because the large pieces of moist bracts become so entangled in the fibre that the cleaning machinery cannot remove them.

Snapping is of value to Queensland cotton growers, but should be adopted with discrimination.

Recently, mainly as the result of the increased amount of mechanical picking, bulk handling has been introduced on a limited scale. The seed cotton is loaded direct from the machine into trucks or trailers and conveyed by road to the ginnery. This method has much to commend it but, until the ginneries convert portions of the receiving platforms and arrange extra storage bins, there is little scope for expansion of bulk handling.

One big advantage is that the cotton is not compacted as it is when packed in bales. Mechanically picked cotton invariably carries some green leaf and tight packing in the bale causes some sweating and staining of the lint. For this reason no more than 350 lb. of mechanically picked cotton should be packed in the bale. With hand picking, bales can usually carry up to 450 lb.

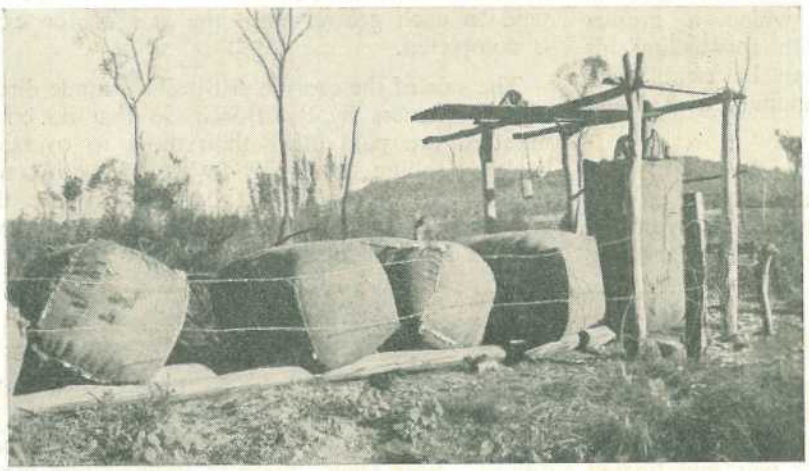


Plate 13
Packing Cotton in a Once-Used Woolpack.

Packing and Forwarding Cotton. Owing to the distance of the cotton fields from the ginneries in Queensland, the crop is usually forwarded by train. It is contained in either bags or woolpacks containing around 80 to 100 lb. and 350 to 450 lb. of seed cotton, respectively. The growers of small acreages generally use containers such as second-hand chaff-bags, while those with more than 5 or 6 acres generally purchase once-used woolpacks (Plate 13). It is cheaper to use woolpacks, obtainable from the Cotton Marketing Board, because they are returned to growers for a small fee, which covers cost of freight, whereas bags are not returned and thus represent a loss to the grower.

Before a container is filled, it should be cleaned carefully to remove everything that might affect the grade of the cotton. Woolpacks, especially those that have had cotton in them, should be cleaned in order to protect the purity of the seed. Growers should pay particular attention to this requirement, for contamination of pure seed varieties can be caused by admixture with seed cotton remaining in the corners of the wool packs or attached to strands of the sewings along the edges.

Cotton, on being harvested, should so far as is practicable, be packed in separate containers according to its grade and staple. Obviously inferior grades can be readily separated from higher quality material, but the objective to be aimed at is to carry the separation much farther and, in so far as is within the skill of the packer, to achieve a high degree of uniformity of grade and staple in each container.

Every grower has a registered number, and should include this with his initials and railway station in a brand for identifying each container he sends. The brand should be placed in a conspicuous part of the container. It should be in black that will not rub or wash off.

Each season a number of woolpacks are received at the ginneries which have no identification marks, or on which the brands are so indistinct as to be illegible. It is only through checking the advice notes which a grower despatches to the Board when forwarding his cotton, that the ownership can be established. This slows up the work at the ginnery, and should not occur.

Marketing

The whole of the Queensland cotton crop is handled each season through a compulsory cotton pool, which is managed by a Cotton Marketing Board composed of one elected cotton grower from each of the six districts into which the cotton areas are divided, and the Director of Marketing of the State Department of Agriculture and Stock. As soon as a grower places his cotton on rail, the pool takes possession and pays all transportation, ginning and marketing costs. The growers, through a co-operative association, own the ginneries for ginning the crop and the oil mill for treating the resultant seed, thus ensuring to them the full value of their crop.

When a consignment of cotton arrives at the ginnery it is graded and the poundage of each grade and staple length is obtained. A first advance is paid to the grower, usually about 70 per cent. of what the average basic value of the crop is estimated to be. As sufficient money accumulates from the sale of the crop, further advances on a flat rate per pound of cotton are paid to each grower until the sale of the crop is completed.

The sale of the crop in Australia is made direct to the spinners by the Board, so that no commissions are paid other than those to overseas brokers selling any portion of the crop not required in Australia. Under this system the grower is assured of his crop being ginned and marketed to his best advantage.

Time of Planting in Strawberries

It has been known for some time that plant growth and development in the strawberry are influenced by times of planting. The significance of this in commercial practice was investigated in trials between 1956-59.

In the 1958 trial, four plantings were made at fortnightly intervals between February 18 and April 22. Of these, the mid-season planting made in March proved superior to February plantings and April plantings. Total berry production for the season and the proportion of the crop harvested in June reached a maximum in the March plantings. Earlier planting tended to promote vegetative growth at the expense of fruiting, while April-established plants lacked vigour throughout the whole season.

In the following season (1959) yields were directly correlated with time of planting, maximum production being obtained from plots established in February. Plant performance declined with each two weeks' delay in the time of establishment. The discrepancy between the results in 1958 and 1959 probably reflects seasonal conditions. Both trials, however, indicate that commercial plantings should be made not later than the third week in March. Yields from April-planted crops may be 50 per cent. down.

Regardless of time of planting, the peak harvesting period (August-September) is the same. However, there is usually a second minor peak of harvesting in October. Late planted strawberries began to throw runners in November, some weeks ahead of early and mid-season plantings.

It is concluded that commercial crops should be planted during the first three weeks of March. Plantings in late February may do better or worse depending on seasonal conditions early in the growing period.

—K. M. WARD, Senior Horticulturist.

Beet Nematode Detected In Queensland

By R. C. COLBRAN, Entomologist.

The beet nematode, an important pest of beetroot, turnips, cabbages and related crops, has been found in Queensland. The life history, behaviour and control of this pest are discussed.

The beet nematode* was first observed in 1859 on the roots of sugar beets in Germany. Although this pest occurs elsewhere in Australia, its presence in Queensland was not detected until May 1960 when a heavy infestation was responsible for the failure of a cabbage crop at Lawes in the Lockyer Valley. Beetroot in an adjacent area were also infested.

Life History

Second stage larvae enter susceptible plants near the root tips, feed on the cell contents and pass through three moults before becoming adults. During development the females break through the root tissues and remain attached by their heads. After fertilization these develop into white, lemon-shaped bodies about the size of pin heads, and are easily seen with the naked eye along the roots. Each female produces 100–600 eggs, some of which are deposited in an external gelatinous matrix whilst others are retained within the body. Death of the female is accompanied by a change in the chemical composition of the body wall turning it into a leathery and durable cyst enclosing developing eggs. These eggs may remain viable for several years. Hatching is stimulated by substances from roots of certain plants.

Hosts

Crop plants liable to damage by the beet nematode include sugar beet, beetroot, mangel-

* *Heterodera schachtii* Schmidt.

Plate 1

Cabbage Roots Infested with the Beet Nematode. Note the abnormal root system with an abundance of short fibrous (hunger) roots.

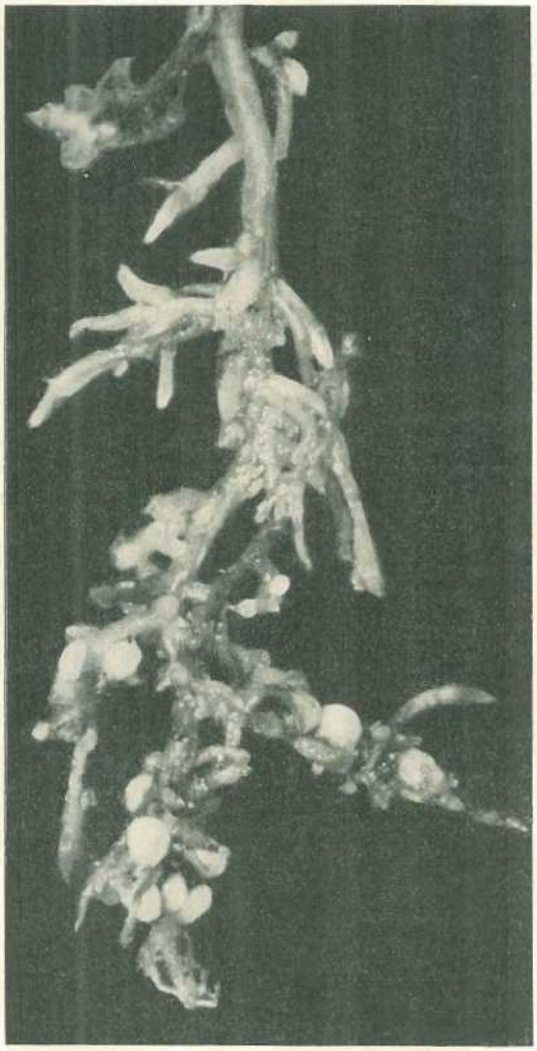


Plate 2

Cabbage Roots with White Cysts of the Beet Nematode.

wurzels, cabbages, cauliflowers, kale, broccoli, Brussels sprouts, spinach, turnips, rape, radishes and rhubarb.

Weeds reported as hosts include fat hen (*Chenopodium album* L.), shepherd's purse (*Capsella bursa-pastoris* (L.) Medic.), hedge mustard (*Sisymbrium officinale* (L.) Scop.), wild radish (*Raphanus raphanistrum* L.), curled dock (*Rumex crispus* L.), chickweed (*Stellaria media* (L.) Vill.) and pigweed (*Portulaca oleracea* L.).

Plant Symptoms

The appearance of areas where plants are undersized is usually the first evidence of nematode injury. Under continuous cropping with susceptible hosts, these areas increase in size.

Heavily infested plants are small and stunted. **The roots are not galled** but there is an abundance of fine rootlets, known as "hunger" roots. An examination of the living roots will reveal the presence of the small white bodies of the females.

Spread of Infestations

Natural migration of nematode larvae does not exceed more than a few feet in a season. The pest, however, is readily spread by wind, irrigation water moving over infested soil, and in soil adhering to implements, farm workers, livestock and farm produce.

Control

Because the developing eggs are protected within the cysts, soil fumigation is not generally recommended for the control of the beet nematode.

In areas where this pest is present, susceptible crops should not be grown more than one year in four.

Suitable crops which can be grown in infested land are beans, peas, tomatoes, onions, melons, cucumbers, celery, lettuce and cereals.

Soils for Irrigation. The water soakage and water holding capacity of a soil to be irrigated should be studied so that irrigation application is efficient. Suitable soils should absorb water freely to the root zone of the crops. Clay soils absorb water slowly and need small flows continued for a long time. Sandy soils have a high soakage rate and the water may penetrate beyond the root zone, unless small amounts are applied at each irrigation. An ideal soil for irrigation is a loam or medium clay loam. These soils not only absorb water freely but also have the capacity to retain a great deal of water which is available for plant growth. Clay loam and clay soils can store a large amount of this available water, but sandy soils can hold only a limited amount. The advantage of irrigating soils that hold a large amount of water for plant growth is clear, as fewer applications are needed to maintain plant growth.

—A. NAGLE, Irrigationist.

pasture and crop

Safflower Spacing Trials.—Trials have been conducted at the Regional Experiment Station, Biloela, during five consecutive seasons, to ascertain the most desirable spacing for the planting of Horowitz safflower in Central Queensland.

Because it is grown during the winter, its water requirements must be drawn mainly from stored supplies in the soil. This in turn places emphasis upon the most desirable number of plants that can be grown in any given area. In other words, the most favourable spacing depends on both row spacing and on plant spacing within the row.

Results over the years indicate that yields of over 1,200 lb. of seed per acre can be obtained by employing 14 in. row spacing using 27 lb. of seed per acre or by using 18 lb. per acre when planting in 21 in. rows.

—W. A. R. COWDRY,
Senior Experimentalist.

Check on Johnson Grass.—Most people know that Johnson grass is a pest in cultivation but do you know for certain whether it's on your property? If you have one plant this season, next season you could have hundreds.

Johnson grass is easily recognised. It's a big grass with seed heads like Sudan grass but it has long white underground runners. Just pull a clump up by the roots and have a look—you can easily tell.

There's a new chemical to get rid of Johnson grass—dalapon. It's better than either T.C.A. or sodium chlorate and the cost per acre is less.

Spraying is a waste of money when the plants are past their prime. The best time to spray is spring.

The thing to do is to find out whether you have Johnson grass; where it is; and be ready to attack it in the spring.

