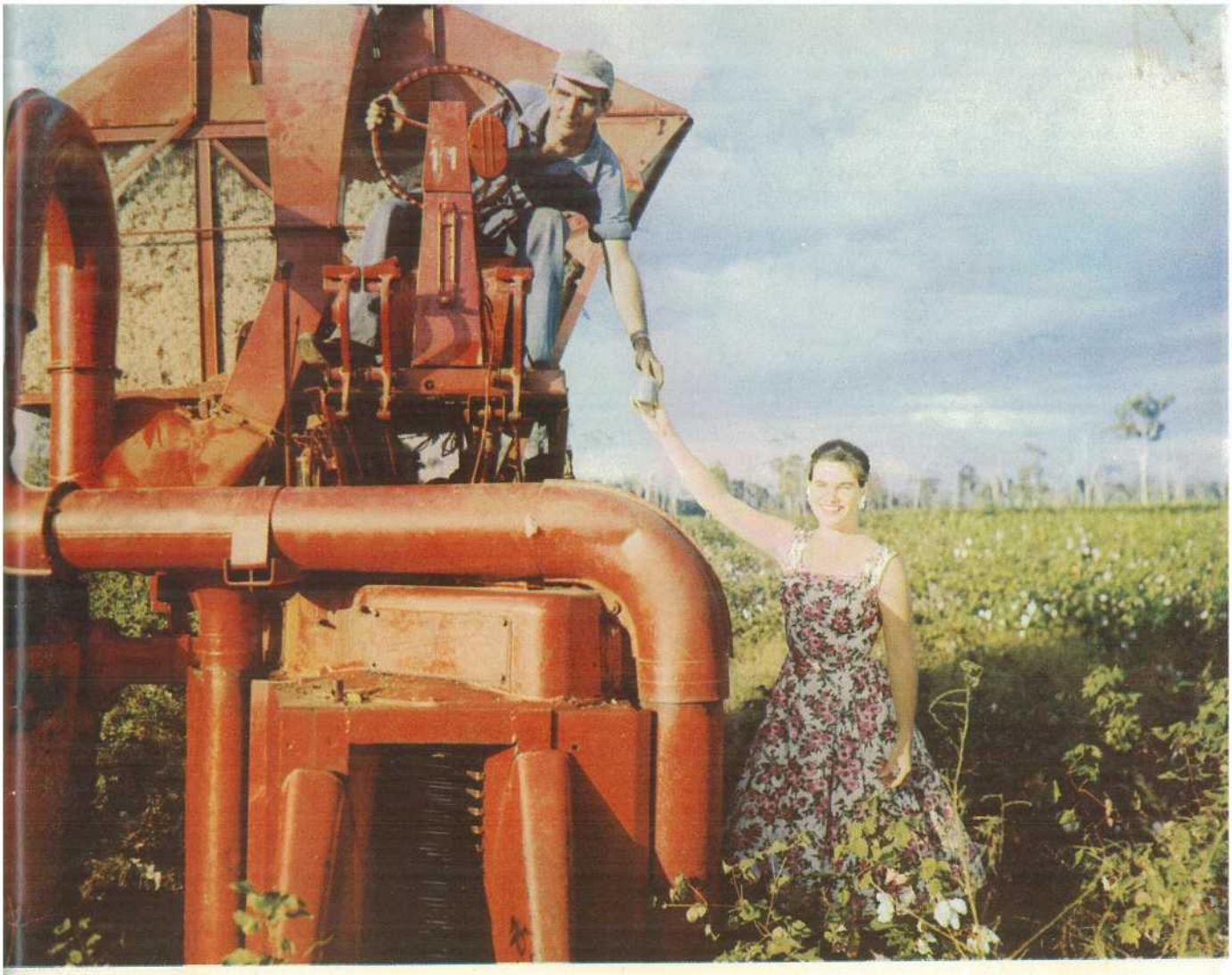

QUEENSLAND AGRICULTURAL JOURNAL

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contents

COVER PICTURE: Leader of the Biloela Junior Farmers' Club, Miss Ann Burns, hands a cup of tea to Mr. C. Allwood, driver of the mechanical cotton harvester on Mr. A. Meissner's farm at Kariboe Creek, in the Biloela district.

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Overcoming White Spear And Yabila Grass Problems

By W. J. BISSET, Agrostologist.

A system of cultivation in the case of white spear grass and judicious burning and spelling in the case of Yabila grass are ways in which the problems set up by these two grasses in the Central Highlands can be dealt with.

The native pastures of the open blacksoil downs of the Central Highlands are normally dominated by Queensland blue grass (*Dichanthium* spp.). Such pastures are highly regarded as stock feed over the summer months. In addition to the blue grass there are variable proportions of other good grasses and often considerable amounts of edible native legume species of which "Peak Downs clover" (*Glycine tomentosa*) is perhaps the best known.

Two other grasses present in these pastures are also important to the grazier but in a different way. These are white spear grass (*Aristida leptopoda*) and Yabila grass (*Panicum queenslandicum*).

Yabila grass is commonly known by various names such as star, umbrella, windmill, and blow-away grass. However, these names are rather loosely applied in western Queensland to grasses having a spreading seedhead which breaks off at the base and blows away. The name Yabila, which is considered to be a genuine local aboriginal name for this grass, is therefore preferable to these others.

Both white spear and Yabila grasses are extremely unpalatable to stock. In addition, white spear grass is a serious pest of sheep during its seeding period (summer and autumn). The seed can penetrate the wool, skin, and even the flesh.

Normally these two pest grasses are present in minor quantities only. Under certain conditions, however, they can increase considerably at the expense of blue grass until the pasture is dominated by one or the other or even both of them.

Reasons for Prevalence

A native pasture in which white spear grass and/or Yabila grass is dominant is regarded as degraded (a botanical term indicating a reversion to a more primitive type). It so happens in this case that the degraded botanical condition is reflected in reduced economic value of the pasture.

What are the causes of this degraded pasture condition?

Observations by pasture specialists over a number of years have shown that although seasonal conditions can have an important bearing the main factor underlying this degraded condition of Central Highlands blue grass pastures is wrong management.

Management.—The introduction of stock in the form of sheep to this region by the first white settlers about 1854 began a new era for these native grasslands which had previously supported only limited numbers of marsupials and birds. The pastoralists soon found that normal seasonal changes in pasture productivity raised problems in management.

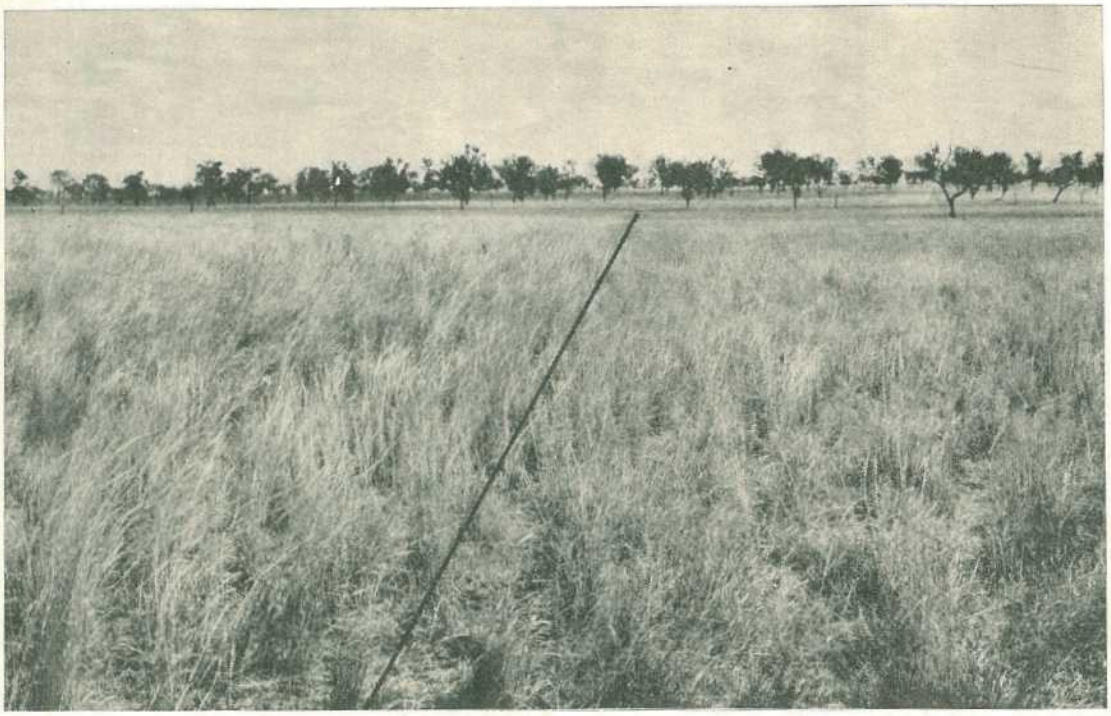


Plate 1

Effect of Cropping on a Native Pasture Dominated by White Spear Grass at Springsure. The area on the left of the black line which was ploughed and planted to grain sorghum 4 years ago, has reverted (after 1 ratoon crop) to a blue grass–dominant pasture.

During the early part of the summer growing season blue grass pastures provide an abundance of highly palatable and nutritious young growth. With the approach of maturity, however, a progressive decline in food value sets in, with the result that during the winter months the pasture has an extremely low feed value.

The early pastoralists found an apparent remedy for this seasonal deterioration in pasture quality. This was to burn strips of grass during the autumn and winter, commencing as soon as possible after the wet season. This practice had the effect of providing a readily-available young green shoot high in protein during the winter months.

From the long-term point of view, however, the method proved harmful. The sheep concentrated on the burnt strips, which altogether comprised a relatively small proportion of the paddock, thus resulting in localised overstocking. This resulted in the gradual disappearance of the better pasture species and their progressive replacement by the unpalatable pest grasses.

As the proportion of these pest grasses increased graziers burnt as early and as frequently as possible firstly in an attempt to prevent the grass from seeding, and secondly because only in the very young stages could any feed at all be got from them. This only aggravated things and they found themselves in a vicious circle.

Seasonal Conditions.—Marked irregularity of the yearly rainfall pattern is a feature of the Queensland climate and this irregularity has an important effect on the composition of the pastures.

White spear grass and Yabila grass are more drought-resistant than blue grass.

On the other hand, a feature of above-average seasons in the Central Highlands is the remarkable capacity of blue grass for re-establishing

itself from seed. Thus, the bad management practices mentioned previously as being the main cause of pasture degradation can be aggravated by drought whilst a run of good season can be a tremendous aid towards rehabilitation of the grasslands.

It is on record that the years 1930-40 were bad years in the Central Highlands, and reports from reliable sources indicate that there was a widespread decline in blue grass over this period.

The period 1947-50 saw an improvement in rainfall conditions which after a short break in 1951-52 was followed by three years (1954-56) each of approximately double the annual rainfall. It is common knowledge that the proportion of blue grass in the downs pastures improved considerably during this period.

Below-average rainfall was experienced in the area east of Springsure during the period 1957-59 and this coincided with the increase in white spear and Yabila grass in the Arcturus Downs and Orion Downs areas.

Distribution Pattern

A feature of white spear and Yabila grasses is that they can occur in pure stands or mixtures of varying proportions. It would appear that the distribution of the two species is bound up in some way with types of country. For instance, Yabila grass is commonly found in flats and hollows running back from tea-tree gullies, whilst white spear grass seems to favour the harder country as represented by bloodwood ridges. However, these are apparent exceptions to the general pattern of distribution.

History of Pasture Degradation

Pasture degradation in the Central Highlands first attracted notice in 1915. Since then it became progressively worse, and by 1938 white spear grass was regarded as second only to dingoes as a pest of sheep. The combined effect of dingoes and white spear grass caused many graziers to turn from sheep to cattle during the early 40's. Although by so doing they avoided the problem of grass seed in wool, the problem of low nutritive value of the degraded pastures remained.

Control of White Spear Grass

In 1948 the Queensland British Food Corporation became interested in large-scale farming operations in the Central Highlands, and acquired several large properties for this purpose. Some of these properties were known to have considerable areas more or less heavily infested with white spear and Yabila grasses.

The farming activities of the Queensland British Food Corporation and a few agriculturally-minded graziers demonstrated a practical remedy for white spear grass. It was found that when heavily infested areas were cropped and allowed to revert to natural pasture, the resultant pasture showed a considerable increase in blue grass at the expense of white spear grass. (See Plate 1.)

The good seasons prevailing generally since the commencement of the farming era (particularly during 1954-56) were of material assistance in this widespread improvement of native pastures, through the reduction in white spear grass and the regeneration of the blue grass.

Control of Yabila Grass

Unlike white spear grass, however, Yabila grass does not lend itself to this method of treatment. It is able to re-assert itself in the pasture that develops following cultivation, and other methods of control are necessary for this grass.

Investigations in the Central Highlands during 1959-60 have drawn attention to the remarkable capacity of blue grass seedlings to establish themselves in between the tussocks of Yabila grass. In many instances, however, the young blue grass plants were severely grazed, and even pulled out, by too early grazing, thus slowing down or preventing the rehabilitation of the degraded pastures.

Several instances in which graziers claimed an apparent increase in blue grass over Yabila grass following burning have also been investigated. It was found that, in addition to removing the accumulation of dead growth, the fire reduced the size of the Yabila tussocks considerably, thus providing more room for the young blue grass plants. Here again, however, it was only too obvious that successful blue grass regeneration depended on spelling the pasture after the burn.

Cattle as well as sheep need to be kept off the burnt area. Also, in some cases—mostly in the vicinity of scrubs—marsupials (which appear to have the same selective grazing

Plate 2

Selective Overgrazing by Cattle is Hindering Regeneration of Blue Grass in Pasture Which is Infested with Yabila Grass (large tussocks). Many of the young blue grass plants are being pulled out.

tendency as domestic animals) are important agents in preventing regeneration of blue grass. (See Plate 3.)

The Role of Burning

These grasslands have always been subject to periodic fires from lightning and from hunting activities of the aborigines. Thus, at least some burning may be regarded as a normal feature of the environment under which these pastures have developed.

Fire offers a means of overcoming the selective grazing of stock by reducing all species to a common height (in the same way that a mower is used on smaller areas). If left to grow unchecked the tussocks of Yabila, white spear and even blue grass become very large. These, together with the accumulation of several year's dry stubble, can form an effective barrier to the grazing of stock, and to the establishment of blue grass seedlings. Burning offers a cheap and effective means of overcoming this pasture condition.

Discerning graziers of the "old school" admit that burning should be done immediately after a good fall of rain. Adequate moisture and possibly damp stubble not only minimise the effect of heat on the crown of the plant and the surface of the ground but also assist the early commencement of growth.

Commendable as this rule is, however, it is only part of the correct use of burning as a factor of pasture management.

The growth which grass makes after a burn (or for that matter at the commencement of a new growing season) utilises food reserves stored in the crown and roots from the previous period of growth. These reserves can be replenished only by means of food produced by the leaves as soon as they have completed their growing phase. Grazing of these leaves as soon as they appear results in the eventual death of the plants from starvation. Thus the stocking on this new growth should be regulated to allow the development and maintenance of an adequate amount of leaf area.

Because of the fact that the major part of native grass growth is made during summer, particularly in the period December to March, a pasture burnt in summer would have a much greater prospect of quick recovery than one burnt in winter. The best time of all would be after the first substantial summer storms, but before the commencement of the wet season proper.

Pastures containing a high proportion of blue grass and burnt in early summer require only the bare minimum of spelling provided that they are not subsequently overstocked. Where the proportion of blue grass is low, however, a longer spelling period is required. Given reasonable rainfall conditions, blue grass burnt in December-January and subsequently spelled produces seed in about 8 weeks. Germination of this seed occurs after the first substantial rain. To allow the resultant seedlings to develop to the stage where they can withstand grazing, a spell of three to six months would be desirable.

In order to avoid selective overgrazing of the burnt area, this should comprise either the whole of the paddock or a portion sufficiently large to carry the stock. Where the burn is confined to a portion of the paddock, the remainder (or at least an adequate part of it) should be burnt at the next favourable opportunity to distribute the grazing over the whole of the paddock.

Introduced Pasture Species

Trials with Rhodes, buffel and green panic have been carried out at several sites on the arable lands of the Central Highlands. For ease of establishment and first year carrying capacity they have proved inferior to sudan grass, which in this area also has the advantage of persisting for at least two years. In addition, these grasses

Plate 3

Effect of Protection from Grazing on Blue Grass Regeneration Following a January Burn (Springsure). The area on the right is dominated by Yabila grass (although considerable numbers of blue grass seedlings occur between the tussocks). The rest of the paddock was burnt. Where subsequently protected from grazing (on left of fence) blue grass has become dominant. Where not protected (on right of fence) regeneration of blue grass is being prevented by selective over-grazing (in this case by marsupials).

are unable to match the colonising ability of the native blue grass, and are thus not a satisfactory answer in this area to the white spear and Yabila grass problem.

A Practical Approach

The high cropping potential of the degraded blue grass pastures which have been invaded by white spear grass and/or Yabila grass offers a practical method of improving the pastures and increasing the productivity of the land.

Summer grazing crops such as sudan grass serve the dual purpose of (1) providing alternative high quality grazing during the season when spear grass seed is troublesome and (2) enabling the beneficial burning and spelling of pastures where Yabila grass is prevalent.

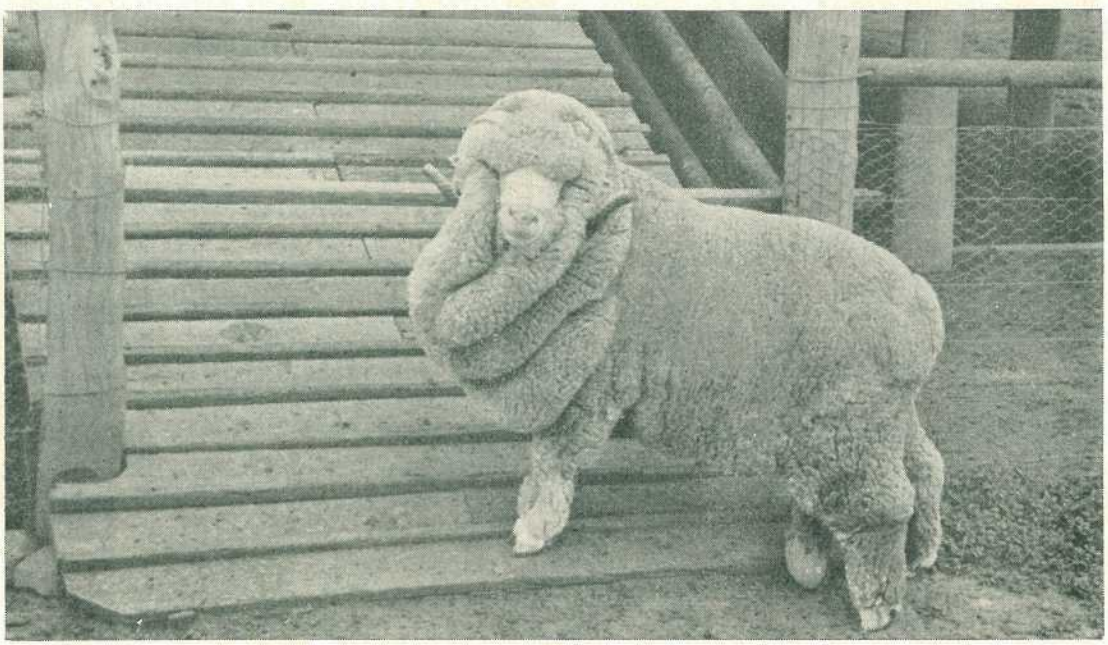
These, in combination with winter crops (grown on summer-fallowed land), and home-grown grain used during the dry spring months, will enable stock to be fed adequately on a year-round basis.

A system of shifting cultivation on a property which aims at embracing eventually the whole of the area infested by white spear grass will result in increased production and the eventual rehabilitation of the pastures.

Any areas of white spear grass which are unsuitable for cultivation because of steepness of slope or shallowness of soil could be treated in the same way as the Yabila grass areas, that is by judicious burning plus spelling.

The provision of alternative sources of fodder during the winter-spring period means that use of native pastures is mainly confined to the summer. They can thus be stocked accordingly to their summer carrying capacity. This results in a much greater use of the feed produced, and prevents the pasture from getting out of control half way through the season as is the case when they are stocked according to winter-spring capacity.

A Proud Champion



Top Stud Ram of Malvern Hills, Blackall, and Champion for 1960 at the Blackall Show.

Plate 1: **A Field of Well-Grown Cotton Ready for Picking.**

Cotton Growing In Queensland

By Officers of Agriculture Branch.

The main cotton-growing districts in this State, since the development of the industry from about 1920, have been the Callide and Dawson Valleys of central Queensland. These have been followed by the central and upper Burnett, with smaller areas sown in the south Burnett, Lockyer, Fassifern and Brisbane Valleys. More recently, however, interest has been shown in cotton growing in north Queensland. This has been particularly so on the lower Burdekin and in the Mareeba-Dimbulah area where large-scale irrigation facilities have been provided by the Tinaroo Falls dam.

On recently opened irrigation settlements at Gibbergunyah on the Dawson River near Theodore, and on the Balonne River at St. George, promising crops of cotton have been grown.

On the northern and western Darling Downs there has been some considerable expansion of cotton growing, and several large individual acreages have been planted.

The industry is at present assisted by guaranteed prices, the current guarantee by the Commonwealth Government being an average net price of 14d. a lb. of seed cotton for five years as from January 1, 1959. Cotton production data for Queensland for 1946–47 to 1958–59 are shown in Table 1.

Cotton is a very useful crop for mixed farms and could be included in the farming programme of most dairy farms in central and south-eastern Queensland. It cannot be emphasized too strongly, however, that the area under cotton should be determined by the amount of time available to attend to the crop. If correct land

TABLE 1

COTTON PRODUCTION IN QUEENSLAND 1946–47 TO 1958–59

Year	Area	Production of Seed Cotton	Yield of Seed Cotton per Acre
	Acres	Lb.	Lb.
1946–47	8,975	2,197,709	245
1947–48	6,688	2,069,740	309
1948–49	2,232	736,882	330
1949–50	2,532	1,106,919	437
1950–51	3,594	1,493,595	416
1951–52	5,397	2,156,018	399
1952–53	10,082	5,424,314	538
1953–54	8,012	3,687,865	460
1954–55	15,269	5,651,270	370
1955–56	9,717	3,929,523	405
1956–57	8,726	3,413,597	391
1957–58	9,550	4,011,166	420
1958–59	17,196	9,469,698	551

(Figures supplied by the Cotton Marketing Board)

preparation is carried out and good cultural practices followed, the risk of crop failures will be reduced and the average yield per acre over a series of seasons raised. There will be an accompanying reduction in the cost of production as compared with crops which do not receive such attention. Where the right combination of variety, soil, cultural methods and climatic conditions exist, good yields can be obtained. Over a series of years, the average yield of rain-grown cotton obtained by growers using sound cultural methods is about 700 lb. to the acre. In favourable seasons, yields of 1,200 to 1,500 and occasionally 2,000 lb. of seed cotton to the acre may be obtained. Under irrigation, regular yields in the vicinity of 1,500 lb. have been achieved over areas of 100 acres or more.

