Queensland
AGRICULTURAL JOURNAL

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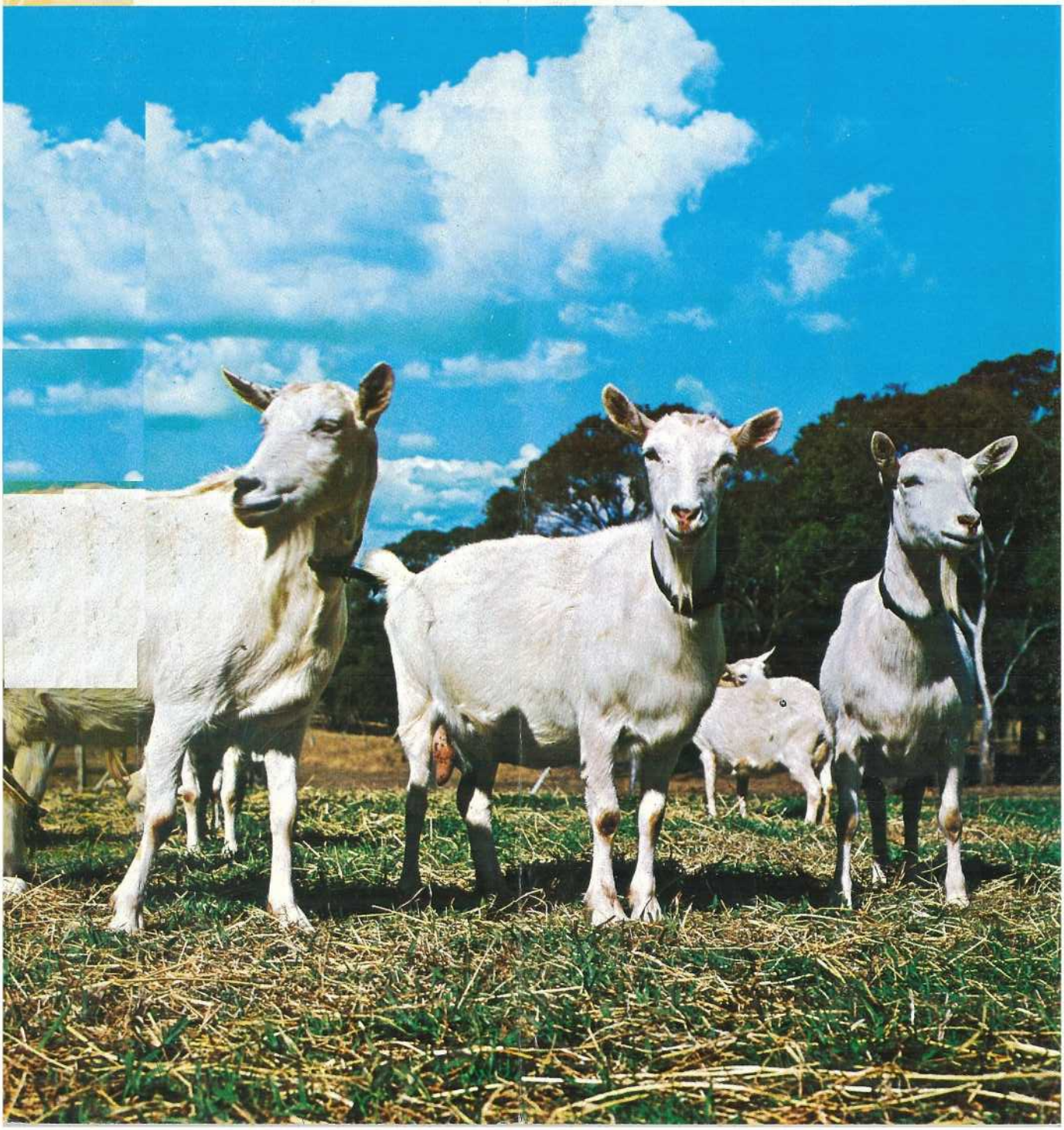

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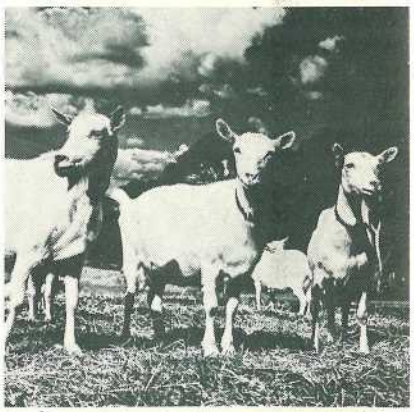

Saanan goats at a Toowoomba district stud.

Editor: A. E. FISHER

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QUEENSLAND AGRICULTURAL JOURNAL

Contents

FEBRUARY 1974

Journal a Flood Casualty

YOUR copy of the *Queensland Agricultural Journal* this month is much slimmer than the volume you're accustomed to. In fact, it's only half as thick.

This is because the floods last month destroyed large quantities of paper in the Queensland Government's paper store in Brisbane.

The only course was to reduce the size of the *Journal* by half.