—H. E. KLEINSCHMIDT, Botanist.

Furrow Irrigation.—Furrow irrigation is a fairly simple method, but failure to get uniform penetration of water to the root zone is a common problem. Penetration is influenced largely by soil type, furrow length, furrow spacing, and the rate of water flow.

To check the lateral spread and depth of penetration of the water, cut trenches at the top, middle and bottom of the field immediately after watering. These will show the penetration pattern. Irrigation is efficient if the water meets half-way between the furrows and the soil is wet down to the root zone.

Dry patches between the furrows mean that the furrows are spaced too widely or that the flow is too fast for the soil type and slope. If the top of the field is getting more water than the bottom, either the furrows are too long or the flow is too small.

—A. NAGLE, Irrigationist.

Certified Seed.—Recently a complaint was made about the quality of Queensland certified seed. When the complaint was investigated it was found that the seed was not certified seed. Obviously this was another case of mistaken identity of the seed.

Since the beginning of the certification scheme, emphasis has been placed on the ways in which a person can be sure whether seed is certified or not.

Briefly these are by the seal and label. All bags and packets of Queensland certified seed are sealed by a metal seal which has the letters DAS embossed on it. In addition, a certification label is attached to every bag of certified seed. The label will have the following details printed on it: Department of Agriculture & Stock, Brisbane, the kind of certified seed, particulars to which certification relates, a reference by which the history of the seed can be traced, and the signature of the officer sealing the bag of seed.

All certified tomato seed is placed in sealed packets. The packets will have printed on them details similar to those just listed.

When ordering certified seed, check the details mentioned and so be sure that the seed you buy is really certified seed.

—N. V. HIBBERD,
Senior Seed Certification Officer.

Points on using Methyl Bromide.—Prolonged illness or even death could be the penalty for a moment's carelessness in handling methyl bromide, which is now used widely for sterilizing tobacco seedbeds. It is a deadly and penetrating poison and must be used with extreme care or the farmer himself may be poisoned.

Dr. M. H. Gabriel, Health Officer, Department of Health and Home Affairs, has emphasised the dangers of using methyl bromide. This fumigant, supplied under pressure in cylinders or cans, vaporises immediately it is released. It diffuses through the air as a colourless gas that has no warning odour, and very little needs to be inhaled before poisoning occurs. Poisoning is caused usually by inhaling the vapour, but methyl bromide can also be absorbed through the skin. The liquid can cause quite severe burns on the skin, so if any splashes on you, wash it off immediately using plenty of water. Remove any contaminated clothing at once.

In using methyl bromide on seedbeds, the risk of spilling a can while introducing the liquid under the seedbed covers is a very real danger. If this happens, move out of the area for an hour or so to allow the vapour to escape. Perhaps the period of greatest danger is when you're removing the seedbed covers after fumigation. Then you could inhale a harmful amount before the vapour has had time to disperse. Unseal the edges of the seedbed covers a good while before you remove them and always work on the windward side so that the vapour will not be blown in your face.

Similarly, when you're introducing methyl bromide under the seedbed covers, work on the windward side of the seedbeds. Then, if any vapour escapes, it will be blown away from you. Don't smoke while you're working with methyl bromide as smoking can lead to carelessness. Any person who shows signs of methyl bromide poisoning—dizziness, vomiting, headaches or blurred vision—should be taken to a doctor at once.

—A. WINTERTON, Agronomist.

Managing Irrigated Pastures.—Well-managed irrigated pastures can be counted upon to carry two dairy cows to the acre. But the secret is good management. On badly-managed pastures, stocking rates can be disappointing.

The first point to remember is that pastures need careful irrigation. Overwatering is a waste of water and power, while underwatering, always inefficient, is often quite useless.

Your aim should be to wet the main root zone, usually no deeper than 15 in., even in deep soils. Don't guess, but use the probe to measure the depth of water penetration. Generally, pastures need 1½ to 2 in. of rain or irrigation every fortnight to three weeks in cool weather, but every 10 to 15 days in hot, dry periods. Borings with a soil auger will show you when the root zone is drying out and another irrigation is needed.

Being heavy producers, irrigated pastures are also heavy feeders and need adequate fertilizer. Topdressing with superphosphate at 1 cwt. an acre in autumn and spring is now a standard recommendation in most coastal districts.

Regular manure spreading will help to keep your fertilizer bill low and your pasture growing vigorously. Rank growth on manure patches is evidence of wasted feed and fertilizer. For best results, spread the manure while it is fresh. Upturned harrows, halves of truck tyres and board smearers are all useful. But don't use heavy tined harrows or renovators—these can damage the sward.

Without planned grazing you cannot hope to get the best from your irrigated pastures. Pastures should be subdivided into sections containing about a week's grazing. Each section should be strip grazed to ration the pasture intake, to prevent waste of pasture and to reduce the risk of bloat. Four to five weeks' spell between grazings is usually enough, but grazing and spelling should be adjusted to suit the seasonal growth.

—A. NAGLE, Irrigationist.

Field Control of Tobacco Pests.—Queensland tobacco growers have to contend with a range of pests that attack the roots, stems and leaves of the growing plant. Success of every crop depends, in part, on pest control measures.

Nematodes require early attention. These root pests are controlled by fumigating the soil with either EDB at 27 per cent. w/v or 12½ per cent. v/v, or DD used at the same rate. Fumigation should be done at least three weeks before planting out.

For three weeks after transplanting, tobacco should be sprayed weekly with a combined spray of either endrin and DDT or dieldrin and DDT. Endrin and dieldrin are used at a strength of 0.05 per cent. active ingredient, and DDT at 0.1 per cent. active ingredient. In a combined spray, each insecticide is used at its recommended strength.

In south-western districts, jassids are kept in check by these routine spray applications. Mites are controlled by fortnightly applications of kelthane at a strength of 0.05 per cent. active ingredient. Late sprayings should be timed by observations on the presence of young stages of the pests.

Leaf miner activity has been high on some farms in recent years, and difficulty has been experienced in dealing with the pests in these proportions. A new spray material, WL1650, a close relative of endrin, has emerged from trials as the most promising insecticide for controlling this pest. It is used at 0.1 per cent. active ingredient. WL1650 has special value as a spot treatment for leaf miner control if pest activity is high. It can be combined with DDT, endrin and dieldrin.

Either endrin or dieldrin at 0.05 per cent. active ingredient will control looper, leaf miner, stem borer, and cluster caterpillar. But neither gives sufficient control of budworm. This and other leaf and stem pests except looper are controlled by DDT at 0.1 per cent. active ingredient. Effective control of leaf miner and looper depends to a large extent upon the method of application. Complete cover of both leaf surfaces is essential. This can be achieved by using sufficient volume of insecticide, and paying particular attention to nozzle placement. In tobacco, insecticides should never be applied more often than weekly, nor at strengths greater than recommended.

—G. W. SAUNDERS, Entomologist.

More Cotton after Early Ploughing.—Early ploughing for cotton can mean more money in your pocket when the next harvest is taken off.

Examples of the higher returns that have followed early ploughing have come out of many cotton growing districts this year. One Callide Valley farmer was able to compare the performance of cotton grown after long and short fallows on his own farm. A planting made after a 10 months' fallow yielded 1,500 lb. of seed cotton to the acre, while another made on short-fallow land yielded only 800 lb.

Cotton land should be ploughed as soon as the previous crop has been harvested. The early commencement of cotton picking this year gives growers an opportunity to turn the land over in time to catch any autumn and early winter rains.

Crop residues should be dealt with by repeated discings or a rotary slasher, and then ploughed under. If the old stalks are ploughed under in autumn, they will be thoroughly rotted before it is time to prepare the seedbed. The seedbed will then be clean and free from trash.

At the first ploughing for the new crop, the land should be left in a cloddy condition. The uneven surface will trap the rains and help to prevent run-off that might cause gullying.

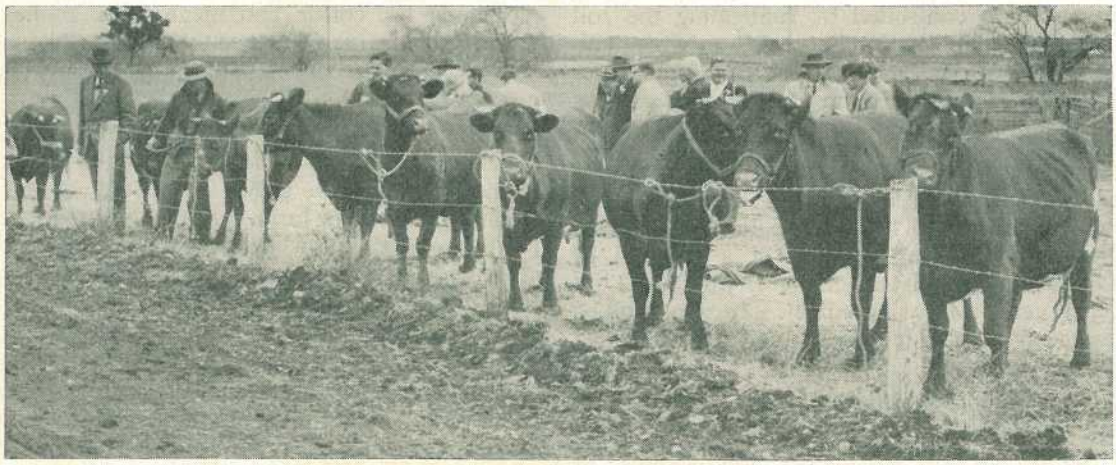
Water stored in the soil during the fallow is available to the crop in dry spells in the growing season. It has been estimated that when a crop is flowering and fruiting strongly, it needs about one-third of an inch of water a day. If you've stored 5 in. of water in the soil, you have a reserve of 15 to 20 days to carry the crop through between rain periods.

Having moisture in the soil also means that you can plant after only light planting rains. With ample stored moisture, you could plant after a fall of only 1 in., but in a dry soil you may need 2 or even 3 in. before planting would be safe.

Over the years, October and early November plantings have proved the most successful in southern and central Queensland. Early ploughing gives you the opportunity to plant early.

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

Brisbane Show Stock



Top: Portion of a team of 12 A.I.S. cattle entered by Mr. M. C. Lester, "St. Andrews" Stud, Glengallan, for the 1960 Royal National Show. Mr. Lester this year won the Brisbane Show butterfat title for the third time. He has built up a notable herd based on sires such as "Fairvale Ensign" and "Tabbagong Victory," from the Illawarra district. Bottom: Miss Georgina Bassingthwaighte with one of the "Woodlands" Hereford stud bulls that were destined to take top prizes in the 1960 Royal National Show. Some of the exhibits of the 1960 Show were seen on the properties visited by a party of journalists on a five-day pre-show tour organised by the Royal National Agricultural and Industrial Association of Queensland and the Shell Company of Australia.

Pick-up Of Farm Milk By Bulk Tanker

By V. J. BRIMBLECOMBE,
Senior Dairy Adviser.

No more washing or lifting of milk cans is an advantage offered to producers by the introduction of bulk pick-up of milk. No more waiting to assist the carrier with loading, is a second advantage claimed for this system—and there are others of equal, or more, importance.

This method of milk collection from farms has made rapid progress in the United States, and is also showing steady progress in New Zealand where it was introduced in 1949. Adoption of this form of pick-up in place of the conventional can collection was commenced experimentally in England and Scotland in 1954 and has since been extended.

The system has been in operation in Victoria and West Australia since 1956.

In Queensland, all raw milk dispatched to Brisbane's central pasteurising factories from country receiving centres is chilled and transported in well-insulated, stainless steel road tankers, and while the system of milk delivery from individual farms to factories is still confined to cans, the transportation of bulk milk direct from farms by tanker is now in the planning stage.

How It Operates

The bulk pick-up system of milk collection commences with the cooling of milk on the farm in a refrigerated, insulated, stainless steel storage tank. The milk is held at a low temperature by the automatic operation of an agitator and refrigerator until picked up by a bulk tanker. Each farm tank has sufficient refrigerated surface to cool the fresh, raw milk quickly immediately following milking to a temperature approximating 40 deg. F.

The tanker is an insulated, stainless steel tank, equipped with a suitable milk pump and hose connection. Equipment for milk sampling and special refrigeration (or ice) for storage of these samples is also incorporated with the tanker.

On arrival at the farm, the grader-driver is responsible for measuring the volume of milk in the farm tank and making the necessary book entries. Before removing the milk he starts the agitator, grades the milk and takes a sample for butter fat and quality tests. Milk is then pumped into the tanker and after the farm tank is emptied, the driver rinses it with clean water.

The farmer completes the washing and sterilizing of the farm tank.

When all milk from farms on the route has been collected the tanker is driven to the milk processing factory, where the milk is quickly pumped into the factory storage vats.

Normal practice is to collect milk once daily in the high production hot weather, and every other day during the low supply, winter months.

It is essential for the driver of the tanker to be a qualified milk grader.