Efficient production means a steady output and a greater degree of stability in the industry. This is most important, for a wide fluctuation in the total yield from season to season increases the difficulties of financing, ginning and marketing the crop.

Climatic Requirements

Cotton is a summer-growing crop which has been planted at some time or other in most farming districts in Queensland, and it is known that good results can be achieved in them if the crop receives the correct cultural treatment.

It can be grown as an annual and as a ratoon crop, but experience has shown that ratoon crops have rarely given satisfactory results. Insect control, plant structure and growth behaviour in such crops are usually unsatisfactory and the practice of ratooning is not recommended, although in some instances good ratoon yields have been obtained.

In areas where frosts occur, and these include most cotton-growing districts, the time of planting is important. Late frosts in spring slow down germination and seedling growth while early frosts may affect the crop before all bolls have matured. Usually, a frost-free period of at least five months is considered necessary. However, a longer period is desirable as the soil takes some time to warm up after the last frosts. In the United States of America a soil temperature of 60 to 65 deg. F. at a depth of 6 in. over a four or five day period is considered necessary before it is safe to plant.

Growing cotton under rainfall conditions in areas with less than a 25 in. average annual rainfall cannot be expected to result in regular payable yields. An expectation of at least 15 in. during the growing period of the crop in south and central Queensland, that is, normally from October to March inclusive, is regarded as a reasonably safe figure.

In the northern sections of the State, particularly on the coast, the heavy rains usually experienced during January to March may be detrimental to cotton planted in early summer. This is because excessive vegetative growth of the cotton plant and difficulty in controlling weeds are encountered. However, autumn plantings are practicable in these areas as temperatures are mild and adequate for the development of the crop during winter.

Good cultural methods can do much to offset the somewhat erratic rainfall of the agricultural areas of Queensland. Early ploughing and fallowing of the land intended for the cotton crop makes possible full absorption by the soil of the late autumn, winter and spring rains. The good subsoil moisture reserves so obtained are the best insurance against periods of dry weather and are a major factor in producing payable cotton crops.

Cotton is a drought-resistant plant in that it rarely dies in a long period of adverse conditions. However, the plant must not only stay alive but must produce and hold a crop of squares, flowers and bolls. This crop may be shed readily by the

plant if stress conditions occur, ability to withstand them being dependent on the amount of moisture available. At these times land which was ploughed early to trap winter and spring rains may hold sufficient soil moisture reserves to enable the plant to overcome critical dry periods.

Soil Requirements

Provided the climatic environment is suitable, cotton will grow on most soils, but some soils are safer than others and can be expected to provide better and more consistent yields.

For rain-grown cotton, clay loams overlying clay subsoils at depths of 12 to 36 in. are the most reliable. There are many thousands of acres of this type of country in Queensland. It comprises much of the flats and lower slopes of the eucalypt forest country. Original timbers on these flats and slopes were box and both broad and narrow leaved ironbark.

Much of the brigalow scrub country is suitable, particularly where associated with belah. The heavy, dark-grey or black soils of the open plain country are also suitable although more difficult to manage. All these soils have in common the ability to retain moisture.

If early ploughing facilitates the penetration of winter and spring rains, these soils will build up a supply of subsoil moisture available to the plants in dry times.

Some of the very heavy brigalow soils, however, are badly drained and accordingly are not suitable for cotton. These heavy, unsuitable soils are usually recognised readily by a growth of whipstick brigalow or by the formation of melon holes or gilgais.

There are other soil types which can produce good yields of cotton but which are more subject to fluctuations caused by weather changes. The fertile clay loams and loams of the alluvial soils which originally grew gum or a mixture of ironbark, box, bloodwood and Moreton Bay ash are in this group. They are capable of producing good yields under favourable seasonal conditions, particularly if rotation is practised.

Probably the least suitable soils are the deep red loams of the softwood scrubs. Crops on these soils tend to make excessive vegetative growth under good rainfall conditions and suffer severely if dry conditions develop.

The deep sandy soils adjacent to streams, because of their inability to retain moisture, are also unreliable cotton soils.

Following severe losses of crop on these two soil types during dry periods, the plants frequently make excessive vegetative growth when rain does fall and generally only small yields are harvested. Under irrigation conditions, however, soil moisture can be controlled, and these sandy soils are then capable of producing good yields.

On the Burdekin, good cotton crops can be produced on the light, well-drained sandy loams of the delta. These, possessing as they do, a permeable subsoil, are more easily handled during the January to March period than the clay loams with a clay subsoil, which are much favoured elsewhere. Unfortunately, the wet season rains frequently result in plantings being late in these clay loams, because of the delay in land preparation. On the other hand, there is generally ample opportunity for establishing and cultivating early plantings on the sandy loams.

Crop Rotations

Experience on all soil types under rain-grown conditions has shown that cotton yields well for two or three seasons following pasture, but that continuous cropping will then result in declining yields. There are two main reasons for this.

The first is that the physical condition of the soil after being spelled to grass is much improved, which means that there will be better penetration of rains and retention of soil moisture. This largely rectifies the deterioration caused by several years' continuous row cropping under which the soil structure is broken down and the soil tends to pack, with the surface becoming almost impervious to water penetration.

The second reason for the decline in yields is that the chemical balance of plant foods is upset by continuous cropping.

The crops for inclusion in a rotation with cotton will, to some extent, differ with the district and the type of farming. In general, however, climatic conditions are similar in those areas where most of the State's cotton is grown, and the difference in the crops selected may not be great.

Crops commonly included in a rotation with cotton are wheat and oats for grain or grazing

as autumn and winter sowings, and maize, sorghum, Sudan grass, millets and pumpkins for summer plantings.

Leguminous crops such as lucerne, cowpeas, velvet beans and field peas should be included in the rotation but not immediately before the cotton crop where it is produced under rain-grown conditions.

A period of pasture should be included.

In dairying districts the improved grazing from pastures sown in rotation with cotton crops has resulted in higher returns from the herd. Even if the pasture is not utilized by the grower for grazing, for instance on farms where no livestock are carried, the seed or agistment may well provide a source of income. On the Burdekin, good cotton crops have been produced, with the aid of supplementary irrigation, on well-drained sandy loam delta soils in rotation with sugar-cane.

Equipment

Where the planting of areas up to about 10 acres is contemplated, the machinery usually available on most mixed farms may be used or adapted for the cotton crop. If they are not already available on the farm, however, the cost of purchasing split-wheel planters and high clearance cultivators is probably not justified for such small acreages. But for the planting of large areas, adequate equipment suited to the cotton crop's requirements should be obtained.

The first requirement is a split-wheel planter, either two or four row depending on the area to be planted. The principle of the split-wheel is that it firms the soil on either side of the drill and leaves it loose immediately above the seed.

This is important with cotton because the germinating seedling is tender and unable to force its way through a hard-packed surface crust. Compaction of the soil on either side of the drill brings the seed into closer contact with damp soil particles and also reduces loss of moisture by closing small cracks and pockets.

In some areas, combines are used for planting by blocking off some of the runs and sowing in rows 42 in. apart. On the whole, stands obtained by this means are not good, because the seed does not run freely and unless the soil is in first class condition the seedbed is left too open. Soils which do not pack hard on top can, of course, be rolled after planting but such a practice is risky on heavy soils.

Similar unsatisfactory results follow planting with high-wheel maize planters unless soil texture and moisture leave little to be desired.

The cost of split-wheel planters may be a deterrent to their purchase in a number of cases but is justified by the improved stands obtained. Four row machines are available for large areas.

Early cultivation of the seedlings is essential, consequently the implement used must be capable of accurate handling. It is an advantage to

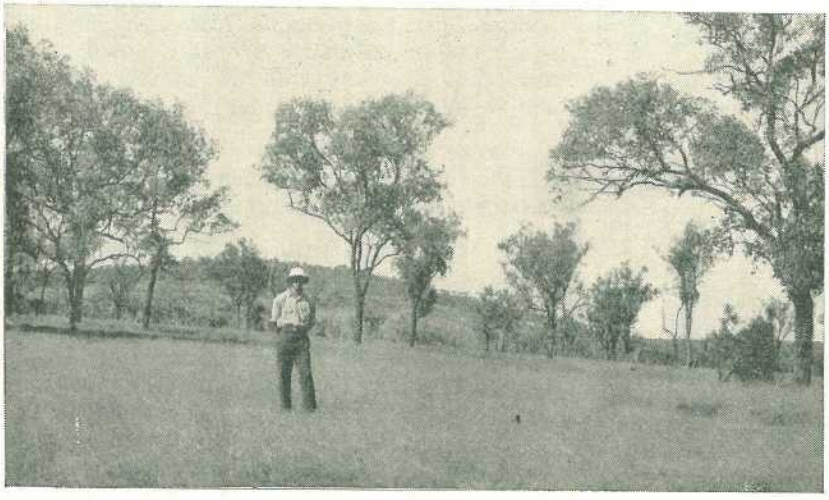


Plate 2

Grassed Open Forest near Biloela, with Ironbark Trees in Foreground.

run the tines as close as possible to the small plants without injuring them. Mid-mounted equipment is very suitable for this purpose, because the operator can observe the clearance between the tines and the plants. This enables him to make a close setting of the tines and thus obtain a satisfactory degree of weed control. Guards should be fitted to the inside tines to prevent loose soil burying the small seedlings.

Cultivation should be carried out as long as it can be done without damage to the plants and for this purpose a high-clearance tractor is essential wherever reasonably large areas of cotton are being grown. Tractor horse-power requirements vary with the area to be planted, but it is usually better to have more power than not enough. Multiple row planters and cultivators requiring considerable horse-power are essential to cover large areas quickly.

For the destruction of plant stalks, a sturdy rotary slasher is very effective, allowing complete covering of the plant material when the land is disced or ploughed.

Thinning by cross cultivation is cheaper than hand labour which is expensive and often difficult to obtain. A tined implement is preferred for this purpose, with small duck feet that are more effective than the points of spike tooth or drag harrows. By adjusting clearances between tines, allowance can be made for heavy or light stands.

Preparation of Seedbed

In seasons of good winter and spring rainfall, successful results may be obtained with indifferent methods, but over a series of years it undoubtedly pays to prepare the seedbed so as to store up the maximum possible amount of subsoil moisture. In seedbed preparation an early clean-up and ploughing are necessary, while consideration must be given to the depth and number of ploughings. Seedbeds are prepared at a different time of the year in northern coastal areas.

Early Clean-up and Ploughing.—Early ploughing for seedbed preparation, preferably during the late summer, traps the later portion of the monsoonal rains and is particularly valuable on old cultivations. Failing this, ploughing should be carried out before the June rains, or soon after, and before the moisture in the surface soil is lost.

Although the benefits to be obtained from early ploughing on old cultivations have been clearly shown, the yield differences have not been so clear-cut with new country or in the first few seasons following Rhodes grass. Even with these newer cultivations, however, it is desirable to prepare land early.

Ploughing for cotton should not be delayed until July or August, when the surface soil is often dry and hard. Good ploughing is impossible under these conditions, and in addition the subsoil may be dry to at least 2 ft. if it has been cropped previously.

It has been shown that a gain of soil moisture equivalent to at least 1 in. of rain is obtained in the upper 18 in. of soil by ploughing ahead of the June rains. Ploughing before June can seldom be done following cotton, however, and this fact lends further support to the desirability of growing cotton in rotation, particularly with crops which can be harvested in time to allow early ploughing.

General experience with ploughings made before June indicates that it is inadvisable to firm the ploughed soil into a compact seedbed until after the winter rains, especially if the soil is of a clay type. The winter rains frequently pack a firm seedbed of clay soil so hard as to necessitate cross-ploughing. However, if the ploughing done before June has been left in the rough state, the winter rains penetrate well into the subsoil and yet leave the ploughed soil in a suitable condition for the preparation in August of a satisfactory seedbed with one or two workings with the spike-tooth harrow. Occasionally on the heavier soils it will be necessary to substitute one disc harrowing and then fine the surface with a spike-tooth harrow.

If a field cannot be ploughed until after the winter rains, it is desirable to prepare the seedbed as soon as possible after the ploughing to reduce loss of moisture and also to obtain a suitable tilth in which to plant the seed. It is particularly advisable to disc or work the day's ploughing with a spike-tooth harrow right after the ploughing if the soil is moist and of a clay type containing little organic matter. A delay in carrying out these operations may result in the ploughed soil drying in a very hard, cloddy condition that will require extra working. This working might involve rolling with a cultipacker, disc-harrowing and then cross-disc harrowing, with a final spike-tooth harrowing, before even a reasonably satisfactory seedbed can be prepared.

Where cotton is to follow cotton, the rotary slasher mentioned earlier is the best implement for handling the standing stalks. However, where they are not too tall or bulky, disc cultivators can do a reasonable job of levelling and chopping up the plants. The aim is to reduce the plant residues sufficiently to allow complete incorporation in the soil by the following ploughing. The smaller the portions the easier it is to plough them under to rot in the soil. If large pieces of residue remain undecayed they can interfere with the planting and cultivation of the following crop. Flail type forage harvesters have also been used with good results for dealing with the standing stalks and other crop residues.

Depth and Number of Ploughings.—The depth and number of ploughings required vary with the soil type and climatic conditions. With the exception of the breaking-up of new cultivations, one ploughing from 5 to 6 in. seems to be suitable in most districts. Some of the heavier clay or clay loam soils tend to set very hard if much winter rainfall is experienced. On these, cross-ploughing early in the spring may be advisable to loosen up and warm the seedbed if excessive winter rains have fallen after the first ploughing.

Late cross-ploughing, however, should not be practised if it can be avoided, because soil moisture is lost, and the dry surface soil turned under by the ploughing may react against seedling growth during dry spells. Growers are also reminded that some loss of stand may be caused if they adopt the deep ploughing and cross-ploughing methods used in preparing seedbeds for potatoes, sugar-cane and some other crops. One ploughing of 5 to 6 in. has become more general for cotton, thus minimising the loss of subsoil moisture.

As with other row-cultivated summer crops, every care should be taken in preparing and cultivating land to ensure that losses of soil from erosion are kept to a minimum.

Seedbed Preparation in Northern Coastal Areas.—The discussion of seedbed preparation has been confined so far to areas south of Mackay. From there northwards, however, climatic and other conditions on the coast necessitate seedbed preparation being undertaken at quite a different season of the year.

In order to improve the chances of early planting in northern coastal areas, seedbed preparation should be commenced before the onset of the wet season rains. If the preliminary ploughing operations have been completed, only light cultivations, such as discing and harrowing, will be required to bring the soil into good tilth should a break in the weather present an opportunity for planting. It is considered undesirable, however, to work the land into a fine tilth before the rainy season, for heavy rains will then pack the soil and possibly cause erosion.

The number of ploughings required is dependent on the condition of the soil, but usually two are sufficient. The land should be turned over during the early summer, when storm rains frequently provide the opportunity to work soil that has been in a very hard dry condition. The second ploughing should usually be completed before the end of December, but in dry years it might be advisable to delay the operation until the first break in the weather after the commencement of the rainy season.

Experiments to test the value of different fertilizers have been carried out in the main cotton-growing districts on various soils where cotton has not grown satisfactorily.

Increases up to 100 lb. of seed cotton to the acre have been obtained in some seasons by the addition of nitrate of soda as a top-dressing on very poor soils and on hard, tight-textured black clays of the open plains type. On some of the older cultivated scrub soils in which the potash content is low, increases up to 80 lb. of seed cotton per acre have been obtained by applying 1 cwt. sulphate of potash per acre. These gains cannot be considered satisfactory on an economic basis.

While this has been the experience with rain-grown crops, recent trials with irrigated cotton indicate that economic increases in yield may be obtained with nitrogenous fertilizers using up to 4 cwt. of sulphate of ammonia to the acre applied in two dressings. The first dressing of 2 cwt. was applied at the commencement of flowering.

Where soils are known to be somewhat low in their phosphoric acid content, it may be advisable for cotton growers on such soils to test the value of 2 cwt. superphosphate to the acre, applied before planting. This may be

placed in the bottom of furrows 4 in. deep, after which the furrow is covered over and the seed planted along the centre.

Varieties

Of the varieties sown at the time of writing, Miller, New Mexico Acala and Empire are the most widely grown. In addition to these three main varieties, Triumph and Rowden are also grown to some extent.

Miller.—Of the main varieties, Miller occupies by far the largest acreage and over a wide range of soils can be considered the most reliable cotton for central and southern Queensland. It does well either as a rain-grown or irrigated crop and is easy to pick both by hand and mechanically. The plant produces lint of medium staple and good quality of a type suitable for Australian spinners' requirements. Several strains of this variety have been developed and, of these, Miller 43.9.0 is the most popular.

New Mexico Acala.—New Mexico Acala is another big boll, medium-stapled cotton which is somewhat faster in maturing than Miller. It produces a good quality lint of a very uniform character. This variety does not appear to possess the drought-resistance of Miller but it does well under irrigation. On fertile soils with ample moisture it tends to make rank growth and under these conditions is not suitable for mechanical picking.

Empire.—One of the more recent introductions from the United States is Empire, which differs in lint qualities from the other big boll types, such as Miller and New Mexico Acala, in that it produces a much finer, longer lint. It forms a medium-sized, compact bush, possesses the advantage of quick maturity and develops a large proportion of its yield for the first pick. This variety, because of its long fine lint, presents difficulties in the removal of trash in the lint cleaning processes. This difficulty will probably be overcome to a large extent when the new ginning and cleaning equipment ordered by the Cotton Marketing Board is installed in the ginneries. Until this eventuates, hand picking of Empire cotton is recommended. If this variety is planted under rain-grown conditions, poor moisture retaining soils such as deep sandy loams should be avoided.

Triumph.—Triumph is a quick-maturing, high-yielding, medium-stapled variety, producing smaller bolls than Miller and New Mexico Acala. It is particularly suitable for the more fertile alluvial soils, and is also the most suitable variety for softwood scrub soils although these soils are not recommended for cotton growing as a rule. Because of its ability to set a crop quickly Triumph is able to recover from a setback and form a crop where other varieties fail. It is regarded as a suitable variety for northern coastal cotton growing areas, including the Burdekin, where so far it has given results superior to those obtained from the Miller variety.

Rowden.—The other lesser grown variety, Rowden, which is similar in many respects to Miller, tends to make excessive vegetative growth on fertile soils.

Other Varieties.—A number of other varieties, while producing high yields of good quality cotton on fertile soils under supplementary irrigation, are not suitable for rain-grown conditions. These include Delta and Pinelands, and several strains of Acala and Stoneville. Another six varieties are under test in various districts and a number of these are showing promise.

Choice of Variety

In choosing a cotton variety, the following points should be considered:

A. *Temperature.*—Quick-maturing varieties are preferable in colder districts such as the eastern Darling Downs where growing seasons are shorter than elsewhere in the cotton-growing country.

B. *Rainfall.*—A comparatively drought-resistant variety such as Miller may produce a good yield on marginal rainfall areas on which New Mexico Acala or Empire might fail.

C. *Soils.*—Crops on fertile alluvials may be rank in growth if a variety such as Rowden is chosen, whereas Empire or Triumph would do quite well on them.

D. *Method of picking.*—A long-staple variety such as Empire could produce a higher yield than Miller but give a lower return financially if the lint has to be downgraded because of excessive trash when machine picked.

Pure Seed Supplies

The responsibility for developing supplies of seed of suitable varieties of cotton for the different districts of the State is vested in the

Department of Agriculture and Stock through legislation, passed with the approval of the representatives of the growers.

The aim of the Department has been to organise the districts on the basis of one-variety communities. This is being attempted in all cotton-growing countries, for it has been demonstrated that it is not only advantageous in maintaining the purity of a variety, but also in developing sound cultural practices and in marketing the crop.

Plate 3

Four-Row Split-Wheel Planter.

Nowadays the demand is for cottons ranging from $\frac{7}{8}$ to $1\frac{1}{8}$ in. and the Queensland industry is devoted entirely to growing varieties which produce this staple length of cotton. Varieties of this class show a marked preference for definite soil types and climatic conditions.

Unfortunately, any variety of cotton will deteriorate rather rapidly unless the purity of the type is maintained by carefully conducted breeding operations. It is necessary, therefore, to operate a system of seed replacement in every variety grown, whereby, in each season, pure stocks can be made available for distribution. The system which has been developed in Queensland aims at sending to the oil mill each season all seed that is in more than the fourth year of multiplication after being released for general distribution. By this method it is hoped to maintain a high standard of quality in each variety.

Planting the Crop

When planting the crop, consideration has to be given to the time, method and depth of planting, to the spacing and length of the rows and to the rate of planting.

Time of Planting.—Planting should be carried out as soon as conditions in the spring are favourable for obtaining and maintaining a good strike. On old cultivations of fertile alluvial loams and clay loams, and on the average of the scrub soils, the best results over a series of seasons have been obtained from plantings made during late September and the first half of October in the central district, and during the latter half of October in the south-eastern districts. On old cultivations on the heavier clay loam soils, plantings up to mid-November can be made with good prospects of obtaining profitable yields, but this should be considered the latest possible planting date on the Darling Downs. Plantings can be made later on new cultivations on all soil types even as late as early December in districts south of Mackay, except on the Darling Downs.

No advantage appears to be obtained by planting in August or early in September, even if moisture conditions are favourable. The low soil temperatures then prevailing retard germination and during the following few weeks rains may chill the young seedlings so much that usually early October plantings catch up with them, and often give a much better stand. In some seasons a very heavy loss of terminals occurs in early September plantings through insect attacks, while later plantings suffer much less damage.

Plantings in northern coastal areas, as indicated earlier, are usually made after the wet season in March and April.

Method of Planting.—Several methods of planting cotton seed are used in this State, all of which are satisfactory when favourable con-

ditions exist. In most districts the best result will be obtained by waiting until a good planting rain occurs, harrowing to make a loose mulch, and then planting with a split-wheel type of planter equipped with disc openers (Plate 3). The harrowing not only warms the soil and thus hastens germination, but also checks an early growth of grass and weed seedlings. This latter point is important because it assists materially in reducing the cost of cultivation. The harrowing before planting is particularly necessary when cotton follows Rhodes grass, for if it is not done, the grass seedlings germinate with the cotton and hand-chipping is soon required.