Requirements on the Farm

Before the system can be implemented in Queensland many problems will have to be overcome, and much advisory work will be required.

Those who will be confronted with most of these problems will be the milk producers; for satisfactory and efficient bulk milk pick-up from farms, it is necessary for the producer himself and his farm equipment to meet the following requirements:

(1) The structural condition of the dairy premises must be satisfactory for the installation of the necessary equipment. A farmer would be very foolish to install expensive plant in an old building which requires substantial renovations. Before the equipment is installed his premises should be in a sound state of repair and capable of being maintained at a satisfactory standard of hygiene.

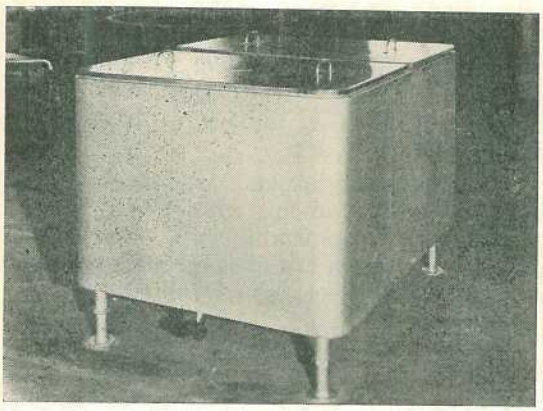


Plate 1

A Typical 200 Gal. Insulated Bulk Milk Vat to Store Milk which has been Externally Cooled.

(2) Electricity is considered a necessity so that cooling equipment could be operated automatically to maintain correct milk temperatures. Electric power is also necessary to drive the milk pump attached to the pick-up tanker. Where electricity is not available alternative power to drive the refrigerator could be used, but this would require careful operation to ensure efficient results and detract from the effectiveness of the ice bank form of cooling: Similarly independent pumping power would be required on the tanker for these instances.

(3) A refrigeration compressor unit would be required to provide cooling for milk and to maintain such milk at a low temperature.

In New Zealand, bulk milk pick-up commenced with external water cooling of milk and subsequent storage in uninsulated farm vats. Milk collection was based on twice-daily pick-up service. These collection conditions were concerned exclusively with milk for manufacture and it is interesting to note that where market milk supplies are collected refrigerated vats are required. In Queensland, with its heat and long haulage, refrigeration is imperative for a tanker pick-up system to be successful.

(4) A stainless steel bulk vat or tank adequately insulated, effectively refrigerated, and large enough to hold at least three milkings must be provided. Several types of vats are manufactured and the ultimate selection is a matter of personal choice, subject to the vat complying with regulations.

(5) An adequate supply of good quality water is essential. Besides the quantity used for routine dairy cleansing, the driver of the tanker requires approximately 10 gall. to rinse out the bulk farm tank before leaving the dairy.

(6) The dairy farmer must at all times produce milk of high quality. This is important to avoid any risk of rejection of his milk which could involve him in additional expense. Rejected milk must be heated for satisfactory separation. An additional problem if milk were rejected could be the transfer of the milk from the bulk storage tank to the separator vat. Refrigeration does not convert poor milk into good milk; its main purpose is to maintain the original quality of the milk from the time it is produced to the time it is purchased.

(7) A modified cleaning system which differs from that required for cans will be necessary. For bulk farm tanks chemical sterilization will be required in place of heat sterilization. However, even when milk is shipped in cans every care with hygiene is necessary to ensure first quality milk.

(8) Council roads, access roads and grids up to and in the farmer's property will have to be so constructed that they are trafficable in all types of weather for use by the truck tanker. A bogged tanker could not only upset the programme of milk collection, but also cause some disruption of operations at the pasteurisation plant. Farmers supplying liquid milk would be well advised if contemplating the erection of new dairy premises to build them reasonably close to a public highway to avoid the expense of farm road construction.

Types of Farm Vats

A bulk milk pick-up vat must be installed on a firm base, be solidly constructed and maintain the accuracy of its measurement of milk. A dip stick which is calibrated (together with the vat) under the supervision of a weights and measures inspector, enables the quantity of milk to be measured accurately. As checking of the calibration on the farm would be very inconvenient and costly it is necessary to ensure that tank construction and installation does not allow inaccuracies to develop following calibration.

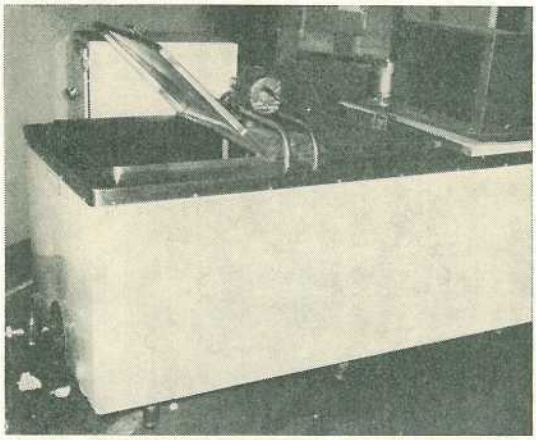


Plate 2

A Type of Insulated Refrigerated Bulk Tank Employing the Ice Bank Cooling Method.

The vat must be provided with an agitator that will stir the contents quickly and thoroughly in order that a representative sample of milk may be taken. Cream quickly rises to the surface of the milk and, when chilled, the cream layer becomes hardened. To break this cream layer and to mix it adequately into the milk, vigorous agitation is required. Thus it is desirable for the agitator to be controlled at two speeds; slow for cooling and automatic temperature control, and fast for quick agitation and thorough mixing prior to sampling and pumping into the tanker.

Bulk milk vats may be constructed for three types of refrigeration, (*a*) those with direct expansion coils on the external surfaces of the vat, (*b*) those using the ice bank principle in which a reserve of refrigeration is stored as ice and (*c*) insulated holding vats in association with external refrigeration. Here milk is prechilled before storage in the vat.

Advantages to Producer

From the milk producer's point of view many advantages could accrue from bulk milk pick-up, and these should, over a period of time, compensate him for the high capital cost of installation. The following are some of the advantages:

(1) The costs of maintenance and replacement of milk cans and water coolers will be eliminated. However, some depreciation costs must be allowed for the bulk tank.

(2) An improvement in milk quality can be expected. Milk cooled to 40 deg. F. and maintained at that temperature, if produced under hygienic conditions, will maintain its quality much longer than milk in cans at higher temperatures. The effect on milk quality of the use of faulty and rusty cans and cracked lids will be eliminated.

(3) There is no loss of milk or fat from spillage or adhesion to the inside surfaces of the cans.

(4) There is greater economy in dairy operations by less handling, washing, filling and storage of cans.

(5) Relations between farmer and factory should be good, because controversy regarding weights and quality will be eliminated. The farmer can see his milk being measured, graded and sampled if he wishes, and can discuss discrepancies on the spot with the driver.

(6) Working conditions will be more pleasant, making the dairy routine more acceptable. Bulk farm milk pick-up could make life more pleasant for the whole family.

The Cost

Against these advantages must be weighed the capital outlay for the bulk milk tank. While the capital costs will be determined by the type and size of vat installed, present day costs for a 200 gall. capacity stainless steel, insulated, refrigerated tank with associated compressor approximates £1,000. It is usual for factories to pay a premium on milk collected in this manner to assist producers in the early years. The extent of this premium is of course a matter of individual determination.

Economy for Factory

From the wholesale factory's point of view there are also many advantages from bulk farm pick-up. The more important ones would be:

(1) The elimination of factory equipment normally used for receival of milk in cans, namely, can conveyors, milk weighing equipment and can washing facilities and economy in maintenance and replacement of such equipment. Of course, this will occur only where all milk is supplied in bulk tankers.

adjacent to the farm. The introduction of this system of pick-up can thus result in a saving in refrigeration requirements of 15 to 25 deg.

Tanker Must Have Paying Loads

The relationship of existing carriers to this system demands serious consideration. As most carriers are private operators, economic factors have to be considered.

Firstly, it would cost a carrier about twice as much to provide a pick-up tanker vehicle as compared with the conventional truck used for

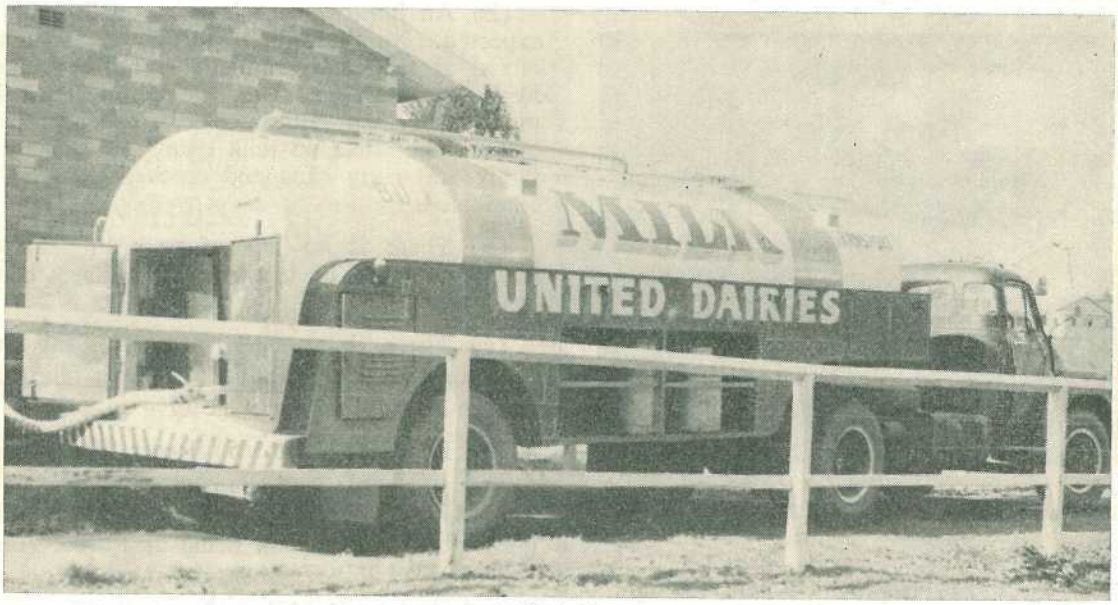


Plate 3

A Bulk Milk Tanker in Use in New South Wales. Note the small rear compartment containing a special milk pump.

(2) Economy in factory operations, that is labour required to operate the equipment.

(3) Economy in refrigeration requirements. Bulk raw milk at the processing depot is stored at a temperature of approximately 40 deg. The bulk haulage tanker, because it is insulated, usually maintains the original farm temperature of the milk during transit to the factory. Therefore, milk temperature on arrival at the wholesale factory would be in the vicinity of 42 deg., and should be not greater than 45 deg. Refrigerated milk transported in cans on hooded vehicles usually arrives at the factory in the summer time at a temperature ranging from 60 to 70 deg. even though it may have been 45 to 50 deg. when picked up at the roadside

can pick-up. Therefore, his initial capital outlay is doubled. To offset this, together with associated depreciation, the tanker owner must increase his loading volume. He must keep his tanker moving with a paying load. This would entail the use of the tanker for two, preferably three, paying trips per day. This could be done by operating on three farm pick-up routes or obtaining one to two loadings of bulk milk from nearby country factories.

Secondly, the driver of the tanker would have to be a competent milk grader possessing a milk grading certificate from the Department of Agriculture and Stock. Only with these qualifications would he be competent to grade suppliers' milk. He would need to be firm in his

decision on milk graded, particularly where poor quality milk was encountered, as one pick-up of poor quality milk could jeopardise the quality of the whole tanker load.

He would have to be dependable and honest. As it would be his duty to measure the quantity of the milk and sample the milk for composition and quality, he would be required to be very careful in the methods employed.

The advantage to the driver in a bulk milk pick-up scheme would be the saving in energy used in loading and unloading the cans, and possibly waiting time at the wholesale factory to which a large number of delivery vehicles are operating.

The owner-driver may also be required to cleanse and sterilize his tanker (usually this is done by a factory operative). It would be the driver's responsibility to satisfy himself that suppliers' produce was being discharged into a clean sterile tanker.

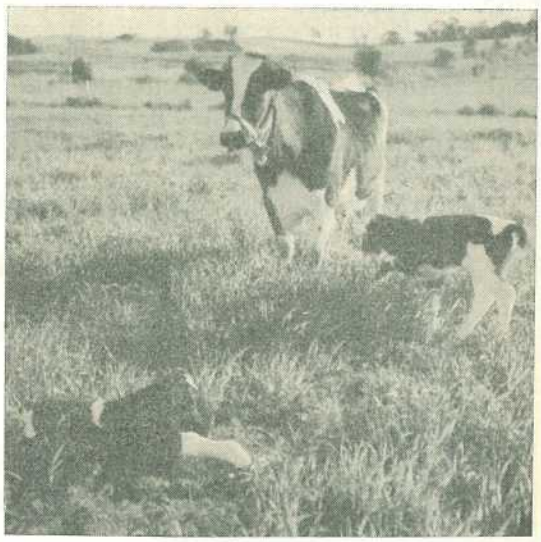
For any farm bulk milk pick-up scheme to be successful there is a gallonage limit at which it is uneconomic to pick up supplies. On every milk route there are small producers as well as large ones. The installation of this pick-up system could involve the small producer in costs which he could not afford. A possible alternative for these producers could be every other day pick-up. However, in these latter cases there could be a risk of deterioration in quality particularly where strict attention to hygiene is not practised on the farm. Where adjacent routes are involved in any rearrangement for a tanker pick-up system, arrangements could be made for a complementary can pick-up of small producers' milk.

This modern trend in milk handling could revolutionise production, transportation and factory receival of milk in this State. Queensland, because of its climate and levels of milk production, possesses conditions which indicate the adoption of this form of milk collection could be of a long-term nature. However, with sound organisation and co-operation on the part of all concerned, bulk milk pick-up could bring benefits to the entire milk industry. Information on this form of milk collection is available from the Department of Agriculture and Stock.

It is desired to acknowledge with thanks the supply of photographs from Frigrite (Qld) Pty. Ltd. and Bryant Bros. Pty. Ltd.

Twins on Show

Seen on the R.N.A.-Shell Journalists' Tour was this Friesian cow with newly-born twin calves on the "Freshfields" Marburg stud of Mr. S. E. G. MacDonald. Mr. MacDonald maintains a high milk yield by scientific feeding, which embraces lucerne and concentrates, sorghum conserved in silo pits, winter oats, and 30 acres of irrigated pasture. This stud holds two Australian All Breeds Milk Production records, including the impressive achievement of 11½ gal. for a twice daily milking, and seven Queensland production records. Journalists voted the tour eminently successful as a unique means of seeing behind the scenes of Queensland's major show.



Safety Rules For Users Of Portable Electric Tools

It is most important to ensure that electric tools are correctly connected to the power supply, that all leads are in good condition and that the tools are maintained in a safe condition and always used in a safe manner.

Installation

Use only 3-core flex of the tough rubber or plastic sheathed types. Make sure that the flex is correctly connected to the tool and to the 3-pin plug; and that a cord extension socket is used where an extension lead is necessary. Incorrect connections can expose the user to electric shock.

The metal casing of an electric tool must be effectively earthed in case it becomes alive. The earthing conductor of the flex is coloured GREEN. It must be connected to the earthing pin marked "E" or "Earth" on the 3-pin plug or cord extension socket, and to the earthing terminal of the tool. Note: 2-pin power points and lampholders are NOT earthed and must never be used for electric tools.

Have the following checks made by a qualified electrical tradesman:

1. That the main earth wire of the installation is not broken or disconnected.
2. That the power points are properly earthed 3-pin outlets.

NOT all 3-pin outlets are earthed.

Maintenance

Make regular checks to ensure that the tool is safe to use and observe the following precautions:—

(1) *The Tool.* Do not use the tool if the casing is broken or damaged. Make certain the brush caps are intact and firmly in position. Take care not to damage the flex when using the tool. If you do—let go the tool—turn off the power and remove the plug from the outlet. Do not touch either the tool or the flex until this is done.

(2) *The Flex.* See that the sheathing of the flex is securely held at the tool. Examine the flex regularly and have it renewed if damaged. NEVER join by twisting and taping—use a properly connected plug and cord extension socket.

(3) *Plugs and Cord Extension Sockets.* Use only robust types and replace if cracked or damaged. Check all screws regularly for tightness.

(4) *The Main Earth Wire of the Installation.* Locate where it is situated and check from time to time. If it should become damaged or detached, call an electrical contractor.

Use

Do not overload the tool so that it stops and overheats. It is better to stand on dry wooden flooring than on damp ground when using the tool. Keep the tool dry and clean. If anything unusual happens—a blown fuse, failure of the tool to operate, excessive sparking or heating—switch off the power, pull out the plug, and have both tool and flex examined by a qualified electrical tradesman.

Above all—do not interfere with the tool or cord fittings if you are not qualified to do so.

Glycine On The Atherton Tableland

By G. W. KYNEUR, Agronomist.

The first plantings of *Glycine javanica* at the Kairi Regional Experiment Station were made in 1947 and this patch gave good production until it was ploughed up in 1959. Approximately 9 tons of green material per acre were ploughed in. (Plates 1, 2 and 3 illustrate this plot at various stages.)

Because of the very limited seed supply in the early years, the area was used for seed production only and was not grazed. However, as stock gained access and other areas were sown, it was shown that under grazing the legume was quite palatable, and was spread to some extent by grazing animals. In this connection its real value would seem to lie in its ability to supply a more balanced diet for dairy stock, when grown as the legume component in a pasture.

Furthermore, the soft, leafy material produced suggested its value for pig-raising, which is carried on rather extensively on the Atherton Tableland in conjunction with dairying.

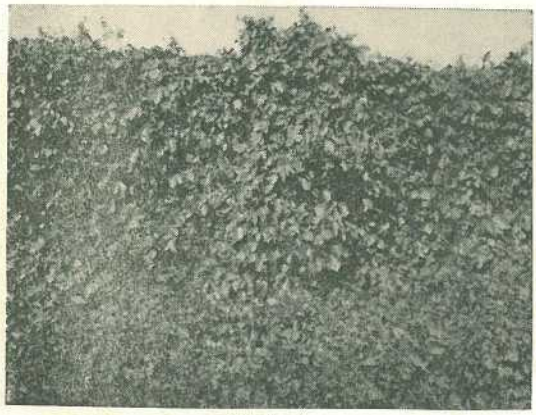


Plate 1

Glycine Planted in January, 1950, Completely Covered the Fence by May, 1952.

Yields

Glycine is used in conjunction with Rhodes grass, green panic, guinea grass and kikuyu grass. Previously, lucerne was used as the legume component but it was not satisfactory because it would not combine at all with guinea grass or kikuyu, and could not supply the large quantities of nitrogen required by Rhodes grass and green panic.

In the mixed pasture areas, the grass is invariably greener and the growth heavier when compared with grass which has no glycine component. Cattle usually show a marked preference for the mixture rather than the pure stand of grass.

A close-up view of a green panic-glycine pasture mixture, taken during autumn, is shown in Plate 4, and the nice balance between grass and legume can be seen. (Compare this with Plate 10 which was taken during spring.) This is about the ideal balance to aim at for this time of the year, though considerable variations will inevitably occur, owing to the different responses to temperature by the two components, and depending on seasonal variation from year to year.

Actual yields have been taken at various times, apart from the ungrazed plot used for seed in the early years.

In order to illustrate the drought-resistant quality of glycine, Table 1 has been included. This gives the relative quantity of forage available at October 30, 1957, in the Rhodes grass-glycine mixtures at a time when the effect of the 1957 drought was being felt very severely in this district. It will be noted how the old stand provided sustenance, although the moisture content was extremely low.

TABLE 1

Date Planted	Yield of Available Fodder		Moisture Content
	Rhodes Grass	Glycine	
			Per cent.
March 1957 ..	Negligible ..	2·2 cwt./acre	50
February 1955 ..	Negligible ..	8·1 cwt./acre	52

A storm yielding 3 in. was received one week later, and in order to illustrate the quite phenomenal rate of regrowth—provided sufficient moisture and warmth are available—cuts were made in the same paddocks only eight weeks afterwards. The figures obtained then are given in Table 2, and show the remarkable recuperative power of the glycine in the stand, as well as the slower regrowth made by the older stand of Rhodes grass.

TABLE 2

Date Planted	Yield of Available Fodder		Moisture Content	
	Rhodes Grass	Glycine	Rhodes Grass	Glycine
			Per cent.	Per cent.
March 1957 ..	12·3 cwt./acre	4·8 cwt./acre	..	..
February 1955	9·7 cwt./acre	30·0 cwt./acre	77	68

The results of the incorporation of this legume with green panic in a pasture mixture has also been quite marked, as can be seen from the data in Table 3. It is pointed out that all areas mentioned were mown off on the same date. As

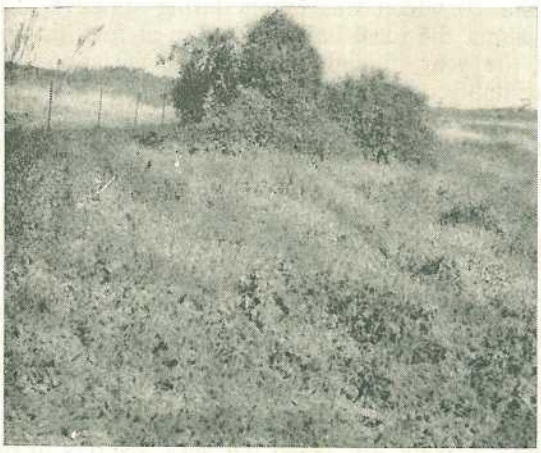


Plate 2

Glycine, 2 Years Old, Showing Ground Cover (9 Tons Per Acre) and Weed Smother.

Plate 3

Glycine on the Same Area as Plate 2, One Year Later.

the areas are adjacent to one another, soil variation is not great, and the yields quoted are comparable.

TABLE 3

YIELDS OF GREEN PANIC WITH AND WITHOUT GLYCINE

Pastures and Paddock Number	Yield of Available Forage as at 7–11–57 after 3 Months Drought
Pure green panic grass (K6–7) ..	5·0 cwt./acre green weight
Glycine-green panic mixture (K6–7)	16·25 cwt./acre green weight
Pure green panic grass (K14–15)..	5·5 cwt./acre green weight
Green panic-glycine mixture (L1) (glycine sparse)	17·6 cwt./acre green weight
Green panic-glycine mixture (L2) (glycine dense)	27·5 cwt./acre green weight

Results were very similar when glycine was the component in a mixture with guinea grass. Table 4 gives the data obtained.

TABLE 4

YIELDS OF GUINEA GRASS WITH AND WITHOUT GLYCINE

Pastures	Yield of Available Forage
Glycine-guinea grass mixture ..	17 cwt./acre green weight
Pure guinea grass	9 cwt./acre green weight
Glycine-guinea grass mixture ..	19·75 cwt./acre green weight

Another example of the capacity of glycine to improve the quality of the grass is furnished by a comparison of three pastures, two of which were planted to grass and one to a mixture of grass plus glycine in February, 1957. The land had been under maize for about 11 years.

By the end of 1958 it was quite obvious that the grass in association with the glycine was greener than that in the pure grass areas and it was carrying more stock.

Plate 4
Glycine–Green Panic Mixture.

During October, 1959, the available fodder on the 4 acres of the two pure grass areas was sparse and of low palatability and fed a herd of 17 cows for only two days, whereas in the grass-glycine area, there was sufficient fodder on 2 acres to feed the 17 cows day and night for three weeks. The high value of the grass-glycine mixture was due to the quantity of feed provided by the legume itself and to the improved quality of the grass.

TABLE 5

Type of Pasture	Amount of Feed Available Cwt. Dry Matter Per Acre	Crude Protein Content
		Per cent.
1. Kikuyu grass	8·44	5·3
2. Rhodes grass	7·14	4·2
3. Green panic-glycine mixture, as—		
(*a*) Green panic	8·10	8·2
(*b*) Glycine	23·10	15·8

Table 5 illustrates the amount of feed available in October, 1959, in each of the three pastures. (The yields are expressed on a dry matter basis as moisture contents are so variable and may not be related to the treatment.)

Photographs show the differences in growth and ground cover of the three pastures. Plate 7 shows the mixed pasture, Plate 8 shows the kikuyu pasture and Plate 9 shows the Rhodes grass pasture. Plate 10 shows the cows grazing the mixed pasture.

Glycine, in common with most perennial tropical legumes, makes rather slow growth during the first year after establishment, and this often sets serious problems of weed control.

In order to investigate the reasons for this, and endeavour to overcome this inherent slowness, investigations into the nodulation of this

Plate 5

Strips of Glycine Three Months Old.

Plate 6

Close-up of a Strip of Glycine Three Months Old.

legume were conducted, and Plates 5 and 6 illustrate the growth of glycine in some of the plots three months after planting. The yield of green fodder averaged 14 cwt. to the acre, but within a further three months they averaged over 2 tons to the acre. However, no particular strain of rhizobium proved superior, while a dressing of sulphate of ammonia did not greatly help, so that further work on other avenues needs to be undertaken.

Value for Grazing

The value of glycine for the grazing of both cattle and pigs was early realized. On the Atherton Tableland lucerne makes its main growth during the spring, but the plant population gradually decreases each year until, at the end of five or six years, the stand is too sparse to be of much use. Glycine, however, from a light seeding of 2 to 4 lb. to the acre increases

Plate 7

Mixed Pasture, Planted January, 1957, and Photographed October, 1959.