Growers planting large acreages of cotton are faced with the problem of getting their crops sown so that they will obtain the fullest benefit from the spring rains. As these seldom occur in more than 2-in. storms, and are often lighter, it is frequently impossible to get the intended acreage planted on the one storm unless considerable equipment is available.

Some growers therefore plant all their acreage in the dry soil prior to the spring rains. Others plant half in the dry and half following the first good rains, while others plant as much as the soil moisture will allow following the first rain, and then wait for further rains to complete their plantings. The last mentioned system is preferable in some respects, for it distributes subsequent operations over a longer period and spreads the labour demand more evenly. The spring rainfall is most uncertain, however, and it is advisable to take full advantage of the rains when they come. The system of planting a portion of the acreage in the dry and the rest after good rains therefore has much to commend it.

The proportions decided on depend to a large extent on the equipment available. Usually sufficient rain falls to allow planting for at least three days under satisfactory soil moisture conditions for seed germination. By planting in the dry soil all but the acreage that can be handled in three days, it is possible to obtain a satisfactory strike over a large acreage from the one rain. The dry planting should be harrowed as quickly as possible after the rain in order to eliminate weed and grass seedling growth. Cotton seed will germinate quickly in late October and in November. Hence any delay in harrowing at this time may result in the destruction of some of the cotton seedlings when the operation is actually undertaken.

Dry planting is attended with certain risks for, in some seasons, much loss of seed is experienced through the spring showers being just heavy enough to germinate the seed, and, should there be no following storms to establish the seedlings, the stand is lost. Again, in wet springs, severe crusting of heavy soils occurs, and in dry-planted areas, even if harrowing is done, the strike may be poor or even a complete failure. The problem is a difficult one, and the general district experience for each soil type must be taken into account by the grower before deciding just what to do.

Some growers of small acreages who have maize planters which are unsuitable for planting cotton seed that has not been delinted, have adopted the practice of opening shallow furrows, sowing the seed by hand, and then covering it by using either a harrow or scuffler. This planting system unfortunately results in loss of soil moisture and undoes some of the benefit obtained from early preparation of the seedbed.

As an alternative it is suggested that delinted seed be used, and that, where an ordinary one- or two-row maize planter is available, the plates be modified to make them suitable for planting cotton seed. This can be done by enlarging the holes in the six-holed plates and adjusting the gears to allow the proper seeding rate.

Depth of Planting.—The correct depth of planting under most conditions varies between 1½ and 2 in., depending on the conditions of the seedbed, the amount of moisture in the surface soil, and the method of planting. The main objective is to get a good stand as quickly as possible.

This requires planting the seeds just deeply enough to have sufficient moisture to germinate them, but without the soil drying out before the young roots penetrate into the moist subsoil. For most soils under average conditions, a depth of about 2 in. in moist, firm soil will allow a good germination. This is especially true if a split-wheel type of planter is used.

Where the seed is covered by scrapers, or by scufflers if planted in shallow furrows, 2½ in. will probably be a better planting depth. The soil is not compacted under these conditions and

there is a danger of moisture being lost before germination occurs, particularly if drying winds are experienced.

If plantings are made at a depth greater than 2½ in. there is always a danger of the seed rotting in a cold, wet spring. In a dry spring, while germinations may be obtained, the seedlings are frequently so long in coming through the surface that they are thin and spindly and of a pale, yellowish colour rather than the usual healthy green. Such weakened seedlings are susceptible to attack by disease if wet weather is experienced subsequently, and may wither if hot, dry winds prevail for any length of time. Growers should therefore take care not to plant too deeply.

Row Spacing and Planting Rates.—A spacing of 3 ft. 6 in. between the rows has become the standard during the last few years, this spacing being suitable for machine harvesting. The retention of the older 4 ft. 6 in. spacing would result in the left hand wheel of the mechanical picker running down the unpicked row of plants and causing serious damage. Most tractors and implements can be set to operate at the standard spacing.

Plant spacing in the rows is not so standardised as spacing between the rows. The cotton plant adjusts itself to different distances within reason but gaps of several feet in the rows mean loss of production because the plants cannot make up for such wide spacing. The first essential is to achieve a uniform stand of plants and therefore planting rates should not be kept below the level necessary to achieve this objective.

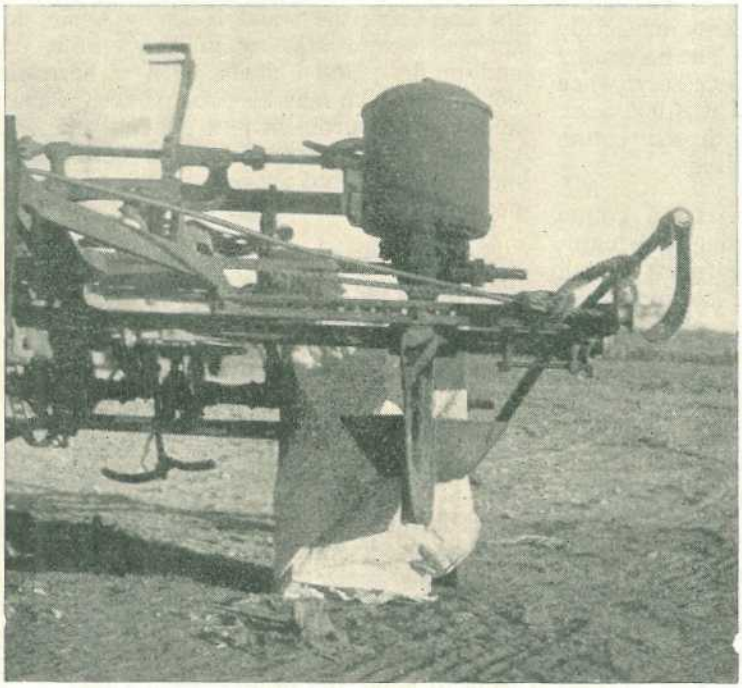


Plate 4

Attachment of "Moisture-Seeking" Equipment to a Cotton Planter. Two plates or wings are attached to a planting boot about 2 in. above its base. These wings remove the dry surface soil from the line of the planting row, and enable the seed to be planted at the correct depth below the base of the furrow thus made.

The cotton seedling is fragile and before it emerges from the ground and for a few days following emergence it may have to survive many hazards. Hence it is considered that, under good conditions, 60 per cent. of the seed planted may develop into healthy seedlings, this percentage thus requiring 15 lb. of average size seed to be sown to the acre to produce a stand of three plants for every foot of row.

On heavy clay soils it may be necessary to plant as much as 20 lb. to the acre to achieve this density of plant population.

Under ideal conditions, with supplementary irrigation, a regular stand of three plants to the foot may be adequately maintained and accordingly may not require thinning. On the other

hand, however, under rain-grown conditions close spacing such as this can result in the plants suffering from moisture shortage in dry periods or on sandy soils, and thinning may accordingly be necessary.

However, another factor has to be considered if the crop is to be mechanically picked. Close spacing forces the plants to set the lowest bolls higher up on the plant, which is an advantage in such picking as it ensures that the bottom bolls are not missed by the picker.

A compromise must therefore be made and for hand-picking the plants may be from 9 to 12 in. apart in the rows whereas for mechanical picking they may be as close as 6 in. These recommendations may require some modification to suit various soil types and it is a good plan for the grower to compare several spacings in order to ascertain the best distances for his own conditions.

The use of delinted seed is recommended for all plantings except in dry soil, because not only is there a more even distribution of the seed in the row, but in addition germination is more rapid.

It is not recommended that delinted seed be sown in dry plantings, for, owing to its ability to absorb moisture better than the seed that is not delinted, light showers will start its germination. If sufficient rain to complete the strike does not fall the seed will rot, whereas seed that is not delinted may be unaffected.

Length of Rows.—Experiments have failed to demonstrate that there is any advantage to be gained by planting in any particular direction other than that dictated by the topography of the paddock. It is important, however, that the rows be as long as is reasonably practicable. This is desirable to reduce loss of time in turning the cultivator at the end of the rows, and also for the operation of any mechanical picker used. The mechanical picker, owing to its size and difficult manipulation requires long rows to maintain efficiency of picking. On slopes where efficient soil conservation methods have been introduced it is necessary to plant the rows on the contour to reduce the loss of soil to a minimum.

Sowing in Northern Coastal Areas.—The planting depth, as already emphasised, is particularly important and largely determines the success or failure of the strike. Accordingly it is generally recommended that the seed be sown in moist soil at a depth of 1½ to 2 in. Land preparation in northern coastal areas (such as the Burdekin) after the cessation of the summer rains, however, dries out the surface soil, and unless the moisture is replenished by rain or irrigation, difficulty will be experienced in obtaining a satisfactory strike. Insufficient moisture in the surface soil has been responsible for strike failures on the lower Burdekin in past years. At the commencement of planting it is therefore advisable to uncover a few seeds to ensure that they are being placed at the required depth.

It is also suggested that if the surface soil is dry while good moisture exists below the 2 in. level, moisture-seeking equipment be attached to the planter or tractor for the purpose of removing the dry surface soil from the line of the row. This, in effect, means that the seed is planted at the usual depth of 1½ to 2 in. in moist soil under the base of a shallow furrow, thus obviating the necessity of applying a pre-planting irrigation.

The planters in common use can be equipped quite easily with plates or wings bolted or riveted to the planting boot for the purpose of pushing the dry soil surface aside (Plate 4). If the bases of the plates are placed 1½ to 2 in. above the bottom of the boot the correct cover will be obtained irrespective of the depth at which the planter is set. In an emergency, furrowing equipment of a type that will provide small shallow furrows may be attached to the tractor directly in front of the planter wheels.

[TO BE CONTINUED]

pasture and crop

Tropical Maize Rust.—A severe type of rust attacked maize crops on the Atherton Tableland last year, and has appeared again this season. It is a new disease which has been identified as tropical maize rust, and is much more serious than the rust which has been present in Queensland maize crops for many years.

Rust spores are carried long distances on the prevailing winds, and in recent years tropical rust has spread from Africa round the Indian Ocean to South East Asia and now to Australia. The disease is favoured by prolonged warm, moist weather and can be expected to cause losses in susceptible varieties during wet seasons, particularly in the northern districts.

The only practical approach to diseases of this kind is the production of resistant varieties. Maize crops on the Atherton Tableland are being watched closely for evidence of resistance in the common varieties and hybrids. Resistant material is also being obtained from Africa by plant breeders at Gatton College for use in the hybrid maize breeding programme.

—B. L. OXENHAM, Senior Pathologist.

Air Conditioning.—Before the pilot and the astronaut are exposed to the hazards of air or outer space, it is only reasonable that they should undergo controlled tests, to determine their suitability and their chances of survival.

Our crop plants too must face severe hazards —extremes of heat and cold, rain, drought and driving winds. When breeding a new variety, the plant breeder must consider these hazards. Unfortunately, as long as he must depend entirely on the weather to provide his test conditions, he may have to wait several years before they turn up. Years of delay and wasted effort.

However, it's now possible to provide test conditions at will. Environmental chambers, air-conditioned and light-controlled are common overseas. Their value is now recognized in this country too, and similar facilities are being developed.

—H. M. GROSZMANN, Senior Plant Breeder.

Trace Elements.—The chemical elements nitrogen, phosphorus and potassium are required by plants in relatively large amounts, with calcium and magnesium needed to a lesser extent. No less important are the trace elements, so named because, although they are essential for plant growth, they must be present in only small or "trace" amounts.

Most people have heard of the experience in the south-east corner of South Australia where it was found that application of the trace elements copper and zinc, in addition to normal fertilizers, raised the productivity of that area.

The main trace elements concerned in plant growth are molybdenum, boron, iron, manganese, copper, zinc and sulphur. Deficiencies in these elements are frequently indicated by the abnormal shape or colouring of the leaves. If you suspect a trace element deficiency, contact your local Adviser in Agriculture.

When applying trace elements to a soil, it must be stressed that it is very easy to convert a deficiency into a toxicity, and the heavy hand should be avoided.

—B. J. CRACK, Soil Technologist.

Agricultural Chemicals.—All agricultural chemicals sold in Queensland are registered with the Standards Branch of the Department of Agriculture. Before registration the preparations

are carefully checked and they will perform the functions claimed on their labels. However, registration should not be considered as departmental recommendation. The Department will give you advice on any pest or disease control problem you submit.

We are going through a period in which many new agricultural chemicals are available. Before you try something new, give the matter careful consideration. If the chemical you are using at present is satisfactory in all respects, why change? Look for some outstanding advantage in the new material and find out if it has been well tried. A non-poisonous preparation is safe to use, safe for children, stock and for the consumer of your produce.

—N. D. IRWIN, Registration Officer.

Marketing Cotton.—The procedure for marketing Queensland's cotton crop is somewhat unique among our primary products. The knitting and weaving portion of the crop, that is the higher grades, is virtually assured of disposal to Australian cotton spinners at import parity prices. Spinners are permitted to import the balance of their raw cotton requirements duty free *provided* they undertake to purchase this portion of the Queensland crop.

However, this assured market does not apply to the lower grades, the disposal of which is purely dependent on the requirements of cordage and bedding manufacturers.

Besides a virtually guaranteed market for a large portion of their crop, Queensland cotton growers also have the advantage of a guaranteed price. If realisations from the sale of the crop fall short of the guaranteed average price over the whole crop, the deficiency is made good by the Commonwealth Government.

—K. CHESTER, Marketing Officer.

Give Lucerne a Chance.—Farmers who regularly rely on lucerne to pull them through a dry spell need no reminding that planting skill greatly influences the success of their stand.

It is only commonsense to give the crop every chance. And to get a sturdy, vigorous stand, a few planting points must be observed:

Your first care will be to select the right variety, and here you can't do better than Hunter River Broadleaf. Experience has shown that this is the best commercial variety in Queensland. The seed should be of good quality and have a high germination. Before planting, it should be inoculated with a strain of nitrogen-fixing bacteria. The Department supplies inoculum free of charge; all you have to do is to write for it, giving the name of the crop and the quantity of seed you'll be planting.

Lucerne seed must be planted in well-prepared land. The final seedbed should be of fine, compact tilth, and shallow. The recommended planting time is now.

The most satisfactory method of planting lucerne is through a seed drill, using a lucerne box if you have one. If you have to sow through a standard combine, a sawdust filler will be needed to get a suitable planting rate.

With a combine, the planting rate is 10 lb. of seed to the acre. If broadcasting by machine, the sowing rate is about 11 lb., but if broadcasting by hand you may have to use up to 14 lb. an acre to avoid a patchy strike. In districts with an annual rainfall below 25 in., row plantings using as little as 1 lb. of seed to the acre have been successful for grazing stands.

Whatever planting method is employed, shallow planting ½ in. to 1 in. deep is the rule. On self-mulching soils, deeper planting about 1½ in. to 2 in. is suggested.

Remember to use a "mother" crop of oats or wheat, sown at 15 to 20 lb. an acre, no more. The mother crop will help to keep down annual weeds and to protect the young lucerne from heavy frosts. But handle the mother crop to suit the lucerne, not the reverse.

—V. J. WAGNER, Chief Agronomist.

Buffel Seed Harvester.—The only catch in growing your own buffel grass seed is the difficulty in harvesting it. But now, mainly through the efforts of farmers and graziers themselves, this difficulty has been largely overcome.

Laborious and slow hand plucking is on the way out. Although this method does have the advantage of producing good quality seed, it cannot compete with faster mechanical means.

One simple, but very effective, buffel seed harvester has been developed by Messrs. Kirby Brothers, of Bullindgie, Dirranbandi. This machine consists of a metal-bottomed gauze box which is attached to the front bumper-bar of a utility truck. The use of gauze on the top and sides of the box eliminates eddy currents that would otherwise disturb the harvested seed and cause some to escape. The front of the gathering box is covered with rabbit netting and horizontal wires.

The utility is driven through the mature seed crop at 4 to 6 m.p.h. The usual harvesting procedure consists of two runs over the crop at fortnightly intervals. Together, these give a seed yield of 20 to 30 lb. to the acre. Harvested seed is later screened through bird netting to remove straw and grasshoppers. The cost of harvesting seed by this method has been worked out at 8d. to 1s. a lb. Other machines will harvest more seed per acre but this is probably the simplest to construct.

You can build this simple buffel grass seed harvester in your farm workshop. Plans are available free from the Department's head office, William Street, Brisbane.

—S. MARRIOTT,
Assistant Director of Agriculture.

Makarikari Grass For Downs

Makarikari grass, a little-known but promising African pasture plant, has given encouraging results under grazing on the Darling Downs. Observations on a seven-year-old stand on a dairy farm at Pinelands point to its palatability, cold tolerance and quick response to rain.

The Minister for Agriculture and Forestry (Hon. O. O. Madsen, M.L.A.) said that the report on its performance under farm conditions in Queensland was based on a two-acre planting. This was laid down in February, 1953, under the supervision of Mr. R. G. Wilson, Adviser in Agriculture at Toowoomba. Runners and root divisions from the Department's Toowoomba pasture nursery were set out by hand in plough furrows spaced 3 ft. apart.

Mr. Wilson's report on the plot says that after seven years' experience, the landholder rates Makarikari grass as the best pasture plant on his property. He points out that it is more palatable than green panic, Gayndah buffel and lucerne, and he has had to fence the area to prevent overgrazing. Frosts cut back the top growth, but the stock still eat it. In only a moderate season, the grass will grow 5 ft. tall, but the stock will eat it back to the butts.

The report adds that Makarikari grass could be an asset to any dairy pasture improvement programme on the Darling Downs.

Mr. Madsen said pasture research workers in the Department see a future for Makarikari grass if certain establishment problems are overcome. They believe it could make a contribution by improving the winter feed in sub-tropical Queensland. Although Makarikari grass makes its main growth in summer, it is one of several promising summer grasses that have some cold tolerance. In the winter when feed is scarce, Makarikari grass is superior to buffel, Rhodes grass and some other species.

Shortage of seed is at present hindering wider testing. The grass flowers over a period of several weeks and the seeds fall as soon as they are ripe. Research workers are aiming to keep the seeds on the plant until all or most of them are ripe.

Another possible means of mechanising planting so the grass can be established in big areas involves using a modified Bermuda spring planter to plant runners and root sections. For a grass of such promise, investigations with this machine could be worthwhile.

Guides To Beef Cattle Breeding

By G. I. ALEXANDER, Senior Husbandry Officer.

This article will give some idea of the underlying mechanisms in animal breeding which cause us to make the recommendations we do.

As you probably know, each individual receives half his inheritance from the male parent through the sperm and half from the female parent through the egg. When the sperm fertilizes the egg, then the individual has its complement of hereditary factors. These factors are called "genes" and occur in pairs, one from each parent. During successive generations, these factors get more or less mixed up so that the offspring of a parent do not look like either parent in every characteristic.

Most of the characteristics of economic importance in livestock are controlled by a large number of genes whereas factors such as colour and polledness are controlled by only a very few genes.

Another point of difference between the easily recognised characters such as colour and the characters which are important economically such as growth rate is that these latter characters are modified by the environment. That means that a red animal is a red animal in Queensland or Tasmania whereas a beast may grow well in Tasmania and not in Queensland or vice versa.

This makes it more difficult to select animals for economic characters than for things such as colour or polledness.

Heritability

However, there are ways of knowing how to select animals for performance. One aid in the selection of an animal for a certain characteristic is to know the *heritability* of that characteristic.

Heritability may be best described by an illustration. Say we were to use a bull which grew at the rate of 4 lb. per day on a group of cows which had gained at the rate of 1 lb. per day. Then, if growth rate were completely inherited, we would expect the offspring to grow at the rate of 2·5 lb. per day or exactly half-way between the male and female parent. In actual fact, this never happens. What we find is that the offspring will average about 2 lb. per day. Then the offspring can be said to perform at 1/1·5 or ⅔ of the level that they were expected.

If you convert this to a percentage, they only performed at 66 per cent. of their expected level. Thus the heritability of the growth rate in this hypothetical case is 66 per cent.

Heritability estimates vary considerably from place to place and depending upon such factors as the severity of the climate and pasture conditions, the degree of selection in a herd (or how highly improved the herd is), and the breed or breed-crosses being examined.

However, we can average out all these different heritabilities and arrive at a working guide for a breeder.

Now that we have the heritability estimates of these characters, how shall we use them to decide what to do?

Geneticists have found that traits with heritabilities above 30 per cent. can be as efficiently selected for in the individual as by a progeny

TABLE 1

HERITABILITY ESTIMATES FOR BEEF CATTLE CHARACTERS

Character	No. of Estimates	Average of Estimates	Range of Estimates
		Per cent.	Per cent.
Production Factors—			
Calving interval ..	3	8	0–15
Birth weight ..	15	41	11–100
Weaning weight ..	26	30	—13–100
Cow maternal ability	2	40	19–60
Post-weaning feed-lot gain.. ..	13	45	19–70
Post-weaning pasture gain ..	6	30	9–43
Efficiency of feed-lot gain.. ..	4	39	3–75
Carcass Traits—			
Dressing percentage ..	2	71	69–73
Carcass grade ..	5	34	—30–84
Rib eye area ..	3	69	69–72
Tenderness ..	2	61	41–82
Conformation Grades—			
Weaning	16	26	0–53
Slaughter ..	5	39	—13–63
Cancer Eye Susceptibility	2	32	23–41

test. This means that we can select bulls for their ability to get rapidly growing calves either by selecting them on their own growth rate or that of their calves.

If the heritability of growth rate were 66 per cent. as we worked out in our example earlier, then we can select the bull himself on his own growth rate and this will give us a good guide to the performance of his offspring.

Looking at the table now with the actual quoted heritabilities, we can see that all the characteristics quoted with the exception of calving interval have heritabilities in excess of 30. Thus they can all be selected for on the individual's own performance.

However, of course, carcass characteristics can only be evaluated in a bull's offspring since it is impractical to slaughter a bull to decide on his own carcass quality. Some day when semen can be easily stored for a long time this may even be possible.

Number of Characters to Select

If we wish to select only one character with a high heritability, then progress will be relatively rapid. However, if we wish to select more than one character, then the rate of improvement we can make in the herd is reduced proportionally. Thus it is important to keep the number of characters that you want to select at an absolute minimum and that the characters selected for are of the greatest economic importance.

What Goal to Aim For

If a breeder has in mind today one selection objective and then five years later he changes his mind and selects for some other type, then he will never make very much progress. It is important to decide upon a certain clear-cut objective and then select towards that objective without taking notice of fads and fashions. I feel that a commonsense objective for a beef breeder is to select stock which will produce as much edible meat as possible in as short a time as possible.

What Foundation Stock to Use

Selection will not create new genes nor cause genes to change. Therefore, it is important to commence your programme with as good foundation stock as possible. One of the principles in the foundation of new breeds has been to establish it on line crosses, strain crosses, or breed crosses. These provide sufficient genetic variation to give a good chance of rapid improvement.

Size of the Herd

The size of the herd is important for a man who is going to try to improve his stock. It is important to have a herd of sufficient size so that a mistake in the selection of a bull will not adversely affect the progress. If sufficient bulls are used and replaced rapidly then the rate of genetic improvement is greatest since we do not allow any one individual to play too great a role but rely on the average performance of bulls selected to lift the herd. If we wait until we strike the odd outstanding individual bull, then we may wait forever, so that it is preferable that we concentrate on a rapid turnover of bulls.

In order to do this, a herd size of about 100 head is the minimum to use so that three or four bulls are used at a time in any one season.

These points are only a few which should be considered. They represent some of the more significant points which a breeder of beef cattle must consider fully and which commercial men should be aware of when deciding where to purchase an animal.

Tobacco Pests Controlled In Seedbed And Field

By W. A. SMITH and G. W. SAUNDERS, Entomologists.

Queensland tobacco growers have to contend with pests which attack the roots, stems and leaves of the growing plants. Some of these pests are present on most farms every year and even on new farms it is almost impossible to grow a payable crop without the use of suitable control measures.

The following programmes outline routine preventive practices for seedbeds and early crop growth in the field, and indicate where observations should be used to regulate later treatments:

In the Seedbed

Prepare the seedbed site early and eliminate as many weeds as possible.

Before planting, sterilize the beds and paths by firing or fumigating to ensure nematode-free transplants.

After planting, spread a layer of medium grade river sand to a depth of one-eighth of an inch on the beds as a protection against seed-harvesting ants.

At the time of seedling emergence, search the beds closely for activity of leaf-harvesting ants. If this is evident spray the beds and paths lightly with endrin or dieldrin, and give the nests additional spray.

Two weeks after germination, or earlier if necessary, make light sprayings weekly with either endrin or dieldrin. The spray should be directed horizontally from each side and applied after the last watering for the day.

A day before lifting for transfer to the field, give the seedlings a thorough spraying with either endrin or dieldrin.

In the Field

Prepare the fields early to eliminate weeds and to obtain a good tilth.

To control nematodes, fumigate the soil with either EDB or DD at least three weeks before planting out.

For three weeks after transplanting, make weekly applications of a combined spray of either endrin and DDT or dieldrin and DDT.

Later spraying should be timed by observations on the presence of young stages of the pests. Applications of endrin at approximately 10-day intervals should prove sufficient if looper is present. DDT at weekly intervals is required while budworm is active; the DDT should be combined with endrin if looper also is present.

Crops planted for autumn picking should be given the early routine protection. Subsequent insecticide requirements are usually much less than those for fields harvested during the summer.

In south-western districts, jassids are kept in check by the routine spray applications while mites may be controlled during periods of activity by fortnightly applications of kelthane.

Nematodes must be considered early. Where soil working can be done carefully during the early life of the crop, the fumigant may be applied in rows 6 in. on each side of the intended planting line. Application in rows 1 ft. apart over

the whole field, however, permits maximum lateral working of the soil. The double row treatment requires 10 gall. of fumigant to the acre, the complete treatment 20 gall. In each case the depth of application should be 6 to 9 in.

During recent seasons, leaf-miner activity has been high on some farms, and difficulties have been experienced in dealing with the pest in these proportions. Insecticide trials have been carried through with a range of new materials. The most promising of these is WL1650, a close relative of endrin. This material killed leaf-miner more quickly than standard recommendations but information in respect to other pests is incomplete. WL1650, therefore, may be of special value as a spot treatment for leaf-miner control should high activity be suspected or evident. It can be combined with DDT, endrin or dieldrin as required if other pests are present.

Either endrin or dieldrin will control the looper, leaf-miner, stem borer and cluster-caterpillar, but neither gives sufficient control of budworm. DDT will control budworm and also the other leaf and stem pests except the looper. WL1650 will control leaf-miner.

Weekly applications may be required to control heavy and persistent infestations of leaf pests. On no account, however, should it be necessary, nor is it advisable, to apply insecticides to tobacco more often than weekly, or at strengths greater than recommended.

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 only by using sufficient volume of insecticide, and paying particular attention to nozzle placement.

When budworm is prevalent the spray treatments, whether with DDT alone or as a combined spray, should be applied to protect the plant hearts. If this pest only is active, more rapid and economic protection can be obtained by confining the DDT to the upper portions of the plants.

Insecticides in emulsion form and spray strengths recommended are:

(1) Endrin, 0·05 per cent. active ingredient.

(2) Dieldrin, 0·05 per cent. active ingredient.

(3) DDT, 0·1 per cent. active ingredient.

(4) WL1650, 0·1 per cent. active ingredient.

(5) Kelthane, 0·05 per cent. active ingredient.

In any combined spray, each insecticide should be used at its recommended strength.

Soil fumigants and dosage rates are:

(1) EDB, 27·0 per cent. w/v or 12½ v/v*.

Treatment 6 in. each side of intended row position—10 gall. per acre, applied as 1 pint from each outlet of the machine to 4 chains. The same rate is used if 20 gall. per acre are applied in rows 1 ft. apart across the field.

(2) DD.—The material as commercially supplied is used at the same rates as for EDB.

WARNINGS

To avoid the risk of undesirable taints and residues, insecticides should be used on tobacco only when necessary. Dieldrin, endrin and WL1650 should not be used in excess of the recommended rates, particularly near harvesting.

A health risk is involved if dieldrin, endrin and WL1650 are inhaled, ingested or absorbed through the skin. Care should be taken to avoid inhaling these insecticides or being unduly wet by spray.

EDB and DD are skin irritants. Fumes from EDB in a poorly ventilated room are dangerous. Splashes of the concentrates should be washed off immediately with soap and water, and any clothes which are splashed should be changed immediately and not worn again until they have been washed thoroughly.

Scientific Names of Pests

Budworm	*Heliothis armigera* (Hübn.) *Heliothis punctigera* Wallengr.
Cluster-caterpillar	*Prodenia litura* (F.)
Leaf-miner	*Gnorimoschema operculella* (Zell.)
Looper	*Plusia argentifera* Guen.
Mite	*Vasates lycopersici* (Massee)
Seed and leaf-harvesting ant	*Pheidole anthracina* Forel.
Stem borer	*Gnorimoschema heliopa* (Low.)
Root-knot nematodes	*Meloidogyne javanica* (Treub) *Meloidogyne incognita* (Kofoid and White)

* Use other formulations of EDB at equivalent rates.

Some Ways Of Establishing Glycine

By P. G. TOW, Agronomist.

Plate 1: Glycine in a Green Panic-Glycine Pasture Mixture.

This article gives a brief account of some of the methods used to establish glycine, and mixtures of grass and glycine on the Kairi Regional Experiment Station. Although much work remains to be done to get the best out of such pastures, it can be said that they have been established with reasonable ease, and have shown their value for milk production beyond doubt.

The tropical legume *Glycine javanica* has shown promise as a pasture component in the mixed farming areas of the Atherton Tableland. It is palatable to stock, mixes well with a variety of grasses, and, when well established, has the capacity to provide nitrogen to the associated grass.

Nitrogen is the plant food which is most often lacking in pastures on the red soils of the Tableland.

Unfortunately, glycine is damaged by frost, but if adequate soil moisture is available, regrowth after frost is quite satisfactory. If it escapes frost, it produces seed prolifically.

Glycine has been grown at the Regional Experiment Station, Kairi, since about 1947. Seed has not been produced commercially to date except at experiment stations. Plantings have been increased on the Kairi Station in the last few years; in 1959, large areas escaped the frost and produced a prolific crop of seed. Many farmers have taken the opportunity to collect some of this seed for plantings on their farms.

Soils

Glycine grows well on the red clay loams that once supported rain forest. Where regular grazing does not occur, it will come up on its own, spread over the ground, and eventually grow over fences, shrubs and trees.

However, it will also grow on the poorer, more acid and lighter-coloured soils where eucalyptus forest once occurred. Such soils are scattered throughout the district on ridges or smaller outcrops. Growth on this soil is often slower and there have usually been spots (eroded patches and plough-outs) where the glycine has failed to spread at all. Therefore, it cannot be expected to do wonders on poor, "worked-out" maize soils.

Rate of Planting

While little has been done to compare rates of planting of glycine with grass, a rate of 3 to 4 lb. to the acre has generally been adopted and found satisfactory. As glycine has a creeping habit of growth, a thin stand from lower rates of planting will thicken up in time, but a good

Plate 2

Green Panic–Glycine Pasture Mixture.

stand right from the start will have more chance to compete with weeds and with heavy stands of grass.

Early Growth

Glycine appears to be a naturally slow grower in its first year. This has been found, not only at Kairi, but also in South Africa. The farmer, therefore, has to take this into account and he should give it every opportunity to establish and form a good cover.

This slowness of early growth is aggravated by the presence of weeds and grass. Reasonable weed control by mowing (or brushing and chipping of small patches) and avoidance of heavy grazings in the first year are highly desirable.

Of the methods used to establish grass-glycine mixtures on the station, some have been successful, others not. They may be divided into two groups:

(a) Establishment of Grass and Glycine Together

The normal practice in establishing a new area of grass-glycine is to work the ground to provide a fairly fine seedbed and to plant both species together through the grass seed box of a combine. The glycine will begin to germinate within a week, but the grass may take longer.

In 1957, a paddock which had been under maize for several years previously was ploughed and disced to give a seedbed, and planted to green panic and glycine in mid-February.

Vigorous weed growth gave the young pasture a setback, and thinned out the stand. Mowings were necessary in the first six months, but after this, the glycine made good headway.

The following year, a good mixed pasture was present, and it has continued to improve.

In early March, 1959, a mixture of Guinea grass and glycine was planted in a similar manner. Conditions for most of the year were ideal for weed growth, which was very strong. Four mowings were necessary in 1959, and this prevented the use of the pasture for grazing till the end of the year. Ten months after planting, the pasture was in a satisfactory condition, but

care with grazing was still necessary to allow the glycine to develop a strong hold amongst the grass and to suppress weed growth.

(*b*) *Establishment of Glycine in an Existing Stand of Grass* (*Sod-Seeding*)

In establishing glycine in an existing stand of grass, a fine seedbed has not been found absolutely necessary. However, the stand of grass must be weak, or made weak by appropriate cultivation in order to allow the glycine to make good early growth.

In January, 1957, an area of land which had been under Rhodes grass for about 10 years was ploughed. The grass by this time was unproductive. Towards mid-March, the area was sundercut, and then planted to glycine. The seedbed was very rough, but the glycine germinated well in most parts, and grew satisfactorily. Fortunately, weeds were not very bad, and mowing was not necessary till July.

By the next summer, the Rhodes grass had re-established itself in the area, and both pasture species were present in good proportions, though growing only slowly.

After storm rains, the glycine came away more slowly than the grass, but eventually gave excellent dense growth. A good mixed pasture has since been maintained without trouble.

In February–March, 1958, an attempt was made to improve three different stands of grass by sod-seeding them with glycine:—

(i) A year-old stand of Rhodes grass–lucerne in which the lucerne was rapidly disappearing, was sod-seeded with glycine. The grass stand was good, and its growth was moderately vigorous. Although a higher rate of seeding than normal was used, the strike of glycine was only fair. Plants developed a few leaves, and growth then remained at a standstill. Apparently, the grass offered too much competition. Plants have survived here and there but they have never made enough growth to form a good mixed pasture.

Plate 3

Glycine Grown for Seed.

(ii) A year-old stand of elephant grass was sod-seeded with glycine. The elephant grass was in rows about 4 ft. apart, and the glycine was seeded into the inter-row spaces. The elephant grass was quite vigorous, and the inter-row spaces had been invaded by vigorous Rhodes grass. A reasonably good germination of glycine resulted, but grass competition was evidently too much for it, and it died out.

(iii) A three-year-old stand of green panic had been allowed to grow tall and rank during the wet season. However, it was suffering from nitrogen deficiency, and the plants were weak. The stand population was only moderate. The grass was mown and raked off to remove any impediment to the sod-seeder, and the glycine then planted. Quite a good strike resulted. The green panic regrowth was not very dense, and this allowed the glycine to grow without much competition.

Frost and dry weather kept the pasture at a standstill after June, but a good mixed pasture resulted in 1959. A satisfactory effect was achieved in the same year in another thin stand of green panic by ripping the pasture with tines and then oversowing with glycine by means of a seed drill.

It is generally advisable to inoculate legumes with a culture of the correct strain of Rhizobium bacteria. Inoculum has not been used in planting at Kairi, as indications are that a satisfactory strain is present in the soil. However, cultures of inoculum for glycine are available free of charge from the Bureau of Tropical Agriculture, South Johnstone, and it would be advisable to inoculate at least some of the seed before planting.

In conclusion, it can be mentioned that many farmers are broadcasting seed which has been collected by hand and therefore mixed with a certain amount of soil, leaf and other trash. A few farmers are planting glycine runners because of the scarcity of seed. These plantings will be watched with interest.

bucket and bail

Cowpeas For Summer Milk.—Cowpeas have long been recognised as a valuable legume for green manuring. Their value as a stock feed has been largely overlooked, but with the excellent results being obtained on the Downs with this crop it may soon assume its rightful place as an extremely valuable summer legume.

The main advantage of legumes is their high protein content. They maintain this high protein content longer and do not become so fibrous as non-leguminous grazing crops. The sudans and sweet sorghums after their initial growth, and particularly in a dry spell, become very coarse and fibrous and consequently do not provide the high quality ration necessary for good milk production.

One farmer who has proven the value of cowpeas over other summer grazing crops and natural pastures is Mr. A. Harvey, of Kingsthorpe. By using cowpeas he increased his production during February and March by 35 per cent. to a level higher than he has obtained at any other season of the year. This is more significant when you remember that February and March are the months on the Downs when dairy production commences its seasonal decline.

Mr. Harvey planted cowpeas at Christmas time primarily as a soil improvement measure, but his herds production responded so well to them that they will now become an important part of his annual cropping programme.

The crop, planted towards the end of December was ready to graze on the first of February. As it was very lush, some difficulty with bloat was experienced and only limited grazing could be allowed. Nevertheless production from Mr. Harvey's herd of 25 head rose from 44 to 59 gal. a day. After a fortnight, when bloating was controlled and continuous grazing was given, production rose still further to 64 gal. a day.

It is estimated that the increase in production during this period was worth about £100, and the crop was still supplying the bulk of the herd's requirements at the end of March.

Mr. Harvey is quite sure that from the other feed he had available, crops and pasture, his production without the cowpeas would not have risen over the 44 gal. and most probably would have fallen.

One acre of cowpeas to each cow is a good allowance for full feeding and the effective grazing period of this crop can be extended by making a succession of sowings.

Cattle may be slow to commence eating cowpeas at first but they soon overcome this and eat them readily. There is also a danger from bloat if the crop is young and lush but this can be overcome.

—J. A. ONLEY,
Adviser in Cattle Husbandry.

Did You Carry Any Passengers?—It pays to examine the milking history of your herd. These cows are your main income units. What they have produced has determined the efficiency of the farming business.

Most important will be how long each cow has milked. Unless this was of the order of 9–10 months then you certainly have had some passengers. There are two main reasons why cows may have had short lactations.

Primarily there has been a feed deficiency. This has occurred through cows calving too early or too late to catch the full benefit of the seasonal flush of natural pastures or because they were not adequately fed during that critical dry period immediately prior to calving. This in turn influenced their later production period.

The second reason for short lactations would be failure to "take" during service, thus calving at the wrong period of the year, suggests breeding problems.

While the provision of adequate feed at the proper time is one of the major tasks of a dairy farmer, the systematic control of mating is a valuable and relatively simple means of influencing length of lactation. The provision of a special bull paddock and recording of service dates will be a major step towards increasing herd production.

—W. D. MITCHELL, Dairy Technologist.

After-Calving Paralysis.—Milk fever is not the only cause of freshly calved cows being paralysed in their hindquarters. But it is the most common, and affected animals usually recover quickly after an injection of calcium borogluconate.

Cows paralysed in their hindquarters will fail to respond to calcium borogluconate injections if some other disorder is responsible.

Besides milk fever, other common causes of paralysis after calving are:—Acetonaemia, injury to the pelvis or sciatic nerve, dislocation of the hip, leg fracture, and toxic mastitis. Unless the cause of the disease is obvious, it is desirable to call in a veterinary surgeon.

Acetonaemia is an upset that may be brought on by the stress of calving, though it may also occur independently of calving. In this disorder instead of the carbohydrate reserves such as fat being converted to blood-sugar, acetone is produced. This causes a wide range of nervous symptoms that usually end in paralysis.

Correction of this condition requires the injection of sugar into the bloodstream and drenching with glycerine. Cortisone has also been used effectively by veterinary surgeons.

Cows will usually recover in a few days from paralysis caused by injury to the sciatic nerves. This disorder is caused by excessive pressure injuring the two trunk nerves to the leg muscles.

An acute attack of mastitis may cause a cow to remain down after calving. Unless she is examined carefully, this condition may be overlooked.

Injury to the pelvis and fracture of the thigh bone will also prevent the animal from getting up. If the hip is dislocated, the intense pain will prevent the cow from attempting to rise. These conditions are usually difficult to diagnose, and your safest course it to consult a veterinary surgeon.

—O. H. BROOKS,
Divisional Veterinary Officer.

Slow Milking.—Don't let faulty milking machines or out-of-date milking methods rob you of fast milking. Each milking machine unit should milk at least 12 cows an hour. If you're falling short of this average, the efficiency of both your milking machine and milking methods needs overhauling.

Fast milking is a real time-saver. And time saved in the dairy can always be employed profitably on other farm jobs.

Quick milk let-down is the first requirement of fast milking. You get this by handling your cows gently and by training them correctly. Let-down is stimulated by washing the teats and udders thoroughly with warm water. Addition of a chlorine solution to the udder wash helps to check the spread of mastitis. Let-down lasts from four to six minutes, and your milking machine must be operating efficiently to remove the milk in that time.

Like any other machine, a milking machine needs regular maintenance for continued efficient operation. It has been shown that a fluctuating vacuum will bring discomfort to a cow and reduce the milking rate. This fault is most commonly caused by air leaks or a dirty vacuum relief valve. Ensure a constant level of vacuum by sealing off any air leaks and cleaning the vacuum relief valve regularly. Effective oil wicks are necessary to make sure that an adequate oil supply reaches the internal surfaces of the pump.

You'll run into slow milking troubles also if the pulsators are not set and serviced according to the manufacturer's instructions.

With effective let-down and efficient milking machines, most of your cows can be trained to machine stripping. This permits faster milking and removes the risk of spreading mastitis from the milker's hands.

If you're in any doubt about the efficiency of your milking machine, consult your local Dairy Officer. With equipment provided by the Queensland Dairymen's Organisation, he will check your milking machine free of charge. He will also advise you on modern milking methods and machine stripping.

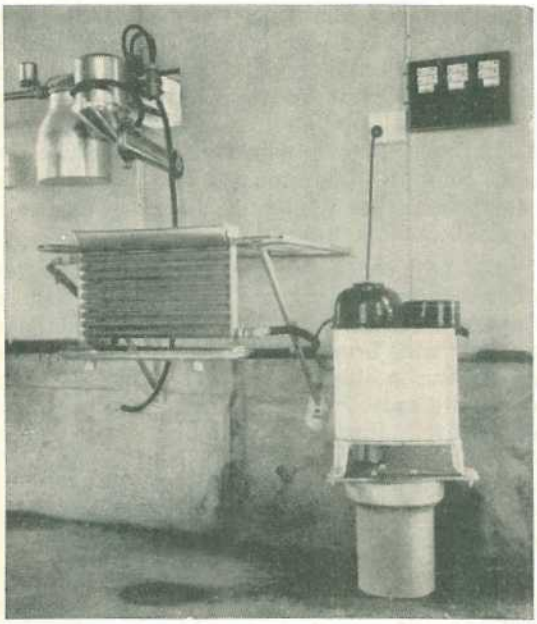
—E. W. COSTELLOE, Dairy Officer.

Handy Hints For The Dairy Shed

By P. McCALLUM, Senior Dairy Adviser.

Hints that can save time and labour in the milking shed will be welcomed by most dairymen. Manufacturers with an array of household appliances are continually striving to make the daily lot of the housewife much easier, so why not make the 365 days a year dairy routine a lot easier? It can be done in many ways.

Mr. J. C. Naylor, Ferny Grove, who recently erected a new milking shed, incorporated several ideas which make the daily cleaning routine much easier. These ideas may have application on other dairies.

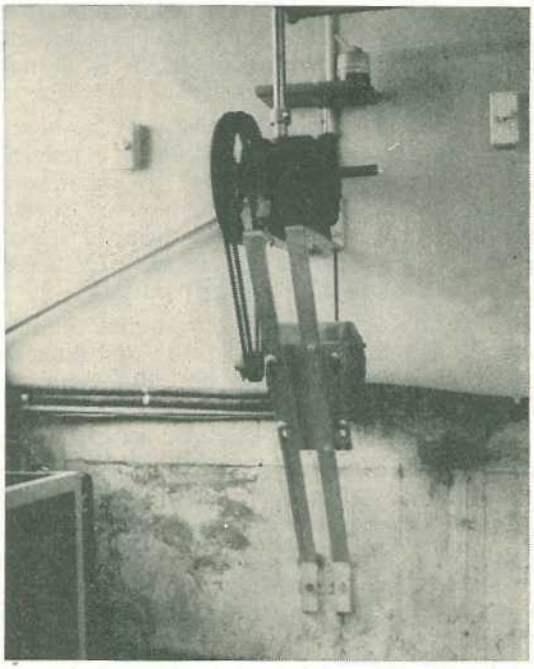


A glazed earthenware pipe was used to make the separator block (Plate 1). This pipe was set into the concrete floor and then filled with concrete. A steel plate was attached firmly to bolts previously set in the concrete and the separator was then bolted to this steel plate. This provided a neat, easy to clean, separator block.

A 12-in. diameter untested earthenware pipe can be purchased for approximately 22s. from most hardware merchants.

Other features worth noting in this picture are the 2 ft. 6 in. high concrete wall between the separator room and the first bail, and the tubular metal stand for the milk vat and milk cooler. This vat stand is braced onto the dwarf wall.

The floor of the separator room can be further freed of obstructions by attaching the electric motor and vacuum pump to the wall with metal brackets (Plate 2).



The fittings described provide more space in the separator room and make the daily cleaning operations so much easier.

Action To Prevent Tetanus In Stock

By C. P. CRAVEN, Divisional Veterinary Officer.