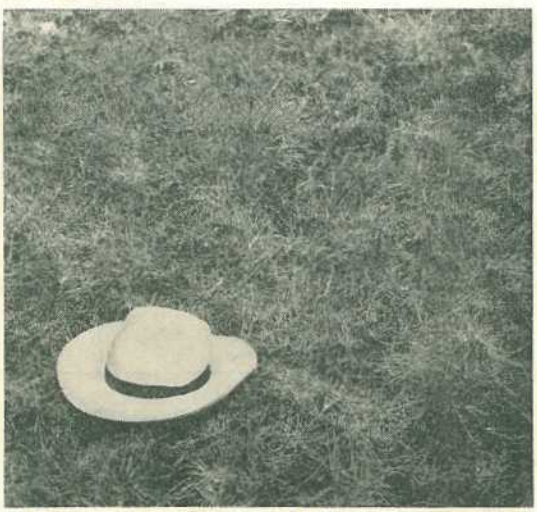


Plate 8

Kikuyu Pasture Planted January, 1957, with No Legume Components. Photographed October, 1959.

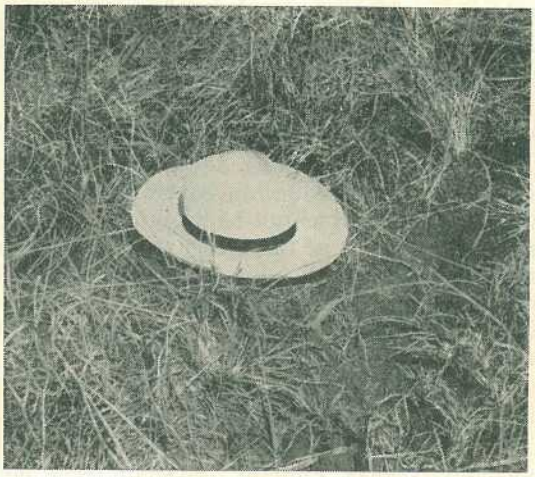


Plate 9

Rhodes Grass Pasture Planted January, 1957, Photographed October, 1959.

Plate 10

Cows Grazing the Green Panic–Glycine Mixed Pasture, Photographed October, 1959.

in density each year until (if not properly managed) it will smother most plants competing with it.

It is a prolific seeder, and the shattered seed would appear to have a high germination capacity. It may also, under certain circumstances, spread by runners. On the other hand, it is not so drought or frost resistant as lucerne.

The grazing value of lucerne is superior because of its greater palatability. But because of its better ability to benefit the associated grass, glycine has considerable indirect value, and forms a grazing mixture which thereby is more palatable and nutritious. With correct management, the glycine can be kept in check so as not to choke out the grass.

Its ability to produce such large amounts of soft, leafy forage suggested its value for pig grazing. Lucerne had previously been the only perennial legume available for this purpose, and

Plate 11

Glycine–Kikuyu Mixture in Pig Grazing Paddock.

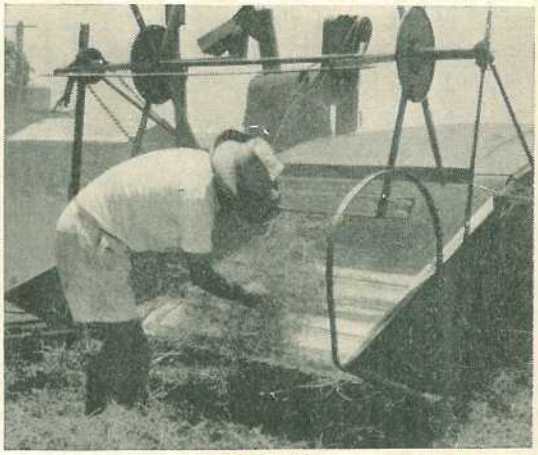


Plate 12

Feeding Glycine Vines into the Header.

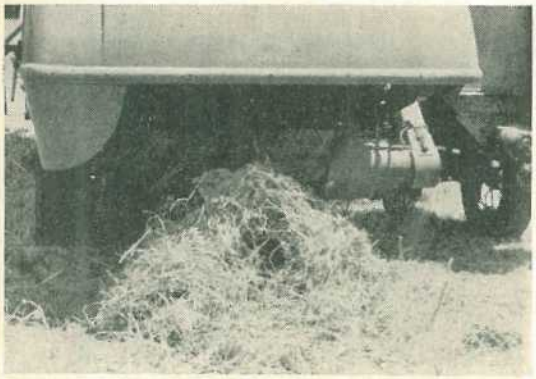


Plate 13

Glycine Vines at Rear of Header. These were fed through repeatedly until all the seed was removed.

it was quite satisfactory provided that it was carefully managed. But this meant that the pigs could not be left on it for any length of time, and that special measures were necessary to curtail weed growth during the summer months.

Glycine has been found to be quite palatable to pigs, and it was therefore planned to use this legume to provide the protein supplement when the pigs were grazing such crops as arrowroot and sweet potatoes.

The grazing capacity of such a combination has been proved to be considerable. For example, an area of 1½ acres, divided into equal areas of glycine, arrowroot, and sweet potatoes, was found to be able to support one brood sow (or its equivalent) for 250 days and there was grazing to spare at times. Plate 11 shows a mixture with kikuyu grass that was grazed readily by the pigs.

Several large areas have now been planted in mixtures with grasses to provide grazing for the herd of dairy cattle. The beasts do not show so strong an attraction for the glycine as they do for lucerne, but they do eat it, and very often it is more attractive during the hot, dry, early-summer weather, when it may be the only green growth in the pastures.

Conserving Excess Pasture.—Grass-glycine mixtures are valuable for silage making. During the autumn of 1959, a nine acre paddock of green panic-glycine was closed up for 2 months and then cut for silage. The yield was 10 tons to the acre, consisting of 4 tons of grass and 6 tons of legume. The material was ensiled in a trench using a flail type forage harvester and the silage was quite satisfactory.

Soils and Nutrient Requirements

Glycine seems to grow satisfactorily on the soils of the Tolga–Atherton–Malanda area, provided that erosion has not been serious. The red basaltic clay loams of the area are fairly uniform and there is every indication that the plant should grow quite satisfactorily on them. However, on soils derived from granite, which are usually shallow and severely eroded, the growth is slow and the glycine requires about two years with little or no grazing to establish itself and spread.

From Malanda to the southern edge of the Tableland, higher rainfall—especially the cold drizzle of the winter months—may not suit glycine and the higher soil acidity may also retard its growth. These factors have yet to be investigated in relation to glycine growth.

Little is known of any specific mineral nutrient deficiency affecting glycine growth on Tableland soils and no visual responses have yet been observed in the small-scale pilot tests so far carried out. Investigations along these lines are continuing.

Seed Production

In the early years of its establishment, seed production was the main aim, since no other source of supply was then available.

The method used was slow and costly, the vines being cut by hand from fences and tall weeds where seed formation was the heaviest.

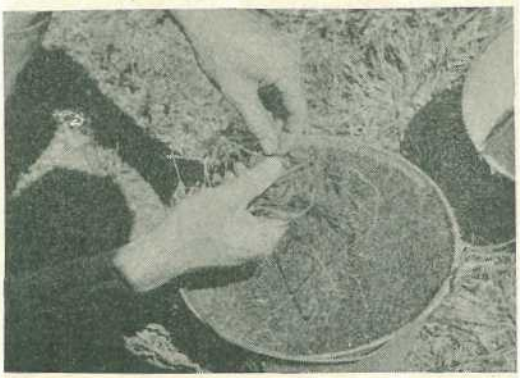


Plate 14

A Bucket of Clean Seed and a Handful of Seed Pods.

Plate 15

Clean Seed After Final Sieving by Hand.

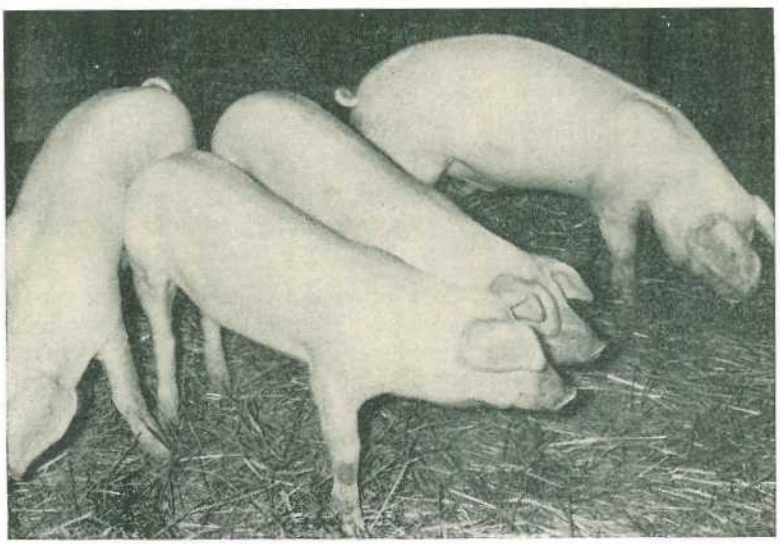
The pods were then allowed to open, being caught on concrete or tarpaulins, the whole mass of vines having to be turned frequently to facilitate drying out.

An improvement in efficiency was obtained by modifying a header to thresh the vines before opening of the seed. The vines were allowed to dry for a day and then passed several times through the header until the majority of the seed had been threshed. Plates 12 to 15 illustrate this method.

On areas where, in certain seasons, frosts are not experienced, considerable success may be achieved in the harvesting of glycine for seed by the use of a forage harvester. This machine chaffs up the whole of the above-ground portion of the plant and feeds it into a trailer, so that it can be conveyed to a suitable place for drying and threshing. No difficulty has been experienced in threshing this material and after winnowing the sample of seed is of good quality.

For immediate use, however, it is not necessary to thresh the chaffed-up material, which can be broadcast quite readily over the area to be sown.

Because of the obvious advantages that glycine possesses, the incorporation of this legume in pastures of various kinds of grass on the Atherton Tableland is strongly recommended. Judicious management will need to be practised, however, to provide grazing as quickly as possible, and in order to maintain a good balance between grass and legume at the most critical periods of the year.



Landrace Baconers Meet The Press

These Landrace baconers were inspected during the R.N.A.-Shell 1960 Journalists' Tour. They were at the "Glenroy" stud piggery of Messrs. W. F. Kajewski and Son, on the Darling Downs. Mr. Kajewski told the touring party that these four baconers were 3½ months old; the top weight was 132 lb. A litter of nine pigs from a 12 months old sow averaged 40 lb. at birth and 99½ lb. at 2 weeks.

stock and station

Drought Feeding with Grain Sorghum.—In an experiment at the Animal Husbandry Research Farm at Rocklea maiden heifers group-fed in yards with 3 lb. crushed sorghum grain per head per day showed a high rate of survival.

Four groups, each of 10 heifers, were fed the ration with the addition of 1 per cent. ground limestone. One group (No. 2) also had 0.5 per cent. salt added to its ration.

Although all animals lost considerable weight during the trial only two died—one each in groups 1 and 3.

A pre-trial period of three weeks was occupied in bringing the cattle on to the all-grain ration. The times of feeding and the average live weights of the groups at the commencement and conclusion of the 26 weeks all-grain period were as follow:

Group 1 (fed daily)—462/356 lb.—loss 106 lb.

Group 2 (fed daily—salt added)—464/381 lb.—loss 83 lb.

Group 3 (fed twice weekly)—460/364 lb.—loss 96 lb.

Group 4 (fed weekly)—464/335 lb.—loss 129 lb.

At the end of the grain feeding period five animals from each group were turned out immediately to pasture. The remainder were fed with lucerne chaff for one week prior to turning out and it was found that the animals that had been fed intermittently consumed greater amounts than those fed daily. After 7 weeks the average live weight gains were:

Group 1, 151 lb.; group 2, 136 lb.; group 3, 177 lb.; group 4, 182 lb. Although some of this gain must be attributed to "rumen fill" the figures indicate the rapid recovery of the cattle on pasture.

On the basis of this trial it would appear that twice weekly feeding is the most satisfactory.

Immunity of Calves to Tick Fever.—Cattlemen generally believe that calves from tick infested cows possess an immunity to tick fever.

In an experiment conducted at the Oonoonba Animal Health Station two groups, each of nine pregnant cows were used to test this theory. No. 1 group was inoculated three times during pregnancy with blood containing a tick fever organism, *Babesia argentina,* while No. 2 group remained untreated. Eight calves from each group completed the trial.

In the calves from No. 1 group, six up to 35 days of age showed no clinical symptoms of tick fever following inoculation with infected blood, while one inoculated at 43 days of age and one at 52 days reacted to the injections. Blood taken from all eight calves was subsequently proved to be infective by inoculation into susceptible animals.

The eight calves from No. 2 group were also inoculated with infected blood and all reacted more severely than any in No. 1 group.

To check whether the immunity of the No. 1 group calves had been conferred by pre-natal infection, blood was drawn at birth from members of this group and injected into susceptible animals previously prepared by surgical removal of their spleens. None of the recipients showed evidence of infection. This indicated that a passive immunity derived from their infected mothers had protected the calves from the disease.

Lantana Poisoning.