While tetanus is encountered in all classes of farm stock in Queensland, most cases are seen in horses and sheep. Cattle and pigs are not so commonly affected, some cases are recorded in dogs, and one case has been seen in a goat. The disease is characterized by excitement and increased tone of muscles which produces a characteristic stance and gait.

Tetanus is caused by a germ (*Clostridium tetani*) which is an inhabitant of soil, both cultivated and uncultivated. It is commonly found in the manure of most animals, particularly horses. The germ appears first as a slender rod but later develops into spherical spores.

Method of Infection

Infection in all animals occurs as a result of wound contamination. Clean wounds rarely result in tetanus. It is the dirty wound containing foreign material, particularly soil, that is most dangerous. Deep penetrating wounds are much more dangerous than superficial ones. When soil accompanies tetanus germs into a wound, it paves the way for the multiplication of the germs, and the setting up of tetanus. The germ begins to multiply in the wound area and in so doing produces a toxin or poison which is responsible for the symptoms shown. The local effects of the tetanus germ in the wound are negligible; the principle agent in the production of the disease is the toxin, which is one of the most poisonous substances known.

How the toxin produces symptoms of tetanus is not definitely known. It is thought, however, that it is absorbed by nerves near the wound and then passes along these nerves to the brain. It is thought that the general symptoms of the disease are produced when the poison reaches the brain.

Incubation Period

Incubation is the period which elapses from when the germ enters the wound until the first symptoms of tetanus are seen. This is commonly one to three weeks, but in some cases may be longer. Thus in sheep, it is common to see cases of tetanus one to three weeks after castration or tail docking.

Symptoms

Horses.—Tetanus usually occurs in horses following some sort of injury, such as a nail prick in the hoof, castration, injuries caused during breaking in, and stake wounds. Frequently, however, no wound can be seen. It is possible for such wound to have occurred internally, for example, in the tissues of the mouth.

In the horse, the first symptom seen is stiffness, followed by rigidity of the muscles. This often begins first in the muscles of the head and produces "lock-jaw". The horse may then have difficulty in picking up food, masticating it and swallowing it. There would be a resultant drooling of saliva. An early symptom seen is the third eyelid protruding across the eye. This may be induced by throwing the head upwards. Normally the third eyelid retracts immediately the head returns to normal but in tetanus retraction is very slow.

The horse will have a straddly gait, forefeet may be picked up quickly, tail held out stiffly, ears pricked stiffly and head and neck extended. He will be excited easily. Sweating, and trembling of the muscles, are seen. Noise or movement induces spasms, and the horse may go down and be unable to get up. Temperature is normal in the early stages but later because of spasms, may go up to 110 deg. F. Death occurs in about 80 per cent. of cases, usually within 10 days of the onset of symptoms. Some may recover in three to four weeks.

Cattle.—Tetanus is not common in cattle but cases are seen usually following calving in the cow, or after castration in calves. Symptoms are similar to those in the horse. There is rigidity of muscles, stiffness and extension of the head and neck; toes are widely spread. The tail may be held in a raised position and the third eyelid protrudes over the eyeball when the animal is disturbed or frightened. Bloat frequently occurs.

Sheep.—Tetanus commonly follows lamb marking or shearing. It has also followed penetration of the skin by grass seed. It has been seen in young rams following the shedding of temporary teeth and it is thought that infection gains entrance to the body through the tooth socket.

When tetanus follows an operation such as lamb marking, the first cases are seen usually about a week later and losses can be heavy.

Lambs may be unable to suckle and they may have a grinning facial expression due to the contraction of the muscles of the face, Head is held high and the legs wide apart. Affected sheep are found with legs and head thrown back. If touched, the whole body stiffens. In early cases, there is stiffness in walking and a raised carriage of the head, the animal appears sick and is unable to eat properly. Again the third eyelid protrudes from the inner angle of the eye. Bloating occurs rapidly. Death can be as early as 24 hours after the onset of symptoms.

Pigs.—Tetanus is seen in pigs usually following castration. Symptoms are very similar to those already described for the other animals. The muscles are rigid and animals remain standing. Gait of the affected animal is similar to that already described. Affected pigs are excitable and exhibit "lock-jaw".

Dogs.—Tetanus in dogs is uncommon. The most characteristic signs are elevation of the ears and furrowing of the skin of the forehead due to contraction of muscles; also the third eyelid will protrude across the eye.

Post-Mortem Appearances

There is no abnormal change produced by tetanus seen on post mortem in any animal which has died from tetanus. Consequently a post mortem is useless in determining the cause of death.

Diagnosis

Diagnosis in all animals is based on the symptoms exhibited by the affected animal. The contraction and rigidity of muscles, the peculiar gait, and the behaviour of the third eyelid are all quite characteristic of tetanus. The general appearance of an advanced case is quite unmistakable.

Treatment

Treatment is usually attempted only on valuable horses, and other stock which the owner considers warrants a degree of expense and time. Treatment consists of injections of the modern tranquiliser drugs to relax muscles, and also many injections of large amounts of tetanus antitoxin. Even with treatment many cases fail to respond. It is wise to obtain the help of the local veterinary surgeon if treatment of a tetanus case is contemplated.

Prevention

Tetanus can be prevented by inoculating healthy stock against the disease. There are two forms of inoculation. One gives the animal immunity within a few hours of injection and maintains immunity for two or three weeks. Thus, if an operation such as castration of horses or sheep is contemplated, at the time of castration these animals can be inoculated with **tetanus antitoxin** during the operation; the chances then of their getting tetanus are very slight. Also if a horse has been staked or cut by wire, a tetanus antitoxin inoculation within 24 hours of the injury will reduce considerably the possibility of tetanus setting in. The doses of tetanus antitoxin are as follows:—To horses, foals and cattle from 500 units; to sheep, pigs or dogs 100 units. The injection is given under the skin. No undesirable reaction will follow the injection.

The other form of inoculation gives the animal a lifetime immunity but this takes about 14 days to develop. It consists of injecting **tetanus toxoid** under the skin. The dose for horses, foals or cattle is 10 c.c. and this may be followed in 12 months' time by another 10 c.c. and immunity will then be solid. For sheep or lambs, one dose of 1 c.c. is required. There will be a swelling at the site of injection but this will disappear later. Both tetanus antitoxin and tetanus toxoid are available at a very cheap price from the Commonwealth Serum Laboratories' representatives in a number of the larger towns in the State.

Both products can be used simultaneously, injected into the animal at two different sites. Thus the advantages of both can be obtained, giving the animal an immediate as well as an enduring immunity.

How Long Has Your Cow Been Milking?

The monthly progressive production sheet is forwarded to members of the Herd Recording Scheme every month. It shows the length of time each cow has been milking and the production for that period. On the bottom of the sheet is shown the average daily production per cow for the month.

This sheet enables the owner to see at a glance how long each cow has been milking and her production to date. It is particularly useful for comparing the production of animals which calved at the same time of the year.

Reference to this sheet in conjunction with the Monthly Herd Record Sheet and Shed Sheet will indicate cows which should be dried off.

Drying Off

The monthly record sheet is a very valuable guide in determining when to dry off a cow. All cows should be dried off within six to eight weeks of calving irrespective of the amount of milk and fat they are yielding. Thus a decision of this nature is easily made providing service dates have been kept and the date due to calve listed. However, the case of low producing normal cows requires more consideration. If feed is plentiful it is generally advisable to continue milking such animals. Drying them off will not increase the feed used by other cows, and though their yields are small they still add to the gross cash return without any appreciable increase in the cost of milking them. Sometimes such cows sustain a moderate yield for a long time and may surpass others in production that give a big flush and dry off prematurely. Should the animal's yield, however, tend to decline or keep at a very low level she should be turned out when feed starts to fall off, as the good cows in the herd can utilise the extra supplies.

Short Lactation Cows

The monthly progressive production sheet is particularly useful in showing short lactation cows. These animals are usually unprofitable because of their low production and the long time they are dry and therefore unproductive.

Check On Bulls

The monthly progressive production sheet gives an early indication of the productive ability of a bull's daughters. If you have a first crop of heifers by a certain bull, you will be able to see how they compare with other cows in the herd after three or four months. Naturally the best information is obtained by a comparison of completed lactation records, but an early indication is desirable as one can then decide whether or not to retain the bull.

AN ADDITIONAL SERVICE

The Herd Recording Section is now in a position to assist group members in the selection of a pure bred sire.

If you advise head office of your requirements (that is, breed, age of replacement sire), members of the breed who are recording will be advised of your requirements. Breeders will be asked if they have a sire they consider would suit you. They will be requested to advise you of details of price and breeding.

When you receive this information, forward the breeding particulars to head office and all relevant details of production will be extracted from our records and returned to you. This will assist you to narrow your choice down to two or three sires. It is recommended that you visit the properties if possible so that you can inspect the sire, his dam and sisters. You will also have an opportunity for discussion with the breeder and note the standard of management on the farm.

This Department of course will NOT enter into discussions respecting purchase price as this is a matter entirely for yourself and the breeder.

Low Cost Dairy Hot Water System

By D. K. HOGAN, Dairy Officer.

The device explained in this article enables water to be heated at a dairy where electricity is not available. The capacity of the boiler is in the vicinity of 36 gal. Fuel used is wood and its consumption is low. Heat retention is high.

The unit described is at present in use in the Proston district. Where the farmer can do the installation work himself, the cost of construction is about £12.

Materials required are:

- 400 new or used bricks, in clean condition (72 fire bricks if desired).
- 1 x 44 gal. heavy steel petrol drum, with two bungs on front top.
- 2 bags cement.
- 2 bags slaked lime (if desired).
- 1½ cu. yd. fine sand.
- 3 ft. of ¾ in. galvanised piping threaded both ends.
- 1 x ¾ in. T piece (or elbow).
- 1 x 2 in. galvanised bend (male and female fittings).
- 2 sq. ft. of galvanised iron and some solder (funnel).
- 2 x 3 ft. lengths of 3 in. flue piping (fibrous cement preferred).
- 1 x ¾ in. tap.

Method of Construction

The first step is to lay a concrete foundation 5 ft. by 3 ft. in a position close to the outside dairy wall. Allow this to set hard. If it is desired to reinforce the corners of the completed unit, right-angled plate iron should be embedded in the foundation for final connection with tie rods when all the external brickwork has been completed.

When a boiler is used regularly inclusion of reinforcement in the concrete foundation has been found desirable to prevent severe fracture. The most usual material is round steel ½ in. or ⅜ in. weldmesh but K-wire may be included where the weldmesh is not readily available.

Next construct a brick fire box upon this foundation 5 ft. long and 11 in. wide, inside measurement. Build to a height of at least 15 in. from the foundation (see Plate 1).

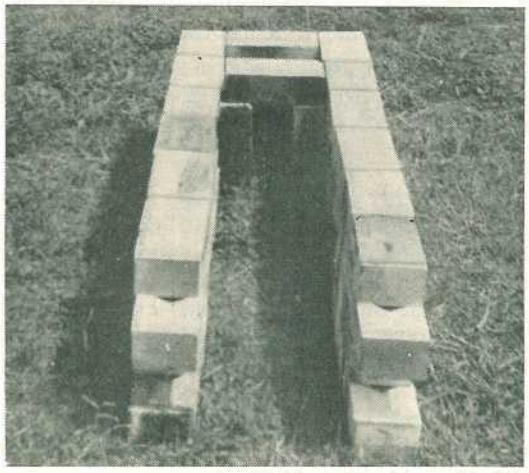


Plate 1

The Brick Fire Box is 5 ft. Long and 11 in. Wide.

The usual practice with brick construction where heat is present, for example, in a fire box, is to provide special fire bricks. This will ensure a more permanent structure.

While mortar for bedding bricks in this unit was a mixture of cement and fine sand, the addition of slaked lime would have been advisable to prevent any shrinkage and cracking under severe heating. A mix of 2 parts of cement, 2 parts of lime and 1 part of fine sand will provide a desirable mortar.

Place the drum on the top of this fire box, lengthways, 6 in. from the front end of the bricks, leaving the portion behind to form the chimney space. The small bung of the drum should be at the bottom and the large one at the top in front (see Plate 2).

The gaps between the drum and the fire box bricks are now packed with a stiff mixture of cement. All other openings no matter how small should also be filled, with the exception of the chimney space. This directs all heat towards the drum surfaces sealing the top of the fire box.

The pipes and large elbow should now be fitted into place. The ¾-in. pipe is the draw off outlet and is screwed into the small hole at the bottom of the drum. The 2-in. elbow forms part of the filler line and is fitted to the large plug hole. A suitable funnel can be prepared and soldered onto this elbow later.

The external brick walls are now built up from the edge of the concrete foundation all around the drum and fire box, until at least one brick higher than the top of the drum. This forms a wall all around the fire box and drum, leaving a cavity up to 4 in. wide between the two constructions (see Plate 3).

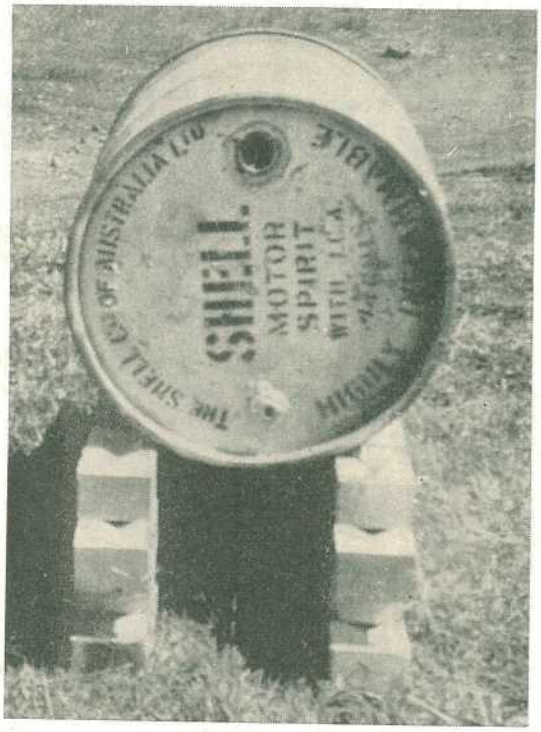


Plate 2
The Small Bung Should Be at the Bottom and the Large One at the Top.

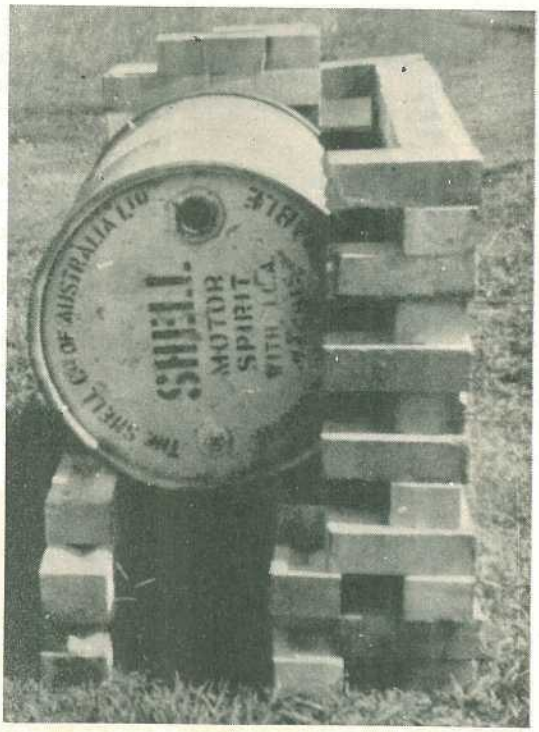


Plate 3
Forming a Wall all around the Fire Box and Drum, Leaving a Cavity up to 4 in. Wide Between the Two Constructions.

The chimney and the front of the drum can also be built at the same time. When sealing the front end it will be necessary to allow sufficient space in the brick work for the pipe fittings. All bricks should be toothed at the corners to give added strength. A brick on a tom suspension or an iron bar for support will be necessary to begin the front wall because of the opening which is left in the fire box.

The cavity so left after building to above the drum is next filled with dry sand and packed as tightly as possible until all spaces are filled. Cover the uppermost part of the drum with sand until a brick top can be laid level across the top of the whole construction, totally enclosing it.

The chimney can now be completed. In this unit a length of fibrous cement flue is cemented into place. It will be necessary to provide sufficient height in the flue to allow the fire to draw.

The whole system is now totally enclosed and should appear like a brick box with a covered top. A tap is fitted to the smaller ¾-in. draw off pipe and a funnel to the 2-in. elbow fitting. If desired, these fittings can be sited inside the dairy by attaching an appropriate short length of piping. While this adds greatly to convenience of operation it will be necessary to lag the hot water draw-off line to prevent a serious drop in water temperature when water is being withdrawn.

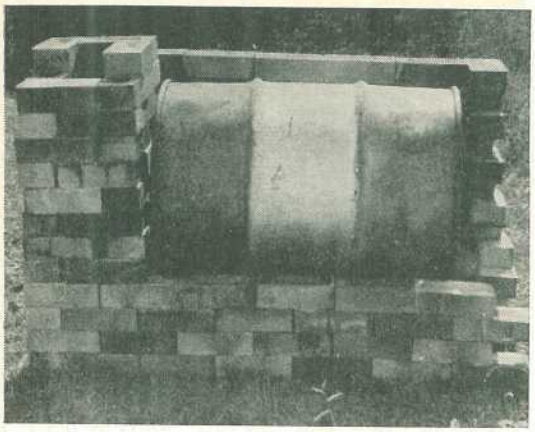


Plate 4
The Chimney is Constructed.

Curing

As this heater is composed of bricks and mortar it should be allowed to cure for at least a week before being used. On lighting the first fire do not stoke too heavily, rather let the heat increase gradually.

Filling the Boiler

Filling of the heater should be to within 6 in. of the top of the drum. Do not on any account overfill the drum or close off all vents. Leave the filler funnel open for the steam to escape. The funnel can be covered loosely with a perforated gauze cover when not in use to prevent the entry of foreign material.

A water level gauge may be fitted in this simple manner. Using a T piece in the draw off pipe, connect another short length of pipe in a vertical position to the height of the water level required. Leave the top of this pipe open and it will overflow when the heater has sufficient water in it. A certain amount of water will be lost from this gauge pipe as the water is heated.

The first time the heater is lighted it will take some time for the water to boil. This is due to the bricks being cold. Once they have absorbed heat it will be found that very little additional fuel will be required to keep the water on the boil.

A general recommendation to keep the water hot for many hours is to refill and stoke again immediately after use.

There is very little need to cut fine wood to use in the heater; it works very well on large, long billets. As a safeguard against rust it will be found helpful to add to the drum once a week about ¼ lb. of washing soda.

This type of farm heater has several major advantages: the capacity is large; the installation cost is low; fuel costs are low, and hot water is available day and night.

◇◇◇◇

Plans For August

Commence training heifers to ensure good milk let-down.

Tattoo calves for future identification.

Control grazing on weed-infested paddocks to minimise milk taints.

Join a Herd Recording Group now to find out which cows are profitable.

Overcome low fat milk by correct feeding. Consult your dairy officer.

Graze springers on good pastures and crops.

Records Saved Herd Slump

A set of scales and a butterfat test saved a Beaudesert dairyfarmer's breeding plan from disaster.

The farmer, Mr. H. H. Draper, of Cryna, was a member of a herd recording group. This meant that every month a herd recording officer came to his farm and measured the milk and butterfat yield of each cow. Results of these tests unmasked Mr. Draper's bull as a herd wrecker instead of a herd improver.

Mr. Draper said that, in this bull, he had thought he had the sire of a lifetime. On appearance, the bull measured up to everything that a Jersey bull should. And his calves—never had Mr. Draper had better-looking, healthier heifers!

But when they calved and joined the rest of the milking herd, production records showed that their yields were always below herd average. Next season they were just as disappointing.

"I quickly got rid of that bull and his heifers," said Mr. Draper. "If I'd reared replacements from those heifers I would have pulled down my herd's average instead of raising it."

Mr. Draper is certain that it was the information supplied by herd recording that enabled him to correct his breeding plan before too much damage was done. At the same time, it saved him a continuing loss in production, for it costs no more to run a good cow than it does to care for a low producer.

Mr. Draper said he culls his cows regularly. First he takes into consideration the disease history, present health and dairy temperament of the animal. Then he checks their production performances from his records and makes his decision.

Good Feeding

In obtaining high yields from dairy cows, Mr. Draper regards good feeding as essential. On his 217-acre property he has 60 acres of cultivation. He keeps 20 acres under lucerne and uses the remainder to grow maize and grain sorghum in the summer and a mixed crop of oats and golden tares for winter grazing. At present about 10 acres of his cultivation is under improved rain-grown pasture, a mixture of green panic and lucerne.

Four years ago he amply demonstrated the value of irrigated pasture in raising dairy yields. In 1955–56, admittedly a good season, he got his first grazing from 11 acres of irrigated pasture. The average yield from his 33-cow herd was 190 lb. of butterfat a head, 30 lb. better than the previous year's.

Although 1956–57 started well, the season later turned dry, and his irrigation water supply in a creek dried up. That year his production was 176 lb. In the drought year of 1957–58, production slumped to 143 lb. a head.

It was then that Mr. Draper began to concentrate on lucerne, both for hay and grazing. This change paid off with production up again to 171 lb. of butterfat a head last year.

"On a place like mine, where I haven't got a lot of water, I find lucerne is the best proposition," he said. "I use it for grazing, and in the good times I cut it for hay."

Mr. Draper said that as a cream supplier he did not believe it paid to feed concentrates. He feeds lucerne chaff almost the whole year round. At present he is feeding about 2 lb. of lucerne chaff a day to each of his cows.

His fodder reserves are 3,000 bales of lucerne hay and 60 tons of sudan grass—cowpea silage put down three years ago. He hopes to build up his lucerne hay stocks further before the winter.

As well as his dairy, Mr. Draper also runs a successful piggery. He relies on skim-milk and home-grown maize as his chief source of pig food.

Safe Use Of Portable Handlamps And Extension Leads

Handlamps and extension leads are very useful adjuncts in the home, in the garage, in the workshop, and, in fact, in any location where temporary illumination is required; but there have been too many instances of electrical accidents recorded in which the users of "home-made" leads have received electric shocks, some, indeed, with very serious and even fatal results.

"Home-made" leads are dangerous, and you should protect yourself and others by avoiding their use.

Safety can be very readily secured. If you need light to work under the house or in your garage or any other place, it is a very simple matter to purchase a portable handlamp at a small cost from your electrical contractor or reputable electric retail store.

You will be sure that you are buying a satisfactory article, as portable handlamps are "prescribed" equipment under the Electric Light and Power Acts, and must not be sold without the prior approval of this Commission.

When making your purchase, always ask for an approved article.

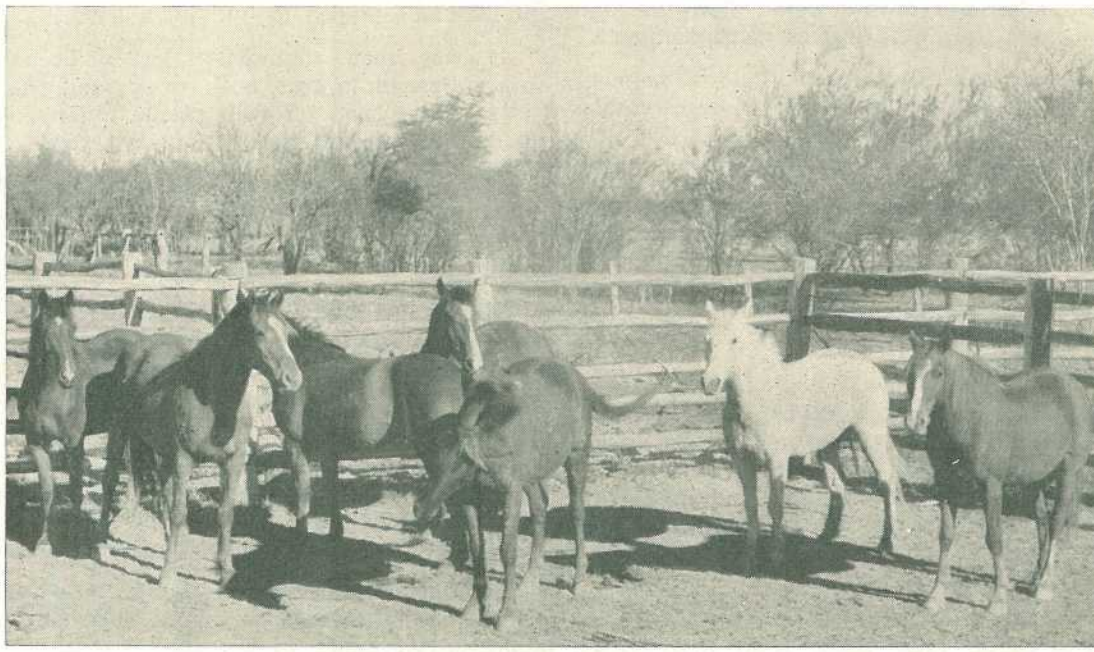
If the handlamp you buy is not already made up complete with flexible cord and connecting plug, buy the cord (heavy duty tough rubber or plastic sheathed type) and the plug, and have a certificated electrician assemble the complete lamp.

Do not use light duty (vacuum cleaner type) or figure of eight flex.

Do not attempt to make up your own flexible lead.

Another frequent cause of electrical accidents is the use of perished flexible cords and broken or chipped accessories (apparatus connectors and plug tops and plug sockets). If any of these start to show signs of wear, have them replaced and reassembled by a certificated electrician. It is not a job for the amateur.

—State Electricity Commission.



Working Horses at Toorak Field Station in the Julia Creek Area.

Help Sick Stock With Farm First Aid . . . They Deserve It

By O. H. BROOKS,
Divisional Veterinary Officer.

Prompt emergency treatment of sick or injured stock on the farm or station will often save the life of a valuable animal. The measures taken in the interval between the onset of attack and the arrival of a veterinary surgeon can have a direct bearing on the chances of recovery.

At the same time, emergency attention can spare the beast prolonged suffering.

Many farmers and graziers are too far removed from veterinary assistance and chemists to obtain immediate help for acute upsets in farm animals. For this reason, an emergency supply of non-perishable antidotes, drugs and first aid instruments should be kept on farms and stations.

The common stock ailments that require immediate attention for treatment to be effective are bloat, cyanide and arsenical poisoning, milk fever, grass tetany, tick fever, injuries and stake wounds.

These notes are not intended to take the place of expert veterinary assistance, but rather to enable the stockowner to take some practical steps to alleviate the trouble if there is any delay in securing assistance.

Bloat

If bloating is excessive, the cow is usually found lying on its side gasping for breath. The severe gas tension must be relieved with a trocar and cannula inserted at the highest point of distension on the *left* side. This usually is a point half way between the last rib and the hip and equidistant from the loin. (Plate 1.) The hair should be clipped and the skin cleaned with methylated spirits. A small "nick" through the skin with a pocket knife or razor blade allows the trocar and cannula to be inserted easily into the paunch. By a forceful push the cannula is inserted to its full length.

The trocar is removed and after the tension has been relieved the trocar is reinserted and the trocar and cannula withdrawn. If the bloating is severe the cannula can be left in position until the crisis has passed.

An anti-ferment should be poured into the paunch before the cannula is removed. There are several proprietary remedies available for the treatment of bloat. One ounce of kerosene or turpentine may serve in an emergency.

If a trocar and cannula is not available a pocket knife can be used, but can cause subsequent complications if some of the paunch (rumen) contents escape into the abdominal cavity. The knife should be held in position until the pressure has been relieved.

Plate 1

Puncturing the Paunch with a Trocar and Cannula will Relieve the Gas Tension in Severe Cases of Bloat. The point of entry is on the left side, about equidistant from the last rib and hip and a similar distance from the edge of the loin.

An effective farm remedy is 1 oz. of turpentine, eucalyptus or kerosene, in a cup of paraffin, linseed, castor oil or warm dripping.

A broom stick tied across the mouth like a bridle bit will often allow a cow with a mild attack to belch up the excess gases. Contrary to popular opinion, hypo is useless for bloat treatment, but is a specific antidote for prussic acid poisoning. This poisoning may produce bloat due to paralysis of the stomach muscles.

Prussic acid poisoning arises from cattle and sheep eating weeds containing prussic acid, usually under abnormal conditions. It can also be caused by crops of the sorghum family. Recently it occurred after linseed had been fed. Prussic acid poisoning, also known as HCN or hydrocyanic acid, causes sudden deaths and only prompt drenching will save animals which have consumed lethal quantities of plants or seeds. The specific antidote is photographic hypo (sodium thiosulphite). A delay of half an hour before drenching could result in a failure to use the antidote effectively.

Cattle require 2 oz. of hypo given as a drench in a bottle of water. Sheep require ½ oz. This dose may have to be repeated in half an hour if the animal is still showing symptoms. Hypo is not poisonous and can be measured by hand or in a tablespoon. One small handful of hypo would be approximately 2 oz. A tablespoonful is about ½ oz. Hypo can be purchased in 1 lb. sealed tins and will keep indefinitely.

Remember that an animal affected with prussic acid poisoning may have difficulty in swallowing. Pour the drench slowly into the side of its mouth with its head tilted slightly upwards.

Arsenical Poisoning

Hypo is also an antidote for arsenical poisoning, but is not so effective as for prussic acid poisoning. Arsenic absorbed through the skin or bowels is passed out through the kidneys and

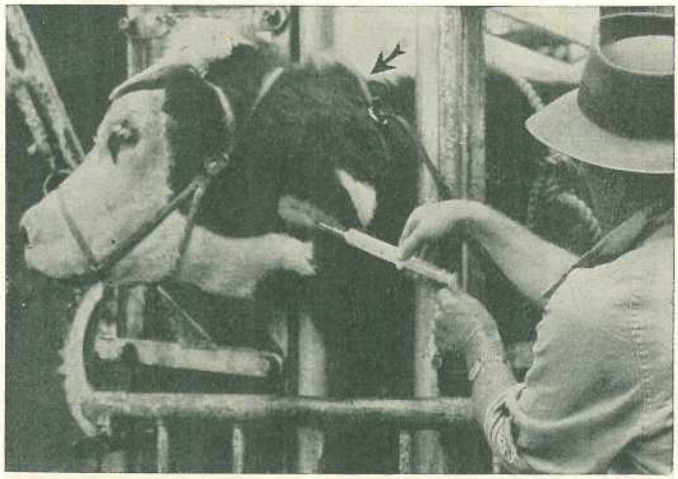


Plate 2

Intravenous Injection by Means of a Syringe. A tourniquet (see arrow) is used to distend the jugular vein.

the hypo has the effect of assisting excretion and delaying absorption.

Prompt drenching with hypo can save cattle. Two ounces given as a drench at four-hourly intervals are necessary until evidence of poisoning has disappeared.

If the arsenic has been taken by mouth, cattle should be drenched with oil such as paraffin or linseed, using 2 pints for adults. If eggs are plentiful, half a dozen whites given in milk will help to soothe inflamed membranes.

If a veterinary surgeon is available, he can administer calcium versenate which is more effective than hypo.

Milk Fever

Most dairyfarmers are familiar with milk fever and keep supplies of calcium borogluconate solution on hand. Where cases do not respond immediately to one injection, a second should be given within an hour. Advanced cases and large cows should receive a double dose from the outset.

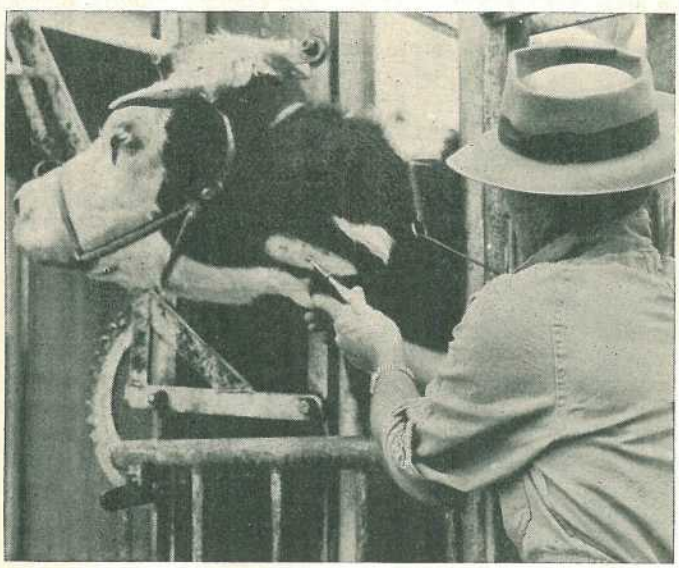


Plate 3

Taking Blood from a Bleeder. Before the trocar and cannula are inserted, the hair is clipped and the skin cleaned with methylated spirit.

Plate 4

Drenches Can Be Administered with Either a Bottle or a Gun. In drenching, tilt the head slightly upwards, but not more than 45 deg.

In cases which do not respond to injections, it is the author's opinion that pumping of air into the udder to stop further milk secretion is justified and often effective. Scrupulous cleanliness in the operation is essential to avoid mastitis. But before this procedure is adopted, such cases should receive veterinary attention if at all possible. Refractory cases of milk fever may benefit from drenching with two pints of glycerol daily as the condition may be complicated by acetonaemia.

Pregnant ewes often develop pregnancy toxaemia or a twin lamb disease in advanced pregnancy and require treatment with glycerol. Daily dosing with 4 oz. of glycerol has been found effective in some cases, especially those due to a sudden change of conditions.

Grass Tetany

In some dairying areas where recently calved cows are confined to one crop such as oats or barley, tetanic spasms, thought to be due to a deficiency of magnesium, may develop.

Drenching with 8 oz. of Epsom salts (magnesium sulphate) may correct this condition. However, a veterinary surgeon will also inject a magnesium solution into the blood stream, and should be consulted.

Tick Fever

The common form of tick fever or redwater can be treated successfully by the early injection of tick fever drugs, all of which are specific and reliable. The dose rate is calculated on body weight.

Tick fever causes a rise in temperature to between 105 and 109 deg. F., red urine and depression. These symptoms would justify treatment for tick fever in tick infested areas. The temperature should drop 3 to 4 deg. within six hours of treatment, otherwise a second injection is necessary. A thermometer is absolutely necessary to gauge the response to treatment (Plate 7).

When tick fever drugs fail, the services of a veterinarian should be obtained to ascertain whether the redwater symptom is due to another disease, leptospirosis, which is a widespread infection, particularly in dairy cattle.

Redwater appearing in an animal under nine months is usually due to leptospirosis. However, in yearling and adult cattle the two diseases can be difficult to diagnose with certainty unless a response is obtained with tick fever antidotes or a smear is positive for tick fever. Blood and urine can be examined for the presence of leptospirosis.

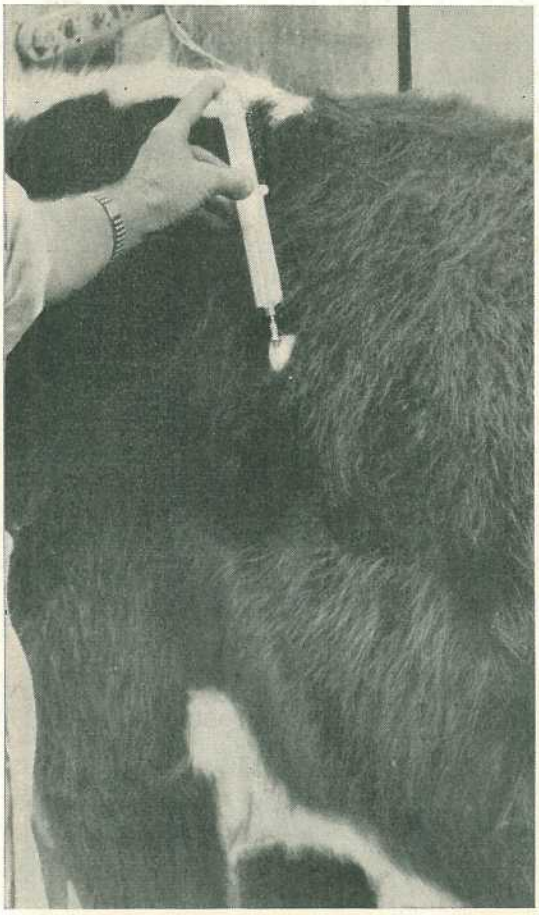


Plate 5

A Subcutaneous Injection in the Loose Skin Behind the Shoulder. Before the needle is removed the injection should be massaged to prevent it running out through the puncture.

Injuries and Stake Wounds

Stake wounds and injuries due to bumps and falls are common on farms and stations.

When haemorrhage is severe, plugging the wound with cotton wool and bandaging with sheeting will save the animal until skilled help can be obtained. Unless the stake can be seen or felt, it is unwise to probe around looking for pieces which may have become embedded in tissue.

Stake wounds in horses respond immediately to penicillin treatment which prevents a bacterial invasion of the surrounding tissue. A course of treatment giving 3-million units daily for three days has been found very effective. For best results, treatment should begin within 24 hours of the injury. However, if there are any fragments of dead bone or foreign material such as splinters left in the wound, it will usually break out again. These cases are best left to a veterinary surgeon.

Punctured wounds may be dangerous as they provide an ideal medium for the development of tetanus. Unless stock have been immunised, tetanus anti-serum should be used. Horses and cattle require 1,000 units while 500 units are sufficient for smaller animals and young stock.

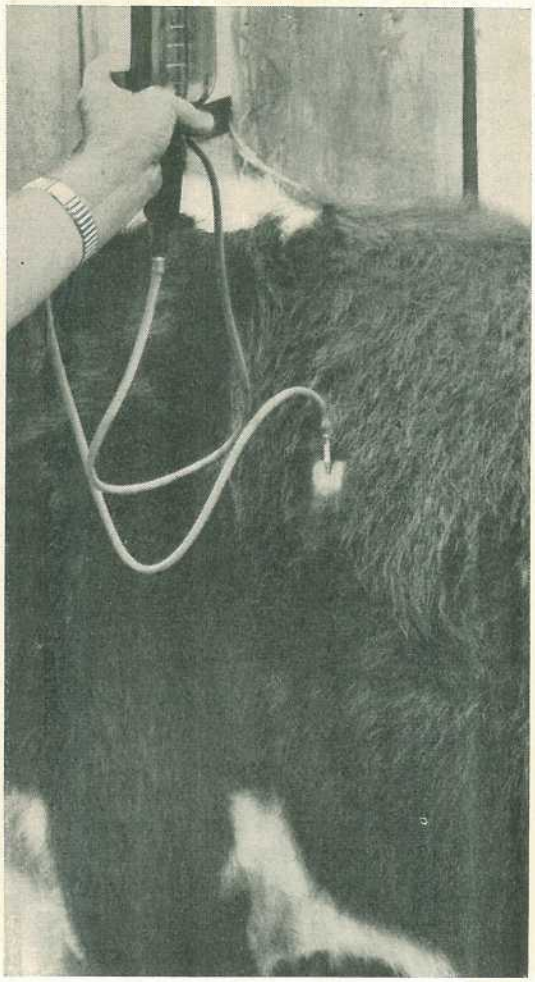


Plate 6

A Flutter Valve Outfit is Used for Subcutaneous Injections of Large Volumes of Solutions.

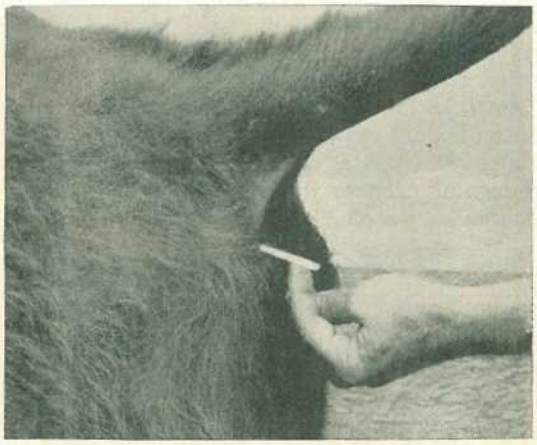


Plate 7

Temperature Recording. A clinical thermometer is introduced into the rectum to about two-thirds of its length and allowed to remain in contact with the rectal wall for 2 min. The normal rectal temperature of cattle is 101 to 102 deg.

Instruments

Hypodermic Syringe.—Plastic syringes are very suitable for inoculation with drugs. They are unbreakable and the rubber plunger rings can be replaced. Two sizes are mainly used, 20 cc. and 10 cc.

Syringes used for blackleg vaccination are also satisfactory for other treatments such as the use of penicillin or anti-tetanus serum. The best needles for general cattle work are 16 gauge S.W.G.

Thermometer.—A clinical thermometer can be obtained at a small cost from chemists. Unless the temperature of a sick animal is known, specific treatment is impossible. The normal rectal temperature of cattle is about 101 to 102 deg. F. A rise of 2 deg. could indicate a possible infection. Factors such as heat, age and exertion must be considered.

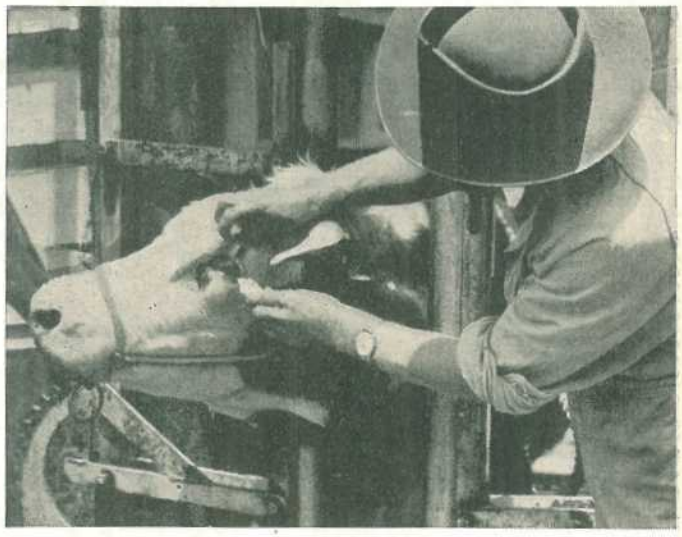
Plate 8

This is a Simple Method of Casting Cattle for Minor Surgery. With large beasts it is advisable to hitch the headrope round a post.

Plate 9

So Long as the Animal is Held Securely, Blight Remedies Can Be Applied Effectively by Means of an Insufflator. In advanced cases, daily treatment is necessary.

—Photographs by "The Morning Bulletin," Rockhampton.



Stake Forceps.—On grazing properties stake forceps are useful to remove protruding stakes from horses.

Trocar and Cannula.—Where lucerne and clover grazing is practised this instrument is essential. Spraying lucerne and irrigated pastures with tallow has reduced the risk of bloat considerably.

Gravity Feed Apparatus.—Where large volumes of solutions such as sulphadimadine and calcium borogluconate are to be given as an injection a rubber tubing outfit known as a flutter valve can be attached to the neck of a bottle, saving a tedious job with a syringe.

Using the Instruments.—In using a syringe to give an intravenous injection (Plate 2), the jugular vein is distended by means of a tourniquet. A hypodermic needle is inserted into the vein. When the blood flows freely from the needle, the tourniquet is released and the syringe is attached to the needle. Drugs can be given by this method, but they should be administered slowly.

A trocar and cannula is used to take blood from a bleeder (Plate 3). First, the jugular vein is distended by applying a tourniquet, and the hair over the vein is clipped. The skin is cleaned with methylated spirit and a small incision is made to allow free entry of the trocar and cannula. When the point of the trocar pierces the jugular vein a sudden loss of tension is felt. Then the cannula can be positioned so that the cannula lies within the vein and pointing in the direction of the beasts's head. When the trocar is removed, the blood should flow from the cannula in a strong stream so long as the jugular vein is held under pressure by the tourniquet.

When sufficient blood has been collected, the tourniquet is released and the trocar reinserted into the cannula. The instrument is then withdrawn. The punctured area should be pinched firmly until bleeding has ceased, otherwise haematoma will form and interfere with later bleedings.

Drenches can be administered with a bottle or a gun (Plate 4). The beast's head should be held under your arm and raised sufficiently to prevent the animal from rejecting the drench. A bail is best for restraining the animal, but the operation can be done in a crush. The animal's head should not be raised more than 45 deg. from its normal position or the drench may pass into the windpipe and cause damage to the lungs.

A subcutaneous injection is given in an area of loose skin either on the side of the neck or behind the shoulder. (Plate 5.) The hair is clipped and the skin cleaned with methylated spirit. A fold of skin is held between the forefingers of one hand while the needle is pushed forcibly against the skin until it penetrates and its stem is between the skin and the underlying muscles. The syringe is then attached and the

injection made. Before removing the needle, the injection should be massaged away from the needle to prevent its return through the skin puncture when the needle is removed.

If large volumes of solutions are to be administered by subcutaneous injection, a flutter valve outfit is used. (Plate 6.)

For minor surgery, cattle can be cast with little effort by applying two half-hitches, just behind the shoulder and just in front of the hip. (Plate 8.) When tension is applied to the rope the animal collapses. With large beasts, it is advisable to hitch the headrope round a post.

Red Clover

Interest in red clover and its use in irrigated pastures has prompted many inquiries regarding this plant.