This severe case shows a typical swollen muzzle with a raw surface, swollen eyelids and thickening of the ears. On account of the sensitivity of the skin to sunlight, affected cattle seek shade and keep their eyelids closed.

Severe liver damage causes loss of appetite, depression and jaundice.

There is no specific treatment. However, some relief can be provided by drenching with up to 1 gal. of paraffin oil to empty the bowel. Sugar is used to strengthen the animal and provide some protection for the liver. Affected animals should be given access to shade.

—O. H. BROOKS,
Divisional Veterinary Officer.

Poisoning of Working Dogs.—Working dogs frequently suffer harm because of the carelessness or lack of thought of their owners. Recently several cases of poisoning have occurred which have been attributed to dieldrin or aldrin dipping fluids.

Some of the dogs became poisoned by drinking spilt jetting fluid (where no water was provided for them), others by absorption through the skin following dipping for dog ticks, and one by licking treated house stumps.

Symptoms resembled poisoning by strychnine. The first fits lasted from 10 to 20 minutes but as the condition progressed their duration shortened and the intervals between them increased. During the period between fits the dogs walked with a high-stepping, jerky type of gait and carried their heads higher than usual. In some cases the symptoms were confused by owners with those of distemper.

Treatment was not very effective. Of nine cases reported, two recovered after treatment with a sedative (nembutal), two after no treatment of any kind, and the remainder died.

To prevent occurrences of this nature, working dogs should be provided with clean water to drink at the dipyards and should be restrained from lying in pools of dipping fluid, or in the vat, to cool off.

Tranquillizers for Pigs.—Tranquillizer drugs have been used successfully in Queensland to control after-farrowing viciousness in sows.

Tranquillizing drugs have made an impact on veterinary medicine. Removing psychological stress, they make vicious, timid or uncontrollable patients easy to manage. Tranquillizers are already being used in Queensland to restrain horses for brief surgical operations, for treating shock and for quietening vicious or difficult-to-manage dogs and cats.

Overseas, these drugs have also been found useful when placing range pullets into intensive laying houses. But little information has come forward on the use of tranquillizers in pig farming. One claim, however, has been made of their value in treating after-farrowing hysteria in several forms.

Recently tranquillizers were used on a piggery near Brisbane to control viciousness in a sow found savaging her young. This usually docile sow had bitten and killed the first two of her litter while still farrowing, and had attempted to bite a third. About half an hour after the injection of a tranquillizer, the unsettled sow became quiet and seven more piglets were born without incident. The sow mothered them quite normally. The owner later reported successful treatment of another sow affected with after-farrowing viciousness.

Savaging their newborn piglets is not uncommon in sows. The attacks may occur during farrowing or soon after.

Tranquillizers could be an answer to this problem. Besides quietening the sow and preventing attacks on the piglets, difficulties arising from separation of the piglets from the sow would be avoided.

—P. D. RANBY, *Veterinary Officer.*

Preparing Grain for Pig Feeding.—Pigs are able to handle a big range of grains in their ration, but do not get full nutritional value from them unless most of these grains are given some treatment before feeding. Maize, because of its large size, is the only grain that can be fed successfully without any special preparation.

Small, hard grains like wheat, sorghum and skinless barley give best results if crushed or ground before feeding.

Awned barley and oats have fibrous seed husks and should be ground to break up the fibrous material. Ground, these grains are much more palatable and are digested more completely than the untreated grain. Because of the high fibre content, don't exceed 30 to 40 per cent. of oats in the ration for growing pigs.

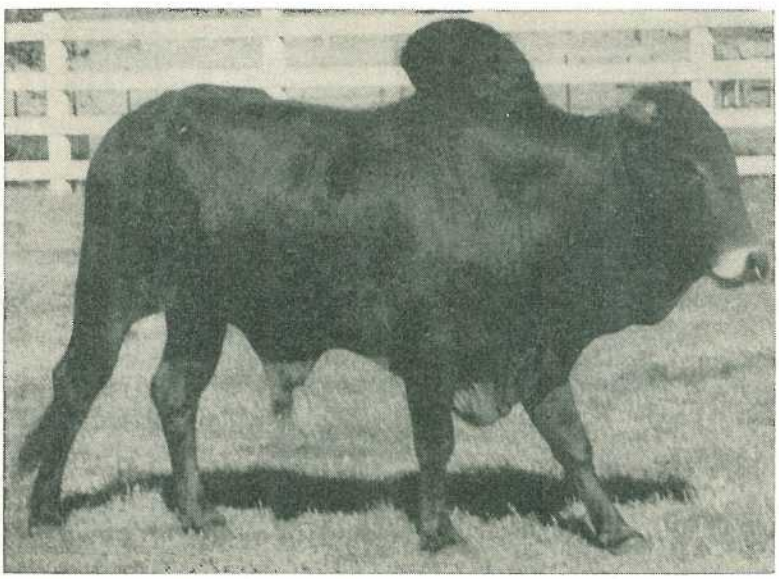
At times when their value as cash crops is low, many other grains are fed to pigs. These include the so-called small grains—millets and canary seed. Grains like these have two common characteristics—they are small and have hard, fibrous seed husks.

If you feed the grain whole, much of it will pass through the pigs undigested. Crushing or grinding makes the small seeds more digestible and, in consequence, a more efficient pig food.

In feeding value, the small grains, when crushed, are not far behind maize, wheat and sorghum. But if fed heavily and continuously, they have a tendency to cause the formation of a soft, oily fat.

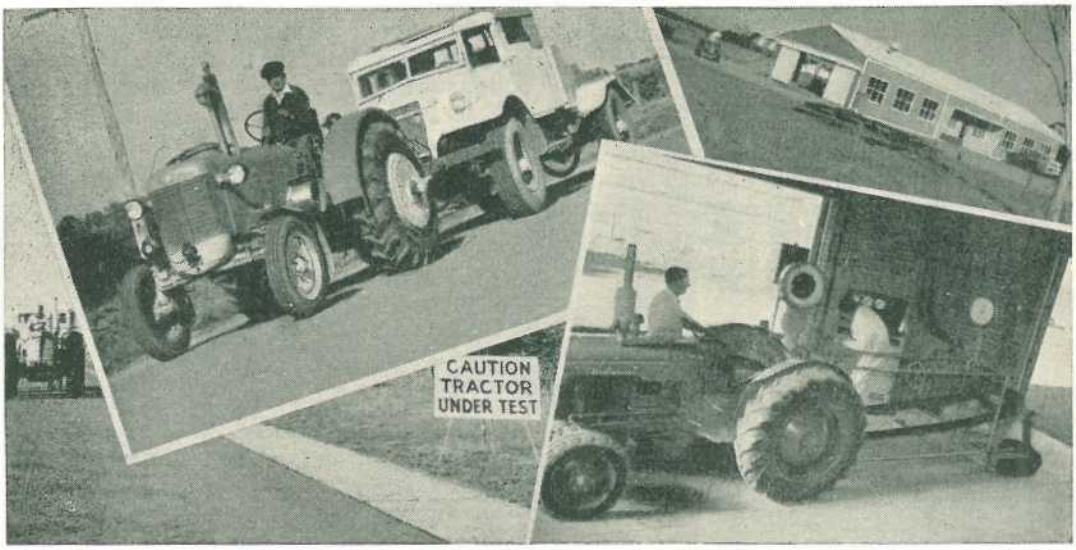
To avoid producing oily bacon pigs, restrict canary seed and millet to not more than 40 per cent. of the pigs' ration. In Agriculture Department trials last year, this quantity of small grains in the ration was found to be the most suitable. It gave growth results similar to those obtained from feeding wheat, barley and sorghum.

—F. BOSTOCK,
Senior Husbandry Officer, Pig Branch.



Journalists Inspected Him

This Red Sindhi bull at Gatton College is being used in cross-breeding experiments designed to develop a tropical dairy breed of cattle. Simultaneously, cross-breeding projects are being carried out by C.S.I.R.O. in the south and the Department of Agriculture and Stock in the north. Journalists on the R.N.A.-Shell 1960 Queensland tour were shown over Gatton College by the Principal, Mr. N. W. Briton, and his staff.



Tractor Testing In Australia—I

By G. H. VASEY,
Officer in Charge of Tractor Testing,
and W. F. BAILLIE,
Testing Officer, University of Melbourne.

Australia is one of several countries that have set up "official" tractor testing schemes. These schemes involve setting up testing stations that, while providing a testing service on the one hand for tractor manufacturers and on the other hand for tractor users are independent of both.

Unless the tests are compulsory, as in Nebraska, they are better described as "formal" rather than "official." The following paper sets out the origins and scope of formal testing of tractors, particularly in Australia. A second paper will describe the test procedure.

Origin In Nebraska

The origin of all the present tractor testing schemes can be traced back to the "Nebraska tests" of the U.S.A.

In 1919 the legislature of the State of Nebraska passed a law requiring anyone wishing to market a tractor in that State to have a sample stock model tested by the University of Nebraska; the Act also required that the test report be published.

The primary object was, simply, to provide a check against the extravagant advertising claims and correspondingly poor tractors being made by some makers who were cashing in on the new wonder—the iron horse—after the First World War had shown these machines to be possible.

It will be recalled that the tractor only began to make its appearance in the years immediately following the war; many wild-cat companies entered the field with little or no experience to back their products; many hopeless designs were put on the market. Farmers, of course, had no way of assessing these machines, whether the claims made for them were valid or outrageous.

The Nebraska tractor test law was designed to cope with this situation. The law soon effectively covered the whole of the U.S.A. since a manufacturer could not risk the obvious implication of selling everywhere but in Nebraska!

As time went by, the bad were sorted from the good; the reputable makers were quick to see the advantage of being able to base their advertising on an attested report from an independent authority with the high standing of the University of Nebraska.

More than 700 separate makes and models have passed through the Nebraska tests since 1919. Although field-day tests of tractors had been organised in England in the early twenties and thirties, and indeed at Werribee in Victoria in 1918, it is obvious that the Nebraska law and the Nebraska test scheme effectively started the notion of tested and certified tractors.

AUSTRALIAN SCHEME

Until the Second World War, most of the tractors used in Australia were imported from the U.S.A. and so were in effect certified by the Nebraska test—for those who cared to read or use the certificate. But in the expansion of mechanised farming after the war, many tractors came to Australia from Great Britain and Europe unaccompanied by a test certificate.

Furthermore, even with the tested American models the amount of Australian content going into their assembly here was increasing, so that overseas tests were not always strictly applicable.

Besides these importations, some interest was being shown in the design and manufacture of tractors in Australia.

Taking all these factors into account, the Commonwealth Government sought to strengthen the interests of Australian farmers, and to provide itself with proper bases for such fiscal matters as duty and bounty, by setting up a tractor testing scheme in Australia broadly along the lines of the Nebraska tests.

At first the work was entrusted to the Aeronautical Research Laboratories of the C.S.I.R. at Fisherman's Bend. Using test procedures exactly the same as those at Nebraska, the Aeronautical Laboratories tested 23 tractors between 1946 and 1951. But, as a result of departmental changes in the laboratories, the scheme was abandoned in 1951, and reconstituted on a new basis in 1954.

Co-operation

The new scheme was developed by the Commonwealth and State Governments, through the Australian Agricultural Council, that called for co-operation between the several governments and the University of Melbourne; (in the early stages the Bureau of Sugar Experiment Stations acted instead of the State of Queensland). Under the terms of this agreement, the Commonwealth was to meet half the cost, the States the other half (in proportion to their tractor populations), while the professional services were to be provided by the University.

Among the conditions laid down by the University for its participation in the scheme was that it should have full discretion in all technical matters, and that its officers appointed to carry out the tests would not only be permitted, but should be expected to carry on research work on tractors and related matters.

The scheme was to be a voluntary one, as it is in England, and for that matter, in most other testing stations. That is to say a testing service was set up: the companies would use it, and submit tractors for test, if they saw merit or advantage in it.

At the same time the scheme was expected to recoup some of its expenses by charging test fees; (the Nebraska scheme runs itself on its income from test fees, which are substantial).

These principles having been laid down, the Tractor Testing Committee* was formed comprising an officer of the Commonwealth Department of Primary Industry as chairman, an officer of the Victorian Department of Agriculture representing the interests of all the States, and an officer of the University of Melbourne.

The first tests were done in makeshift premises at Fisherman's Bend and the State Research Farm Werribee, beginning in 1954. By 1957 a Testing Station was built on the property of the Research Farm. In all, some 10 models of tractors, over 20 spark arresters, and a variety of other engines and tractor equipment have been tested.

Meanwhile, the test procedures themselves have undergone some changes, so that today the Australian test system is in some ways ahead of its counterparts overseas.

* The address of the Tractor Testing Committee is: care of Department of Primary Industry, 301 Flinders Lane, Melbourne C.1., Victoria.

Nature of the Tests

It will be appreciated that the formal testing of tractors is in no sense a competition between rival makes; it is not a question of testing this model of tractor against that, but of measuring the performance of the given tractor in a standard manner.