Answer: Red clover or "cow grass" is a native of Europe and is extensively grown in temperate countries for pasture and hay purposes. In Queensland red clover is an important legume for inclusion in irrigated pasture mixtures where it provides grazing well into the summer. It may last for four to five years in southern States but the climatic conditions here tend to cause it to decline after two to three years.

The plant is upright in growth and has hairy leaves and stems. It has fairly large flower heads which are globular shaped and reddish-purple in colour. As it does not favour hot or dry conditions it is not satisfactory on the tropical coast or the drier parts of the State. In southern Queensland it does well where irrigated. In these circumstances it begins to produce abundant growth about August and in mild summers it will continue to produce well for a long period frequently throughout the summer.

Red clover favours clay to clay loam soils which are well drained and preferably mildly alkaline to slightly acid in reaction. Medium to strongly acid soils are not suited to red clover growing.

This plant is usually sown in pasture mixtures, frequently in association with white clover. The planting rate varies but is usually about ½ to 1 lb. to the acre in a mixture with suitable grasses and other legumes. Planting should be done during autumn.

The palatability of red clover may vary from time to time due to the hairy coating on the plant but generally stock take the plant readily. As with most clovers, bloating may be troublesome during periods of lush growth.

In recent years red clover has shown a great susceptibility to rugose leaf curl and consequently it is now considered unwise to include this legume in pasture mixtures. Once the red clover has become infected with rugose leaf curl it could act as a source of infection for other legumes which are susceptible to the disease.

The types of red clover usually grown in Queensland are New Zealand cow grass and Montgomery red.

stock and station

Regularity of Breeding.—To the commercial cattleman who has a breeding property, the breeding cow is the basic animal. Her job is to produce the saleable product—the calf.

When you have the chance to cull some cows, number one yardstick should be regularity of breeding. Aim at developing a herd of cows which produce a calf every year.

That's a very high standard, but you could approach it this way. At the end of the main calving season, or when you do the first round after the wet season, note all the dry cows. Identify them in some way. You can use coloured or metal tags, for instance. Or you may be able to draft them off into a separate group.

Then in six months' time—say about September—look them over again. Cull those which show no sign of producing a calf. They should be fat and find a ready market.

Your culling for type should have been done before the heifer was allowed into the breeding herd. Once an animal is taken into the breeding herd her value depends largely on the number of calves she will produce in a given time. Many cows produce a calf a year—you can have a greater proportion of them if you make it your number one culling point.

—W. F. MAWSON,
Senior Adviser in Cattle Husbandry.

Litter Recording.—Litter recording will supply the answers to questions about the productivity of your pigs.

Litter recording not only points out the productive from the unproductive sows; it also shows up faults in feeding, housing, and management practices, if the records are kept accurately and used intelligently.

Recording consists of weighing all litters at birth, 3 and 8 weeks. Records are kept for a year and then evaluated. Each sow is awarded points according to age, number and weight of pigs weaned. Sows which rear a litter that scores more than a standard number of points will be given a "star" rating. Similarly the boar is given star rating if he sires enough star litters.

To find out how good your sows are, see your local Pig Branch Officer, and ask him to submit your herd to litter recording.

—T. ABELL, Senior Adviser, Pig Branch.

Care Pays in Weaning Lambs.—The earning capacity of a lamb is often marred in the few months when it first has to fend for itself. Those given good care and feed have the best opportunity to develop into heavy wool producers.

The best paddocks should be reserved for weaners. These paddocks should not only have good feed and water, but also shade, shelter and secure fences.

The best weaning age is five months, because by then most of the ewes have gone dry although they are still conducting their lambs to feed and water. If they have been without green feed for some months and if the season is likely to remain dry, it is a good idea to drench lambs at weaning with 500,000 international units of vitamin A emulsion. You are unlikely to observe any change in their condition, but it has been shown that weaners are better able to pull through a dry spell if given this drench.

The time taken to crutch and wig the young sheep is time well spent. Wigging is especially useful if the paddock carries burr or if the sheep are likely to become seeded around the head.

Sheep going into a new paddock should always be put on the water, and if thirsty at the time so much the better. This should be done in the daylight and for preference just before dusk. The sheep should also be held on the water for a short time so they will be better able to remember its location. A few adult, dry sheep run with the weaners will help to conduct the young stock around. After the weaners have been put into their new paddock, don't forget them. For a week or so, ride the fences carefully every day, driving the stragglers out of corners and back to the water points where they can join up with the main flock.

Mules Operation.—Any way you look at it, having the Mules operation performed on your sheep gives you security. Today, it should be the starting point of all your blowfly control measures.

In the days before the Mules operation, you could never be sure a bad smash wasn't just around the corner as the result of a sudden fly wave. Now, with a Mules-treated flock, even the worst fly wave is unlikely to cause very heavy losses.

Then, when crutchers aren't readily available, you have a margin of safety. Mulesed sheep are much less prone to crutch strike than untreated sheep, so you may be able to wait until a team of crutchers is free. On the other hand, you may have to jet your flock because a mid-season crutching can't be arranged. If this happens, you'll find that jetting mulesed sheep gives better protection.

You can reckon the cost of breech strike in terms of dead sheep, lower wool cuts, lower wool prices and smaller lambings. One strike will reduce a sheep's wool cut by 2½ per cent. And it's well to remember that wool production continues to decrease as the number and size of the strikes increase.

Tenderness of the fleece, which reduces its value, is associated with fly strike. A flock that has had small or medium strikes can be expected to cut about 15 per cent. of tender fleeces. But the occurrence of large strikes, measuring 5 in. or more across, can lift the number of tender fleeces to as high as 44 per cent.

Blowfly strike also reduces the fertility of ewes. Of ewes that have been struck, fertility is usually in the region of 15 per cent. below that of ewes free from strike.

On top of all these advantages, mulesing reduces your other blowfly control measures to a minimum. This leaves more time and labour free for property development.

—M. N. JACKSON,
Senior Sheep and Wool Adviser.

Endrin Sprays Poison Stock.—Endrin is highly poisonous to stock and should on no account be used to spray cattle for ticks. Don't let its high efficiency in dealing with certain vegetable pests mislead you into believing it can be used on stock.

Several Brisbane district farmers have reported deaths and sickness in cattle after spraying with endrin. These farmers had been controlling vegetable pests with endrin and, impressed by its effectiveness, had tried it against cattle ticks.

Endrin is also used extensively against tobacco pests, and in the past, losses from endrin poisoning in cattle and poultry have occurred in the Mareeba district. As tobacco growing is now extending into new areas, new tobacco growers should avoid the mistake of using endrin on house cows or other stock.

Endrin is a nerve poison. Symptoms of poisoning include excessive excitability, especially when stock are handled. Affected stock move hesitantly as though their vision is impaired, their ears flap more than usual and blinking may occur. Some muscle tremor is usually present. In severe cases convulsions may occur with the animal falling on its side and kicking aimlessly.

If you suspect endrin poisoning, seek veterinary assistance immediately. At all costs, avoid disturbing the stock as this will bring on or intensify the symptoms. Put affected stock in a paddock with shade and water. It may be desirable to stop milking them.

Calves are even more susceptible to endrin poisoning than adult stock. Affected calves are best housed in a darkened barn or shed to lessen the degree of stimulation.

It should be noted that the organic phosphate spray, parathion, also should be used only on plants.

—S. G. KNOTT,
Divisional Veterinary Officer.

Nasal Bot of Sheep

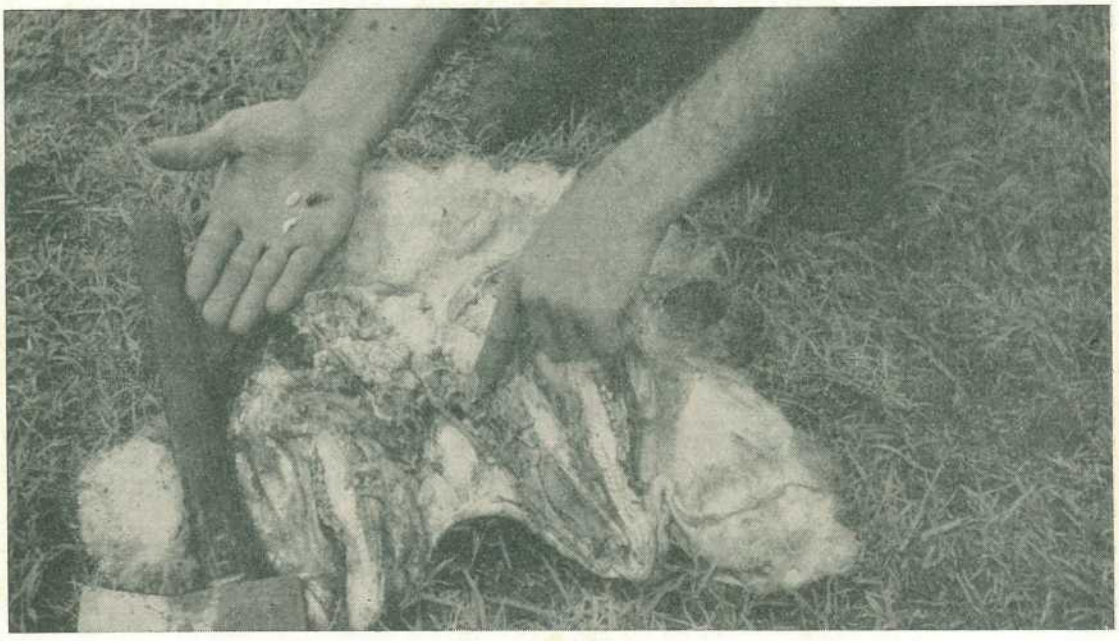


Plate 1

A Freshly Split Sheep's Skull. The demonstrator is pointing to the nasal sinuses of the skull into which the larvae crawl and mature, causing the typical "snotty nose" which is the main symptom of this disorder.

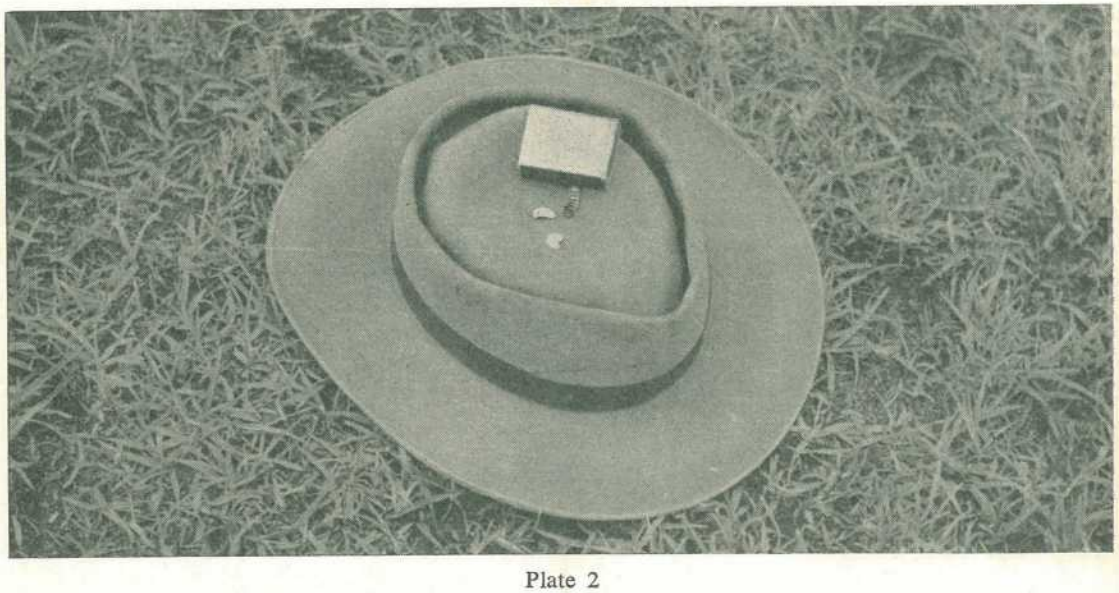


Plate 2

Nasal Bot Larvae, Compared in Size with a Match Box and Hat. An article on control of sheep nasal bot with lindane appeared in the August 1959 issue of the *Queensland Agricultural Journal.*

Tuberculosis-Free Cattle Herds

(As at 1st July, 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
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

Aiming At Efficient Pollination In Apples

By M. A. HANNIGAN,
Senior Adviser in Horticulture.

Growers can take precautions towards obtaining efficient pollination in apples, without which a full crop cannot be achieved.

The aim of every orchardist is to produce vigorous, healthy, well-grown trees which bear the maximum crop of fruit each year.

Many apple growers have good type trees but fail to get regular crops from year to year. Several factors may cause such irregularities in cropping. If yields are still low after allowance is made for the adverse effects on fruit set of spring frosts, cold winds, and wet weather at blossoming, lack of adequate pollination could be involved.

Pollination

The flower of the apple is complete with pistil, stamens, petals and sepals. The pistil has a swollen base and a tube-like style with a swollen stigma at the top. The stamens carry anthers at the tips which open at maturity and liberate pollen. When the discharged pollen reaches the surface of the receptive stigma, it germinates and forms pollen tubes within the style through which the male nuclei pass to the ovary. Here, fertilization takes place and development of the fruit begins.

Self-Sterility

Many varieties of apple either fail to set a crop or set only a partial crop when the flowers receive pollen only from flowers of the same tree or other trees of the same variety. Block plantings of such varieties can be expected to produce only light crops of fruit and are therefore of little commercial value. The flowers are said to be self-sterile.

The causes of self-sterility in apples are many and varied. Sometimes pollen tube elongation is too slow to permit fertilization of the ovary. Sometimes, inherent sterility factors are involved in the failure of the reproductive mechanism. In some varieties, such as Gravenstein, for example, the pollen is actually non-viable and incapable of pollinating flowers of the same or any other variety of apple.

Fortunately, from the point of view of the apple grower, cross pollination between varieties is consistently effective and this fact is exploited in commercial orchard practice to ensure normal cropping from year to year. This pre-supposes inter-planting of two or more varieties when the orchard is established.

As varieties differ in their times of flowering and the period from bud burst to petal fall in a single variety is only a matter of days, the varieties selected for inter-planting must have similar blosoming times.

Inter-planting

The main varieties of apple grown at Stanthorpe, in their order of importance, are Granny Smith, Delicious, Jonathan, Gravenstein, Winesap and McIntosh Red. Most of these varieties blossom at or about the same time.

With the exception of Gravenstein, any two of the foregoing varieties may be planted together. As mentioned previously, Gravenstein pollen is non-viable and where this variety is grown commercially, a three-variety planting is

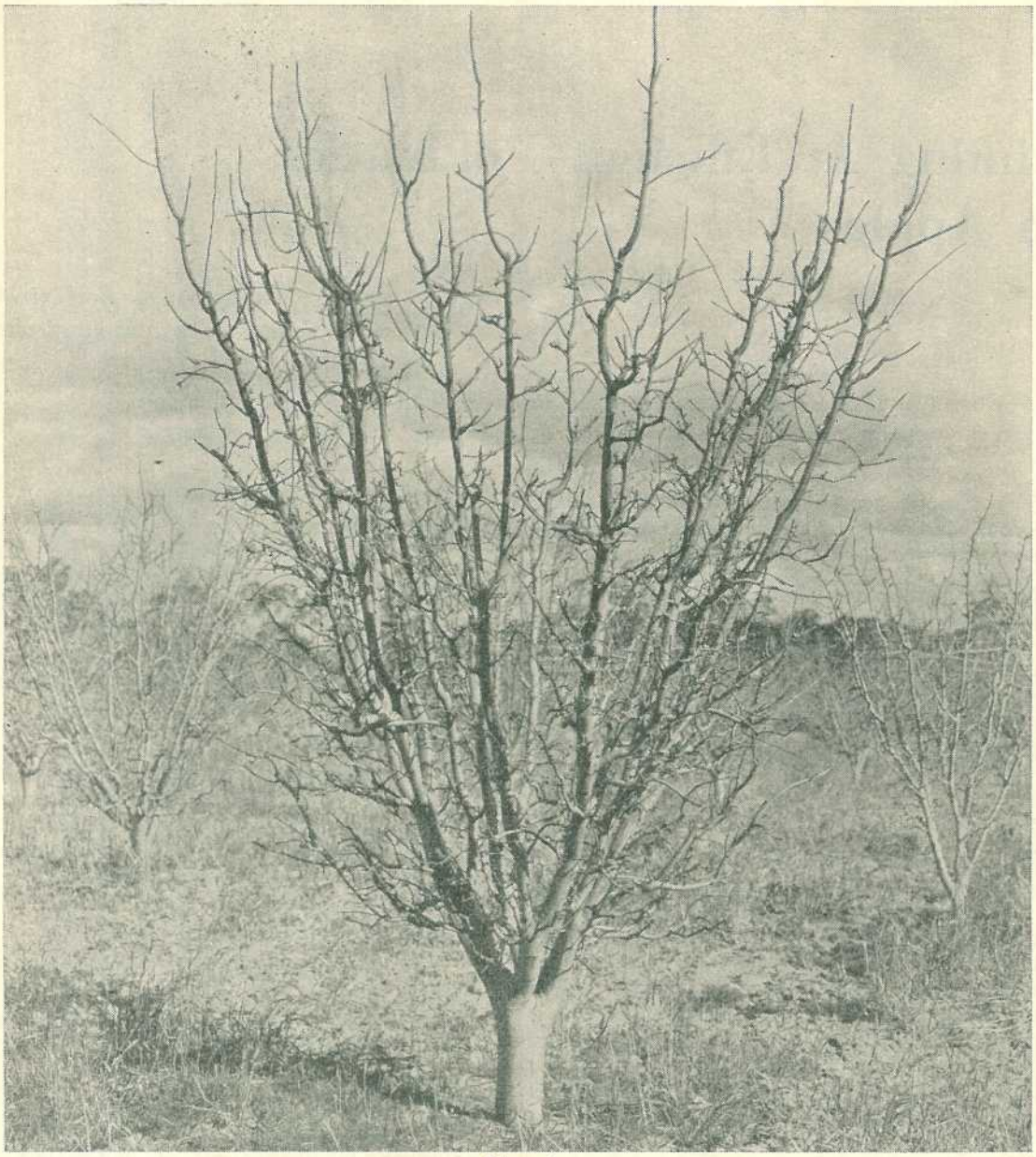


Plate 1

Winter in the Apple Orchard. A season for reflection. If crops are below expectation, pollination may be faulty. Top-working some trees with a pollinator variety may be necessary.

necessary, the usual combination being Gravenstein, Jonathan and Granny Smith. The Gravenstein blossom is pollinated by both Jonathan and Granny Smith, while these two varieties pollinate each other.

Pollen must be carried from one variety of apple to another if cross-pollination is to be effective. The transfer of pollen from tree to tree is largely carried out by bees. When working at high pressure during full blossom, bees

Plate 2

Top-Worked Tree at Bud Burst. Top-working selected trees with a second variety is a recognised method of improving pollination in the orchard.

forage over only a relatively short distance. It follows, therefore, that the inter-planted varieties of apple should be reasonably close together. In commercial orchards, this is achieved by establishing two varieties (A and B) so that two rows of variety A adjoin two rows of variety B. The maximum permissible distance between pollinator trees should not exceed three rows.

Wet, cold or cloudy weather at blossoming will slow down the activity of bees. In order to ensure a full set of fruit under such conditions, at least one hive of bees is needed for each acre

of trees in the orchard. Care must, of course, be taken to avoid using the more lethal insecticidal sprays when the trees are in full bloom; otherwise considerable damage may be done to the hives.

If, for any reason, the grower wishes to plant only the minimum number of trees needed to pollinate his main commercial variety, every third tree in every third row should be a pollinator. With this arrangement, one tree in nine is a pollinator surrounded by eight trees of the desired commercial variety.

Where the number of pollinator trees in an established orchard is insufficient to ensure a full set of fruit, the deficiency can be made good by top working or refurnishing the required number of trees with scionwood of the pollinator variety. This procedure is better than grafting over single limbs on several trees with scionwood of the desired type.

Seasonal Factors

Dry weather, excessive rain and late spring frosts influence blossoming times and their effect is greater in some varieties than in others.

In 1958–59, for example, blossoming was erratic in the three main commercial varieties—Granny Smith, Delicious and Jonathan. Granny Smith was in full bloom before the Delicious flowers had opened. Fortunately, Jonathan trees blossomed shortly after the Granny Smiths and, in three-variety plantings, pollinated both Granny Smith and Delicious. Inter-plantings of three varieties in an apple orchard is probably the best available precaution against poor setting due to variations in blossoming times due to climatic factors. In such plantings, pollen is available for the longest possible period.

Effective pollination is essential for a full crop of apples. It is no substitute for deficiencies in plant foods or soil moisture at critical period of growth in spring. Without it, however, the grower cannot hope to reap the full benefit to be derived from efficient soil management in the orchard.

Pre-Germinate Early Cucumber Seed

The market pays a premium for early cucumbers, melons and pumpkins. If you want to place your crops on this market, it is necessary to pre-germinate the seed before planting.

The market for early cucumbers is so profitable that it is worthwhile making special efforts to exploit it. On light-textured soils with a warm aspect, shallow planting and a heavy sowing rate may solve the problem and get a good stand from plantings made in June and July. But in most vegetable growing districts on the coast, better results can be obtained by pre-germinating the seed.

One of the easiest ways to pre-germinate seed is to spread it evenly between wet bags in a warm room. The bags must be clean, or moulds may develop and smother the seed. If old bags are used, they should be sterilized by boiling before use. The seed may be soaked for a few hours before it is put between the bags, but this is not necessary if the bags are kept moist.

Temperatures in rooms used for pre-germinating seed should be held at 70 deg. F. or higher. This temperature corresponds to that of a farm kitchen with a coke or wood stove. On farms with papaw ripening rooms or chicken brooders in which the temperature rarely drops below 80 deg., bags are unnecessary and the seed may be pre-germinated by placing it in an enamel or plastic basin, covering it with water for a few hours, draining off the surface water and holding the seed until germination begins.

Pre-germinated seed is ready for machine planting at the first sign of a break in the seed coat. If it is to be planted by hand it is better to wait until the root tips emerge from the seed. Planting should never be delayed beyond this stage as seeds with protruding roots are difficult to handle without damage. If the roots are damaged, any advantage from pre-germination is lost. Pre-germinated seed should be planted in moist soil. If the soil is not moist, the land should be irrigated immediately after planting.

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

orchard and garden

Winter Irrigation of Papaws.—Growers know well just how sensitive papaw trees are to soil moisture. Even on a well-drained soil there is a certain amount of seasonal hazard, and this applies particularly to irrigated plantations.