Nor is there any law, regulation, rule, or industrial standard that says a tractor shall have this much power, or pull, or speed, or fuel consumption. The only limitations imposed on the tractor, the only standards to be reached, are those imposed by its own instruction book, and the claims made for it.

Each tractor under test goes through a certain standard set of procedures and inspections that amount in the end to a measurement of the tractor and its performance and qualities.

The test procedures will be described in the second article of this series. Briefly, they consist of: (*a*) a survey of the physical properties of the tractor, (*b*) the power capacity of the engine and of the p.t.o. and belt outlets, (*c*) the power in the drawbar in the several gears, and (*d*) observation of the tractor under test and detailed inspection afterwards.

The testing procedure eliminates as far as possible matters of opinion; it concentrates attention on those things that can be measured. On some things, for example, comfort, the opinion of the testing officers may for the time being play a part, but engineering studies are slowly reducing the guess work even in these fields.

Although the tests conducted at other centres permit and, in effect, expect the companies to submit a selected and prepared sample tractor for test, the objective in the Australian test is to work on a sample of the stock model that has been taken at random from the run of production or stock. Such a tractor is presumed to be representative of all the tractors of that make and model currently being offered for sale, such as any buyer might buy.

Report of Test

The full technical report of the test, in its several sections, attempts to describe the tractor and its response to the checks, measures and tests put on it, and to describe them in such a way that the information is complete in itself, with no loose ends that are doubtful or uncertain.

For example, as the British test code says, no drawbar results can have any meaning unless they are clearly related to the weight of the tractor in the tests, not only total weight, but front and rear axle weights also, and for that matter the height of the drawbar.

Likewise it is not sensible to give any power values for the engine without naming each time the engine speed.

For these reasons, and so that the company's and other technical officers, including extension officers and research workers, can get full sense out of the results, the reports are at some length and in some detail. For the farmer, the physical properties and the summary of results may be sufficient.

On the power tests, the report gives a table of results for full power on the engine, the p.t.o., the belt, and the drawbar. For the rest, including the intermediate values, the story is told in two series of graphs, one set for the engine itself as the source of power, and another set for the drawbar tests.

From these, any professional reader will get a complete picture of the tractor's total performance; from them he can make what comparisons and judgments he pleases.

The last section of the report is devoted to a fairly thorough specification of the main features of the tractor, the statement being supplied by the manufacturer. Nevertheless, the testing officers will have checked most of these details (at any rate those that are observable from the outside) because, of all people, the testing officers must be sure that the tractor they have tested is the tractor described in the specification.

For the farmer reader the report is also issued in a shortened form, with all the description as it affects the operation of the tractor, and with a useful summary of the results, but with much less tabular and graphical detail.

Whereas some hundreds of the Technical Report are issued to trade, professional and overseas bodies, some thousands of the Farmers' Edition are distributed for issue to farmers, if they want them, all over Australia.

Certificate

A tractor that has gone through the tests, and for which a report has been issued, may well be called a certified tractor. To bring this point home, to both users and prospective users of the tractor, a certificate is issued to the company saying that a stock model of this tractor has been tested, quoting the test number and the date, over the testing officer's signature.

This certificate is in the form of a transfer to be affixed to every tractor of the model in stock, so that the certificate may fairly be said to be attached to the tractor.

Interpretation of Test

There is no difficulty in interpreting the results on the engine: there is its full power output that drives everything else in the tractor; there are its torque and fuel consumption, at all speeds and loads, especially of course maximum power at the defined rated speed.

Likewise there is no difficulty about p.t.o. and belt power values; the tests show what the user can expect on p.t.o. drive and on belt drive from a typical tractor of this model; not that a difference of 2 or 3 h.p. one way or the other makes a lot of difference; no user is able, except rarely, to say what power he wants precisely for this job or that.

The physical properties of the tractor are described; these include—heights, lengths, weights, turning circles, p.t.o. and belt speeds, instruments and controls. They may suit him, or they may not, but there is not much room for argument about them.

It is only when we come to the drawbar tests and to the question, "What will this tractor do on my paddock, with my cultivator?" that difficulties of interpretation arise.

The difficulties are threefold:

(*a*) As a rule no one knows what pull is required to work that plough, or any other machine;

(*b*) No one can say how the tractor will perform on surfaces other than the test track;

(*c*) Both the pull required to work the plough, and the performance of the tractor's wheels will vary from soil to soil and, even on the one paddock, with the day to day and seasonal variations in the soil.

It is regretted that a lot more is not known about the pull, and the p.t.o. demand in some machines required to work the different classes and makes of machine on the different types of soil, or even on a standard soil, if there was such a thing.

It will be a very long time indeed before the soil engineers will be able to relate machine and tractor performance, even on the one soil type, to the differing conditions that can arise in a given soil; differences in the states of tilth (from pasture, through stubble, to rough cultivated land), and differences in the moisture conditions of the soil.

As to (*b*), one can say that, compared with the hard dry test track, a tractor in the field will deliver less pull, and will suffer more slip, and so will run at slower speed, and deliver perhaps a lot less power, even though the engine may be fully loaded. As the soil conditions get looser, rougher and/or wetter the difference between test performance and field performance gets worse.

It is perhaps possible to say that, for tractors of comparable weight and power capacities, the field performances are likely to be as much alike as the test performances are, but at some unspecifiable lower value.

It is hoped that, in due course, even this awkward question can be answered: but the answer is not yet in sight.

(*To be continued*)

BEET NEMATODE

The beet nematode, an important pest of beetroot, turnips, cabbages and related crops was recently found in Queensland for the first time (see this issue p.495). When the presence of this pest is suspected, samples of crop roots and surrounding soil should be forwarded to the Department of Agriculture and Stock, either in Brisbane, or the nearest country centre.

Queensland Fauna Sanctuaries

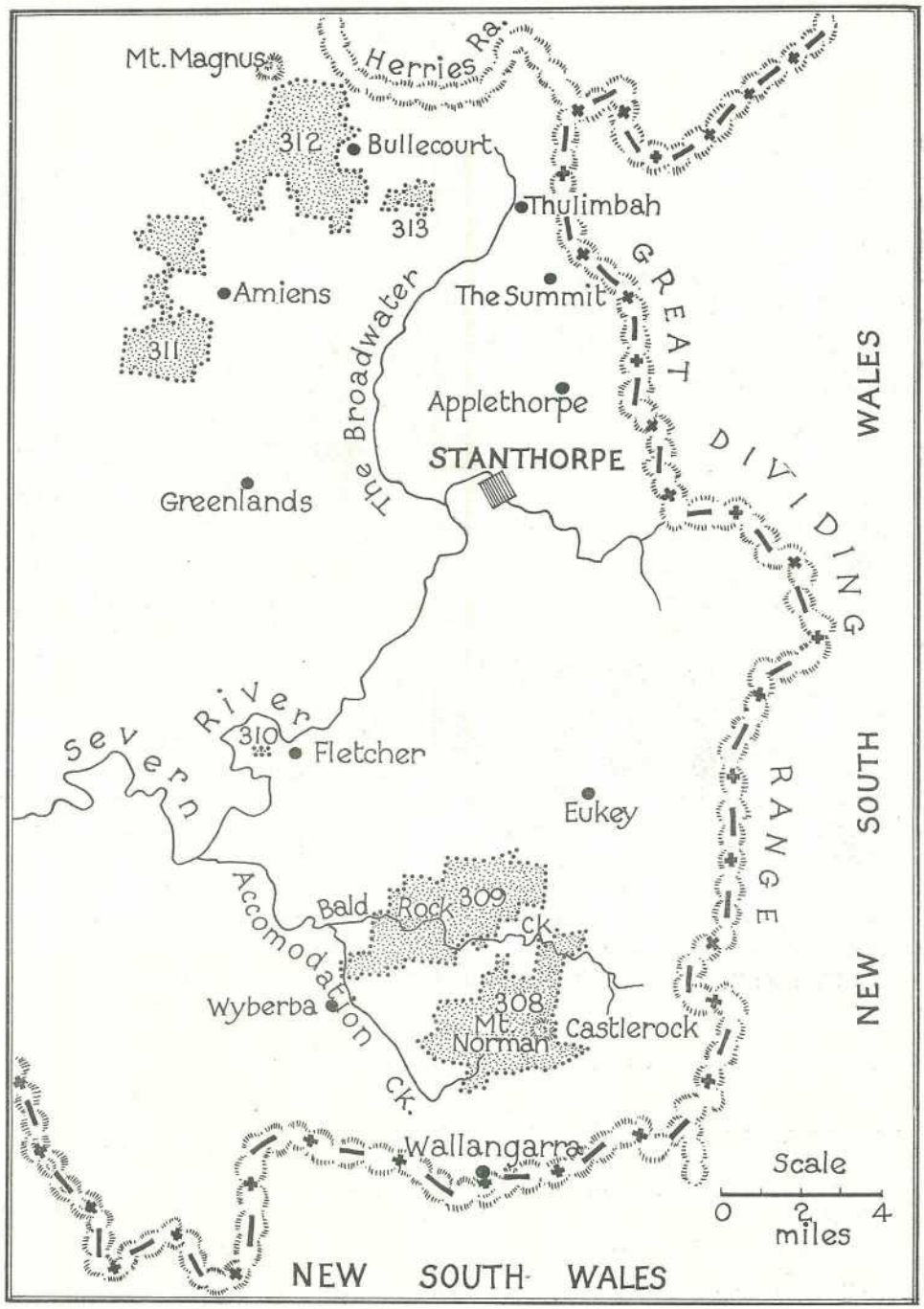
By C. ROFF, Fauna Officer.

Plate 11: **Bald Rock Creek, Part of Bald Rock National Park, via Wyberba.**

[*J. Smith (Manly) photo.*

The following is an index of the sanctuaries outlined in Map 23:—

Index No.	Sanctuary	Area in Acres
308	"Castle Rock" National Park Reserves 282 and 301, Parish of Tenterfield, via Wyberba	6,783
309	"Bald Rock" National Park Reserves 281, 295, 302 and 304, Parishes of Tenterfield and Broadwater, via Wyberba	5,821
310	"Mount Pleasant," via Fletcher	24
311	State Forest Reserve 316, Parish of Pikedale, via Amiens	3,800
312	State Forest Reserve 263, Parishes of Pikedale and Herries, via Bullecourt	6,035
313	State Forest Reserve 321, Parish of Marsh, via Pozieres	450



Map 23: **Map Showing Sanctuaries in Part of Fauna District No. 1.** The sanctuary boundaries, as at December 31, 1957, are delineated by dotted lines enclosing the stippled areas.

All Australian-Made

A Stone, Navy and White Shirt and Stone Skirt That Was Featured in the Parade of Australian Fashions in London. All the garments paraded were made of Australian fabrics manufactured from Australian wool.

A Family Room

Winter has been with us for some time, and the shorter days and longer evenings have brought the family together for longer periods.

Not many homes have more than one warmed room, and some families finding that one room too small are planning to have more space before next winter.

Here are some of the things which need to be considered when planning a family room.

To be a success the room must meet the needs of the family, both as a group and as individuals.

To ensure this the hobbies and interests of each member of the family should be listed, and the activities which the family pursue as a group.

This list will give an idea of storage and floor and table space required.

It is a good idea, too, to look ahead and hazard a guess at what new hobbies and interests may develop—particularly with a growing-up family.

Some questions which the family needs to answer include:—

How much room do we need?

Does it want to be large enough for ping-pong?

Do we want it close to the kitchen for convenient serving of supper and snacks?

How will we heat it?

What do we want on the floor? Are we likely to want to dance there anytime? If so what kind of rug will we have for warmth?

What will be the best storage for our needs?

Do we want a room for rest and relaxation or for activity, or both?

What will be the best lighting to ensure everyone can see well?

Do we need to plan for a T.V. set, or for film or slide projection?

Could one corner double as a sewing room?

How many power points will we need?

Will we want to make a fireside "cuppa" on the spot?

What will be the best kind of furniture for our needs? (Take time to look around for this and other needs.)

When you know the answers to these questions, and the others that will come to mind, definite planning of the family room can commence.

Keep Surfaces New

Homemakers' disappointment in the appearance of a piece of new equipment has sometimes been traced to wrong cleaning methods.

This is a pity because the correct method of cleaning the new finishes on to-day's household equipment is so much easier than some of the wrong methods used.

The right way is usually as simple as wiping over with a damp cloth and then, perhaps, a dry one.

The wrong way usually includes the use of some kind of abrasive cleaner, and once the very smooth, dirt-resistant finish is so treated the surface is damaged and all kinds of trouble may result.

Homemakers would be rewarded by following the advice about cleaning and the cleaner to use.

This advice is usually included in the general instruction booklet or on the tag.

New Cleaners

In addition it is well worth while to take the trouble to keep up with the new cleaners which appear as a result of the development of new materials and finishes. But a word of warning—check on the label to see if the cleaner is recommended for the particular finish, and if so follow the instructions faithfully.

Table Surfaces

Laminated plastics and self-adhesive plastic sheeting are both very easy to keep clean, but chopping or cutting will scratch a laminated plastic surface and destroy a self-adhesive plastic.

For ordinary cleaning, a mild soapless detergent and water is all that is necessary for either.

Rinse carefully, and wipe with a dry cloth to avoid smears.

Use a little undiluted soapless detergent for bad marks.

Anodized aluminium is often used for easy-to-clean trolley tops and trays. When it requires more than the ordinary wipe-over, be careful to use a non-alkaline detergent.

Melamine Tableware

The hard, shiny finish of melamine tableware must not be destroyed with scratchy cleansers, but thorough washing is essential to prevent permanent staining.

Non-scratch cleansers are available, or you can use an oxygen bleach or a soap powder containing one; a little of this rubbed on to a tea stain in a cup will remove the stain.

Kitchen Cabinets

Wipe kitchen cabinets over regularly with a damp cloth, using a mild soapless detergent to remove marks.

Dry with a soft duster to avoid smeary marks.

A sparing and occasional application of furniture cream helps to protect the surface.

Grooves for sliding doors on kitchen cabinets should be kept free from dust and crumbs; use the dusting nozzle of a vacuum cleaner for this job.

Her Job is Promoting Wool

Miss Nan Sanders, who is a Queenslander by birth, and one of the leading textile promotion experts in Australia, has spearheaded a successful drive for a greater use for wool. She is Promotion Director of the Australian Wool Bureau.

Colours For Children's Clothes

We're all familiar with the signals "red for stop" and "green for go", interpreting them as red for danger and green for all clear.

As red is the strongest of the "advancing" group of colours it is easy to understand why it was selected as the danger colour—we see it sooner than other colours.

Making practical use of this "hit you in the eye" characteristic of some colours is gaining wide favour among mothers, reports Miss Nancy Foskett, Senior Extension Officer, Women's Services, N.S.W. Department of Agriculture.

American mothers have been urged to dress their children—particularly the younger ones who have little sense of danger—in red and other strong colours.

Bright colours—red, butter yellow, bright royal blue, crimson—that are in strong contrast to the surroundings, are recommended.

These provide a margin of safety, that extra fraction of a second's warning that spells the difference between life and death when a child runs, unthinking, on to the road or in front of the tractor, after a pet puppy or a lost ball.

An added advantage of brightness in children's clothing is that children are easier to find if they wander away or are lost at bush picnics or on the beach.

Americans are using colours for safety in many other ways too.

For example, tests by American railroad companies show that there is safety in colour combinations of orange and black, or orange and royal blue for train exteriors.

These ensure year round visibility in any part of the country and have reduced the risk of level crossing accidents.

Latest development overseas in the use of colour for safety is the recommendation that aircraft be painted fluorescent orange to reduce the risk of collision by making them easier to see in bad weather.

You Must Sort Washing

Unsatisfactory results from mechanical washing in modern washing machines may be caused by careless—or no—sorting of the clothes and articles.

Modern washers do a fine job for the homemaker, particularly in reducing fatigue, but they cannot produce a good coloured wash if we toss in a collection of unsorted clothing and articles, press a few buttons and go on our way.

There is as great a need, however, to sort clothes for the washing machine as for the washtub and copper.

Sort according to:

- Type of fabric.
- Colour of fabric.
- Temperature of water.
- Washing time.
- Degree and type of soil.
- Type of article.

This latter classification is not usually included in washing instructions, but some might like table and kitchen linen washed separately, and don't like pillow cases and socks washed together.

In the pre-synthetic age we sorted into three or four bundles—wool, silk, cotton and linen, and sometimes mixtures. Today we have synthetics and drip-dries to consider, which also call for different handling.

Irrespective of the tremendous improvements in dyeing it is still worth while not to wash whites and coloureds together.

Worth remembering, too, is that fresh water for dark colours can be a time-saver as any fluff and dirt in "used" water will spoil the appearance of dark colours.

This still varies according to fibres and colours.

Start off with cool and add hot, or vice-versa, according to next load if not a fully automatic washer.

This varies according to delicacy of fabric and amount of soil.

Where a load is made up of equally soiled articles, but some are more delicate than others, stop the machine and remove the delicate articles before the time for the heavier articles is up.

Any stains should be removed before washing, while soaking or a longer wash-period will look after many soiled articles.

Very soiled articles are better washed in two separate waters rather than twice as long in the one water.

Close zippers; check for brooches, pins and tears; empty pockets; and tie any strings in a loose knot.

Rubber Floors

Rubber floor-covering is attractive and durable, clean, and quiet underfoot. It is easy to care for, but the methods used differ from those applied to other types of floor-covering.

After the rubber is laid, clean the surface with a damp cloth.

Never wash until adhesive is thoroughly set—four or five days after flooring material is laid.

(Rubber is slippery when wet and to prevent accidents any liquids spilt on rubber floors should be wiped up immediately.)

To remove ordinary dust and dirt use a vacuum cleaner, or a soft floor brush or non-oily dry mop.

Do not use oil mop or oily sweeping compounds.

To retain that glossy appearance, polish frequently with a clean, soft cloth.

To remove mud and soil, wipe with a mop wrung out in clear, cool water.

For occasional thorough cleaning, wash with an approved rubber-flooring cleaner in preference to soap and detergents.

Strong soaps dry out asphalt, cork, rubber, and linoleum, making them brittle, porous, and hard to clean.

Rinse with clean water. When dry, polish thoroughly.

For an extra-high shine, apply a thin coat of water-base, self-polishing wax. Polish and apply a second thin coat of wax.

Polish thoroughly.

Unless the floor gets a great deal of wear, it should be waxed only occasionally.

If wax is allowed to build up on the surface, it will make the floor dingy-looking.

Always use a water-base wax on rubber, never a naptha-base wax.

Naptha, a solvent, softens and pits the rubber and causes colours to "bleed."

Do not apply varnish, lacquer, shellac or similar products—they cause rubber to dry out, crack and curl.

Regular polishing is the best care you can give a rubber floor.

A floor that receives a fair amount of traffic will benefit from an occasional buffing with No. 00 steel wool.

Leather Likes Care

Leather responds readily to regular care, and rewards the owner not only through more attractive appearance but also by lasting longer.

This is true whether it be a handbag, shoes, brief case, leggings, belts, upholstery or luggage.

Some reminders for regular care:

- As with any other article, do not allow leathergoods to become too soiled or dull before cleaning.
- Dust with brush or cloth before applying polish.
- Use a good polish or cream *sparingly*.
- Use a colour nearest that of the leather.
- A neutral, or colourless polish is an advantage for shoes and essential for upholstery, handbags and belts. When the use of a coloured polish is necessary to restore colour to those articles always give a final polish with a colourless polish to prevent marks on clothing.
- For navy-blue leather-goods, which tend to lighten in colour, use black polish occasionally—but sparingly.
- A final rub with a silicone-treated cloth imparts a protective film which makes continued repolishing unnecessary.

When a build-up of polish occurs and it is difficult to raise a shine, wipe the article lightly with a cloth dampened with methylated spirits.

As this will tend to dry the leather, rub in some colourless shoe cream before polishing.

Grease spots are difficult to remove but this method is usually effective:

First, moisten the leather surface with water, using a pad of absorbent cotton or a small sponge.

With another sponge or wad of cotton, apply a solution of oxalic acid evenly over the soiled surface. The solution consists of 1 part oxalic acid powder or crystals to 10 parts water.

After the spots are removed with the solution apply saddle soap to the leather and polish with a soft chamois.

There is now a silicone spray on the market which will impart a waterproofing film over the article.

It is recommended for the soles of footwear as well as the uppers and the instructions are to respray weekly, depending on wear.

Buying Knitwear

One of the best guides to quality in knitwear is the way parts are shaped and joined, seam treatment, the finish of the neck and any openings; in two words—good workmanship.

Here are some ways of checking workmanship before buying knitwear:

There are two methods used for shaping—the cut-and-sewn and the full-fashioned—and sometimes both are used on the one garment.

Until recently the full-fashioned method had not been used on other than the more expensive garments; the finest and most costly sweaters and cardigans are full-fashioned throughout.

The different parts are knitted on flat machines that shape and bind-off the edges as they knit.

Full-fashioned shaping may be detected by fashion marks (similar to those on the back of a stocking) about the armholes, sleeve sides, and sometimes the neck.

Stitches that look like fashion marks but are for appearance only are sometimes found on cut-and-sewn garments.

Genuine fashion marks are indicated if the rows of knit stitches come together at an angle; in imitation "full-fashion" the rows are parallel.

Cut-and-sewn garments are cut from a flat piece of knit yardage just as garments are cut from woven fabric.

It is a less costly method and is used for less expensive articles.

If carefully cut and stitched, as in high-grade articles, the cut-and-sewn garment will hang, set, and wear well.

But if care has not been exercised in the laying out of knit yardage, placing pattern pieces, and cutting, the garment will sag and twist in the same way as a fabric garment will sag and twist if cut off-grain.

To see whether the necessary care has been taken, follow the ribs and courses of stitches.

This is more difficult on finer knits, but is worthwhile.

Careless cutting may show up anywhere in a garment so check the back, front and both sleeves.

Guide To Quality

Here are some ways of checking the workmanship of seams and joinings and seam coverings:

Serviceability and appearance of a garment are both affected by the way the parts are put together.

Full-fashioned garment seams are made by looping or overlocking, both of which are satisfactory. Looping looks like hand seaming, the edges being machine-stitched together close to the already bound-off edges.

A single ply of the garment yarn is used and the seam is fine, soft, flat, elastic and comfortable.

In overlocking, the pieces are joined with a stitch that looks like buttonhole stitch used in hand-sewing.

A single-ply is suitable if the garment yarn is used and the finished seam is small and durable, but overlocking is more noticeable and not as flat or flexible as a looped seam.

Cut-and-sewn pieces must be stitched securely and covered to prevent cut edges ravelling.

The edges are stitched and covered at the same time, making what is called a merrowed seam.

This looks much like an overlocked seam, but because of the row of stitching it is stiffer and less elastic, and more noticeable, especially if cotton thread is used for the row of stitching.

A well-made merrowed seam is one in which the covering stitches are close together.

Poorly-finished seams, where stitches may be so far apart that the raw edges come through between them, have little stretch and so the thread snaps easily.

Seam ends should be closely examined for secure fastening off.

Seam coverings are often used on the shoulder and back-of-neck seams of cut-and-sewn garments.

They prevent seams stretching out of shape and protect stitching against wear.

If straight tape is used, it should be eased on; other methods are to use a strip of knitted fabric or an overlocked stitch.

In good quality garments, neck and other bands are seamed to the garment by looping, which gives a smart, neat and elastic join.

In cheaper grade articles, overlocked seams are generally used.

These are stiff and bulky, and unless the edges are stretched as they are sewn, the stitching breaks.

Checking The Finish

Neck finish is important, as there is much strain at this point, and if the garment is stretched out of shape its appearance is spoilt.

A neck finish may be single-looped or double-looped.

A single-looped finish has one thickness of ribbing and a double-looped finish two thicknesses, the ribbing being double, with the fold on the neck edge.

The double-looped finish has less stretch but keeps a better shape.

In either case, look for a smooth, neat finish and check the stretch at the join and edge.

An elastic thread run through the edge will help hold the shape.

If the band is made separately, make sure it has been sewn on straight with the rib, or grain, of the body; check the method of finishing for smoothness, good appearance and firmness.

The band should be faced to ensure that it wears well and holds its shape.

Ribbon facing, most often used, is a neat and strong reinforcement for buttons and buttonholes, but may fade or shrink.

A knitted facing matches the garment and will react to washing in the same way as the whole garment, but it is more bulky than ribbon facing.

Make sure the band is firmly reinforced and that buttonholes are evenly spaced and the same distance from the edge of the garment.

The cut should be parallel with the grain of the knitted fabric and its reinforcement, which should be wider than the length of the buttonhole.

Buttonhole stitches should be deep enough to prevent their pulling out and close enough to cover cut edges, otherwise the buttonhole will stretch and tear, and soon look untidy.

Vertical buttonholes are not completely satisfactory on close-fitting garments as they do not stay fastened as well as horizontal ones.

Buttons should be washable, firmly stitched on, with no loose threads, and should be a satisfactory colour.

—New South Wales Department of Agriculture's "Press Notes."

Botany For Farmers

Although compiled in the first place for beekeepers, "The Honey Flora of South-Eastern Queensland" has a use for farmers and others interested in botany. It contains illustrations and descriptions of the important ironbarks, gums, bloodwoods, boxes, stringybarks, wattles, tea-trees, and cultivated plants such as lucerne, pumpkins, oranges and clover.

"The Honey Flora of South-Eastern Queensland" contains 199 pages and 178 illustrations. Prices are: In Queensland 15s. a copy, with a 3s. discount to registered apiarists, University botany students and booksellers; elsewhere £1 a copy.