Growth in spring and summer is vigorous. The soil needs plenty of water to balance big moisture losses from direct evaporation and foliage transpiration. Liberal irrigation is then required to maintain the sequence of growth, flowering and fruiting.

The position is different in winter. Growth is slow, evaporation and transpiration rates fall, water requirements decline considerably and over-generous irrigations can easily cause serious troubles in the way of root rots, particularly among young trees.

—D. DOWDLES, Adviser in Horticulture.

Fertilizer Burn in Bean Crops.—In beans, slipshod applications of the pre-planting fertilizer could cost you the best part of your crop. Unless the fertilizer is placed correctly, it may cause root damage and an irregular stand of plants.

The 5:14:2 pre-planting fertilizer should be placed in a band 4 to 6 in. wide. The depth should be about 2 in. below the level at which the seed will be planted.

Some farmers open up planting furrows and apply the fertilizer in the furrow. This is scuffled into the soil and the seed is planted by hand. This procedure is satisfactory provided the fertilizer is placed in the bottom of the furrow and sufficient soil is brought from the sides to cover it to the required depth. Seed planted in soil containing excessive amounts of raw fertilizer may fail to germinate, or give a poor stand.

—K. KING, Senior Adviser in Horticulture.

Condemned Fruit.—In these days of high costs of production, fruit and vegetable growers must be careful to market only good quality produce. The condemnation of fruit and vegetables is always rather a nasty pill for the grower to take. However, there are times when even the best of growers has a case or two of fruit or a bag of vegetables withheld from sale for one reason or another. The produce may have been damaged during transit, fruit breakdown could have taken place or, worse still, the grower's produce could have arrived at the market during a glut period. In this event a sale may not have been possible before the produce had become unsound and not fit for sale. Within 24 hours of the action being taken, the Market Inspector must issue a certificate of condemnation for all of the produce condemned at the Brisbane markets and give it to the agent who has control of the produce.

This direction is carried out strictly in accordance with the Queensland Fruit and Vegetables Act.

Once the departmental certificate has been issued to the agent it is his responsibility to ensure that it is forwarded to the grower concerned. If a grower has been advised that his produce was condemned, he should ask his agent for the certificate. This is the grower's right.

—A. J. CROCKER, Senior Market Inspector.

Interception Drains.—Surface water must be diverted away from cultivated crops. Interception drains are therefore indispensable on

fruit and vegetable farms in southern Queensland where commercial crops are grown on sloping ground sometimes with very steep grades.

Failure to install these drains and to keep them in good working order only increases soil erosion problems during heavy rains and aggravates water-logging afterwards. They are especially important in areas where crops are planted in spring and autumn on shallow soils which erode easily and drain slowly.

The interception drain is simply a deep channel across the slope on the upper side of the cultivated area. Its purpose is to collect surface run-off and seepage water from farther up the slope and drain it away to a gully or some other natural waterway. The capacity of the drain varies with the extent of the land above it but the usual dimensions are 9 in. wide and 18 in. or more deep. In shallow soils, the drain should penetrate some inches into the subsoil clay. Where necessary, increased capacity is provided by widening the drain rather than by increasing its depth.

The drain must have a fall of 2 ft. or more in each 100 ft. run to lessen the risk of blockages caused by the sides caving in. If no gully outlet is available, the run-off water can be taken to a grassed paddock where the flow during heavy rain is unlikely to do any damage.

Construction of the interception drain is part of the work involved in preparing land for cropping and is normally carried out before the wet season. In newly constructed drains, maintenance patrols are necessary during and after each fall of rain. Any spoil or debris which might lead to blockages in the flow of water should be cleaned out periodically until the drains have become stabilised. Thereafter patrols after each wet season should be adequate.

Construction and maintenance of interception drains is a routine job which saves both your soil and your crops in a difficult season.

—R. L. PREST,
Senior Adviser in Horticulture.

Watch This When Welding

There is a common opinion that welding equipment with alternating current voltages of up to 90 volts may be used without risk of electric shock. This is entirely incorrect. Fatalities among welding operators have occurred through shocks received from circuits supplied with voltages of 70 to 80 volts alternating current. Any alternating current voltage over about 32 volts must be considered potentially dangerous, but it is with A.C. welding, which invariably involves the use of voltages of 70 to 80 volts, alternating current, that we are particularly concerned in this instance.

All welding operators should have full knowledge of the elementary precautions to be taken to avoid electric shocks. The following safeguards are easy to apply, and should be practised during the course of their work by those engaged in manual metallic arc welding.

(a) Secondary Connections

Whenever practicable, the power should be cut off from the welding terminals before connecting the welding leads to the terminals.

The welding leads of transformer-type machines must be connected as indicated on the machine terminals.

Connections of and in the welding leads may be made by the operator, who should ensure that all electrical connections are clean at the contact areas, and that they are properly tightened and insulated.

(b) Precautions When Welding

All parts of the welding circuit, including the return path, should be considered electrically alive. Consequently the operator must ensure that no part of his body is placed in such a position as to complete a path through it for the passage of electric current.

When working in positions which require him to stand on or rest against the work to be welded, or against any metal in contact with the work, the operator should exercise care not to touch the exposed portion of the electrode or the electrode-holder with any other part of his body, thus incurring the risk of the passage of an electric current through his body.

Under no-load conditions there should be no potential difference between the electrode holders of welders working together. Welders with machines connected to separate phases should not work in close proximity to one another.

(c) Welding in Confined Spaces

Where the operator is required to weld in a confined space such as a boiler drum, air receiver, tank, or in similar positions, the following conditions should be observed:

(i) An all-insulated electrode holder should be used.

(ii) Adequate ventilation should be provided.

(iii) An assistant should be appointed to keep the operator under constant observation.

(iv) Suitable means should be provided, adjacent to the work, to enable the assistant to cut off the power quickly in case of necessity.

(v) Provision should be made for the expeditious withdrawal of the operator in case of shock or other injury, and for the application of suitable treatment.

When a welding operator is called upon to work in a confined space the power should be cut off until he is in position for welding, and also when for any reason he is required to leave the job.

It is desirable that apparatus be provided to reduce the no-load (open circuit) voltage to a value not greater than 32 volts. If such apparatus is used the conditions specified in (iii) and (iv) may be waived.

(d) Insulation

The flux of an electrode holder should not be assumed to be effective insulation. Consequently the changing of an electrode into the holder, or the handling of an electrode once it is in contact with the holder (whether the holder is of the all-insulated type or not) should be done with an insulating glove or other protective device. Alternatively, the power should be cut off during these operations.

Note.—A dry leather glove usually has some insulating properties, and may be considered as an insulating medium, whereas a damp glove or a glove wet from perspiration or any other cause has no insulating properties, and therefore should not be used.

Electrodes should be removed from the holders when not in use to eliminate danger from electrical contact with persons or conducting objects. Electrode holders, when not in use, should be so placed that they cannot make electrical contact with persons or conducting objects.

(e) Care of Welding Leads

The welding leads, both electrode and work, should be protected from damage to the insulation or to the conductor wires. Damaged leads should not be used. When a defect in a lead is found it should be reported immediately. Connections in the leads should be made with suitable metallic connectors and should be effectively insulated.

(f) Inspection and Maintenance

To ensure that all accessories are maintained in a safe and serviceable condition, a visual inspection of the welding machine, followed by an insulation resistance test, should be made at least once every 12 months, and welding leads, electrode holders, and so on should be inspected at least monthly by a competent electrician.

For their own safety, electric welders are urged to observe these precautions. In this way serious electric shocks may be reduced in A.C. welding.

—State Electricity Commission.

Arranging A Wall Vase

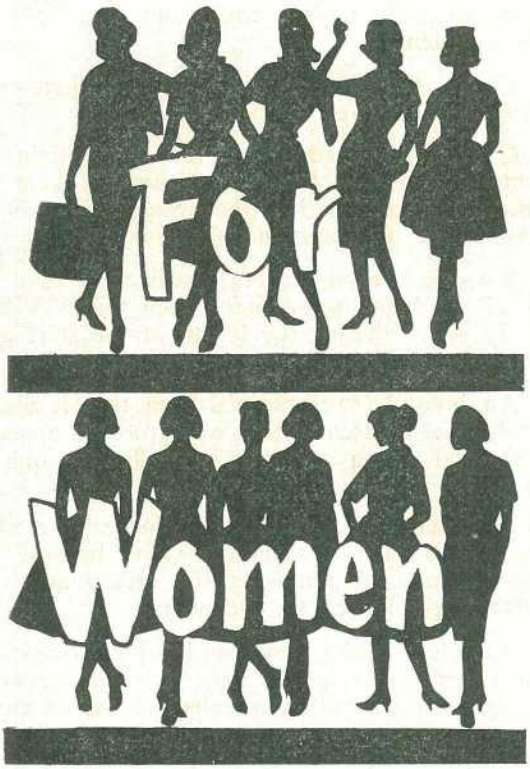
When arranging a wall vase the first and important point to bear in mind is that it is probably going to be looked up at. It therefore is necessary to place the vase at that level to arrange.

The most usual material for such arrangements is that which falls over the edge of the container and hangs well down. Plants which naturally grow downwards are the easiest to use, such as ivy, ivy geranium and similar vines.

As line, or silhouette, is the general effect, it is well to be careful not to use too much material. A good plan is to select and arrange first a good outline and firmly secure it. Crumpled chicken wire is probably the best holder for the tapering type of vase commonly used.

With these branches secure, now place a focal point of two or three blooms, a bunch of berries, or leaves of contrasting shade. Arrange them above and also partly falling over the rim of the vase, thereby breaking the line of rim.

Select a vase which suits your room for there is much contrast in wall vases and their types.



Short-cuts In Dressmaking

Well made, attractive garments can be made in less time and without sacrificing workmanship and serviceability by simplifying sewing.

In addition to contributing to time-saving by selecting easily handled fabrics, simple but well-designed styles, and the right sized pattern, much can be achieved by simplifying construction methods also.

Too much attention to detailed neatening and finishing can sometimes spoil the whole effect of line and style of a garment.

The well-illustrated, step-by-step instruction sheet is one of the best aids to the home dressmaker.

Each step is planned to ensure ease of handling and quick construction.

In addition, it is wise to study one of the dressmaking books published by the various pattern-making companies.

All are clearly and well illustrated, are revised frequently and are not too expensive.

Another aid is to observe the methods employed on ready-made garments—some of them can be adopted by the home dressmaker to her advantage.

Eliminating all tacking is not necessarily time saving—at times it can result in a whole section having to be unpicked, reset, tacked and restitched.

When tacking or basting is necessary to help achieve the desired result, then it is worthwhile.

Experienced dressmakers can, and do, save much time by pin-basting the simpler, more straightforward seamings.

Dressmakers in such a hurry that they haven't time to trim edges are sacrificing the professional finish.

For example, trimming the seam allowance of a curved collar, and clipping out small wedges around the curve to avoid lumpiness, save time in turning the collar.

A more even and flatter edge also results.

Where time is short it is better to select fabrics, or styles, that require little or no trimming.

Buttons, provided they are washable, can provide a quick and effective trimming—alternatively, accessories can take the place of time-consuming applied trimmings.

For children's wear flat trimmings, such as embroidered braids, are quick and easy to attach and are easy to iron.

Novelty embroidery stitches and simple, quick-to-make trims that give a professional look to an otherwise uninteresting garment may be made by modern machines and attachments.

For mothers of a young family this type of machine is a worthwhile investment.

Coat Linings

Coat linings in contrast or pattern have been a feature of recent fashions, but whether featured or not, a good lining adds to the appearance of a coat.

Linings also give added warmth, and many people have found milium—the insulated lining—both attractive and comfortable for this reason.

For those who live where the climate is very cold for some weeks during the winter an extra, detachable, lining will give extra warmth.

If made from one of the fur fabrics or new texture or shaggy woollen, glamour, as well as warmth, is added.

Interlinings which are put between the coating and the lining make winter garments snug and warm without adding bulk or weight.

However, an interlining to give warmth reduces the period for which the coat can be worn with comfort—but this will depend on the thickness of the interlining fabric.

Sometimes it is found sufficient to interline the back of the coat only.

It is well worthwhile for home dressmakers to explore the wide variety of interfacings now on the market.

They include canvas, linens, haircloth, muslins, organdie, and the non-woven fabrics, like vilene, in a variety of colours and weights.

A useful new tip is to interface the seam allowances each side of a zip fastener with vilene for extra neatness and firmness, also put a strip in a "kick pleat" to give a crisp look and prevent wrinkles.

Judging Skirt Lengths

The woman who aims to look as well as she can will heed, but not necessarily follow, fashion's decrees about skirt lengths.

The reason for this is that the length that suits a woman best depends on her figure type, her height and the length and shapeliness of her legs.

The style of skirt and sometimes the pattern on the fabric will also be an influence for the most attractive length.

This does not mean that a fashion trend for up or down should be completely ignored, it simply means that it is well to keep one's figure in mind when taking up or letting down.

Whether skirt lengths are in the news or not it is usually wise to check skirts and hems with each new season in case the fabric has dropped or some stiches have come undone.

When considering whether to alter the length of a skirt always undo the hem completely, press carefully on the wrong side, and pin to the new length.

Check the whole effect by standing—*and sitting*—in front of a long mirror.

Choose the length which is most flattering—remembering that the figure must be kept in proportion, because it is the overall effect which counts, not just from the hips down.

For this reason jacket lengths may have to be changed and sometimes, when the skirt has a hip yoke, altering the length of the skirt can completely upset the overall proportion.

An invisible, well-finished hem that is absolutely level is essential to a well-groomed appearance and worth whatever trouble is required to obtain it.

In general, it is easier and more successful to shorten than to lengthen skirts because of the difficulty of removing the crease and the stitch marks left by the old hem.

If the lengthening leaves an insufficient amount for a hem the wide bias strip which is available by the yard in a variety of colours is the solution.

Stiffening Fabrics

Some of today's fabrics, like yesterday's, need a little help to maintain their original stiffness after a number of launderings.

The British Good Housekeeping Institute has recently experimented to find the best methods to stiffen a problem material.

Starch, plastic stiffener, and gum arabic were the agents used.

A basic starch mix was made by mixing one heaped tablespoonful starch to a cream and adding two pints boiling water. This was diluted with 2 pints water when used for taiho and silk shantung.

The gum arabic was made into a solution by adding 2 oz. powdered gum arabic to ½ pint water in a jar and standing the jar in hot water until the powder dissolves. This was diluted as shown below.

Gum arabic was found the most satisfactory stiffening agent for taiho, silk shantung and taffeta (dresses).

Only a little stiffening is necessary to give body to taiho.

One teaspoon of the gum water to ½ pint water gave a good result, similar to original stiffness; 2 teaspoons to ½ pint made the fabric rather too stiff.

Starch gave a too stiff, patchy, and discoloured result, and the plastic stiffener (1 dessertspoon—1 to 2 pints water) resulted in a slightly patchy finish with poor handling quality.

Good "handle" with almost normal texture resulted from the use of 1 teaspoon gum water to ½ pint water; a stronger solution made the fabric too stiff.

Starch solution gave poor colour and a patchy finish. The plastic stiffener (1 dessertspoon—1 to 2 pints water) gave a matt appearance with a change in colour.

Gum water in the proportion of 1 teaspoon to ½ pint water is recommended to restore original stiffness to taffeta dresses—not underskirts. If slightly more stiffness is required use in proportion of 2 teaspoons to 1 pint water.

Removing Cosmetic Stains

Even women used to handling cosmetics with skill and care sometimes face the annoyance of having to remove stains caused by lipsticks, perfume, rouge, nail polish or some other item of makeup, but fortunately, most of these stains can be taken out by simple cleaning processes in the home.

If the fabric is washable, first wipe off carefully as much of the stain as possible, then just washing in warm, soapy water may be enough to take it out.

If the stain has set or is fairly heavy, loosen it first by rubbing with a little glycerine or lard, then rinse and launder as usual.

If traces of stain persist after this, test the fabric for colour fastness then try sponging with hydrogen peroxide and rinse well. Non-washable fabrics demand special treatment. First place a pad or piece of clean blotting paper under the stained portion.

Then sponge it with dry-cleaning liquid, or dip the stain in a little of the solvent.

Blot frequently with a clean blotter, and be sure to replace the pad from time to time as it takes up the stain.

Bleach with hydrogen peroxide if necessary, after testing for colour-fastness.

A little glycerine, lard, or vaseline could be worked into the stain to soften it up before sponging.

The first step in removing powder stains is to shake the garment out well, and brush it lightly with a soft brush.

Then sponge with dry-cleaning fluid.

Silk or woollen fabrics should be sponged with lukewarm soapy water before the cleaner is applied.

Sponge the stain carefully and lightly with pure acetone or amyl acetate, which can be bought at most chemists—but don't use acetone on acetate rayon fabric unless you want to see the fabric dissolve.

In any case, be sure to test the cleaner on an inconspicuous part of the fabric first.

Any lingering traces of colour can be bleached out of white cotton and linen by sponging first with water, then with hydrogen peroxide, then rinsing the fabric well.

That Word "Shortening"

It is always interesting to learn how a word or term comes to be used in a sense quite different from its more obvious, and generally accepted, meaning.

Here is the result of some research by home economists in the United States Department of Agriculture.

This group traced the background, use, and application of the words "short" and "shortening" as cooking terms.

They traced the word "short" through Old English, High German, Low German, Teutonic, and Latin.

For example, both the Teutonic "shkurt" and the Latin "ex cortus" meant "to break".

Thus, in addition to meaning the opposite of long, short has been given a second meaning—a crumbling, tender quality in food.

An English cookbook of the year 1430 praised a cake which "eats short".

"Shortening" as a cooking term first appeared in an English cookbook published in 1829.

Modern food chemists say that if flour and water are mixed, then studied under a microscope, the long strands of gluten in the dough can be seen. And when fat is added to the dough the gluten strands are seen to be literally shorter.

Thus the meaning of the word which means the opposite of long is also applied when "short" and "shortening" are used as food terms.

Drawer Partitions Useful

For those who "can't find anything in that drawer" Miss Nancy Foskett, Senior Extension Officer (Women's Service), New South Wales Department of Agriculture, recommends partitioning the drawer so that like things may be stored in the one compartment.

In the kitchen drawers this not only saves time but saves wear on the articles and, in the case of knives, sharp-edged and pointed tools, is much safer.

For knives, of course, one of the new type of racks, placed out of the reach of tiny hands, is an even safer and better method of knife storage.

Whether scraps of wallboard, ply, stiff cardboard, or wood from a cheese box is used for the partitions, be sure to make them removable to simplify cleaning and lining.

Sometimes a wooden or plastic cutlery box can be bought to fit a drawer. Failing this, wood or cardboard boxes can often be found to fit into the drawer and, when painted, are quite satisfactory.

A plastic sewing-tidy tray is ideal for a dressing table drawer.

A plastic fly-box from the fishing counter of a sports store is just the thing for ear-rings and small pieces of costume jewellery, whether in a drawer or in a holiday suit-case.

Deep Drawers

The "dead" space in the top half of a deep drawer can often be put to work by having a tray that will slide from front to back, or side to side.

If the bottom half of the drawer is partitioned the tray could run on the partitions; if not, a length of beading tacked down either end, or along the back and front of the drawer would provide runners.

The tray should be only half the width or length of the drawer, to allow easy access to the bottom of the drawer.

A deep drawer in the kitchen could be partitioned off from side to side to give filing-type storage for cake pans.

The distance between each divider would be governed by the depth of each cake pan.

Buying a Washing Machine?

With three types of washing machines available —automatic, semi-automatic and non-automatic —with various features incorporated by the different makers, choosing a washing machine is not easy.

Because a washing machine is a major piece of household equipment and is expensive, its purchase requires careful thought.

Cost is a factor that most have to consider. However, a costly machine is not necessarily the better one—for you.

The extra cost may be due to special features for which you have no need.

For this reason become familiar with what is available; with the various time-and-labour-saving features of each machine.

Analyse this knowledge in the light of—

(i.) Your needs;

(ii.) Your willingness to change laundering habits if necessary.

When checking the performances of various machines with their users, remember one cannot always judge by others' opinions, as individual standards vary.

Other factors to be considered are:

Power.—Required—available.

Water Supply.—In general, automatic and semi-automatic use more water than the non-automatic.

Hot water supply is an advantage with all types.

Water Disposal.—Drains for waste water are desirable. Non-automatic may be emptied by hand if necessary. With large volumes of waste water it may be best to by-pass septic tanks.

Taps.—Separate hot and cold water taps are necessary for automatic and semi-automatic machines, while a fitting that mixes hot and cold water is most convenient with non-automatic machines.

Installation.—No special installation is needed for non-automatic types, but may be for others.

Maintenance cost.—May be higher on automatic and semi-automatic ones. Be sure prompt, satisfactory repair service available.

Operating expenses.—Less for non-automatics, others slightly higher.

Check When Buying

- Amount of water required.
- Availability of hot water. Alternatively, consider heating unit in washer.
- Capacity in relation to family size. Studies have shown that a 6 lb. load washes better than the 8 to 10 lb. loads generally recommended.
- Placement of controls. They should be easy to reach and to operate, and their uses clearly indicated.
- Tub materials should be easy to clean and durable.
- General workmanship: Made from strong materials, well-braced and welded, free from sharp and rough edges; parts that come in contact with clothes rustproof; tub and motor mounted in such a way that noise and vibration will be reduced.
- Motor should be placed where it is shielded from water, grounded, and insulated from metal of the machine. A sealed-in lubricant that oils the machine permanently is desirable.

Wringer machines.—Look for safety features. Check the emergency release, type of rollers and pressure, convenience of controls, balance of machine with wringer in different positions.

Spinner machines.—Make sure drain board (if there is one) is high enough to fit over tub, check tap fittings and ease with which basket may be removed.

All non-automatics.—A separate motor switch on the machine; method of emptying—motor driven pump adds to cost, but saves time and energy and keeps water off the floor; a rubber gasket on the cover; height and manner of adjusting; casters on legs; a holder for the flex; a water line mark on the tub and a timer are useful extras.

—From N.S.W. Department of Agriculture's "Press Copy."

Demand For No-Shrink Wools

Demand for washable no-shrink wools has surprised manufacturers, and mills are working overtime to meet the demand. Exports of washable lightweight wool frocks, blouses and shirts to New Zealand have widened the demand.

Men's washable no-iron shirts are being bought up as fast as they can be produced.

By spring, classweave sironised wool fabrics will be in retail stores throughout Australia in dresses and piecegoods, shirts, blouses, dressing gowns, skirts, slacks and the new spring coats.

—Australian Wool Bureau.

Brucellosis-Tested Swine Herds

(As at 1st July, 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., "Tansey" Stud, 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
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
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