This loss of paper, coming on top of the world-wide paper shortage, means that strict economy will have to be exercised for some time. No one knows just when our stocks will be replenished.

For the next few months, therefore, the *Journal* will be smaller, but it will be restored to full size as soon as possible.

A special apology is made to Queensland's country women whose farm home and cookery pages have been temporarily suspended.

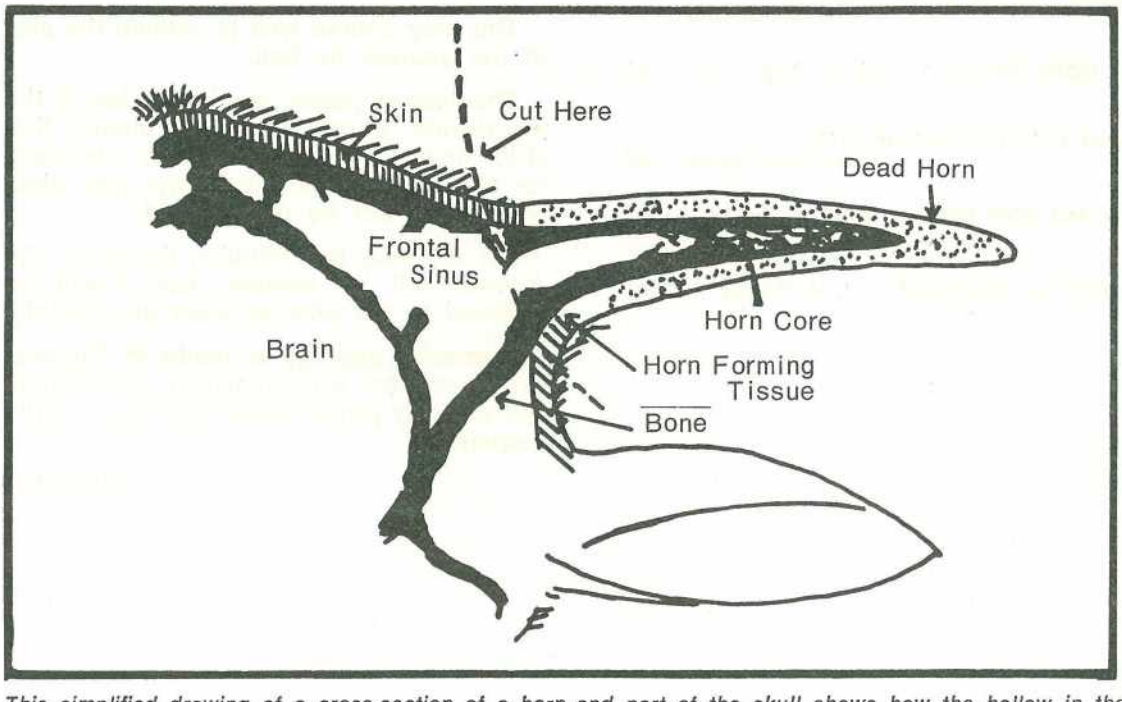
—The Editor

Beef Cattle Don't Need Horns

BRUISING losses have focused attention on horns and dehorning, but there are many other good reasons why cattle should be dehorned. For best results this should be done at an early age.

In New Zealand, meatworks operators and producers have agreed that horned cattle will no longer be accepted for slaughter. It is no secret that many operators in Queensland would be happy to see legislation prohibiting horned cattle being sent to meatworks. They blame a high proportion of costly bruising on horns. They also contend that horned animals are more dangerous and difficult to handle and, since dehorning is so easy, ask why it should not be enforced.

Leaving aside the question of legislation (and there are, indeed, arguments for and against), the fact is that dehorning is easy and horns do contribute to bruising, though to exactly what extent is difficult to measure. With the present methods of selling, the owner of a mob of bruised cattle does not feel the penalty, but you can be sure that beef producers as a whole bear the burden.



This simplified drawing of a cross-section of a horn and part of the skull shows how the hollow in the horn core is connected to the frontal sinus.

by Officers of Beef Cattle Husbandry Branch.

Other Benefits

However, quite apart from bruising of slaughter stock, there are other very good reasons for dehorning. These all revolve around the fact that dehorned cattle are noticeably quieter and less pugnacious. Horned animals need more trough spaces in feedlots or when being hand fed in drought. In fact, even the provision of extra trough space may not, by itself, stop aggressive animals from chasing others away from feed, particularly when cattle have to get by on a very meagre ration.

On many a drought stricken property, the owner has had to dehorn mobs of mature cattle before they would settle down to amicable co-existence at the trough. This is a drastic measure to have to take at a time when cattle are probably already in a weak condition and, moreover, it may have to be done at a time when heat and dust are an added hazard.

Hand feeding is not the only time when horns are a nuisance. Dehorned cattle generally are much easier to work in yards and travel a great deal better. In fact, it is often possible to put more polled than horned animals in a truck with safety. We do not suggest that you can overcrowd polled cattle, but the fact is that, with horned animals, it may not be advisable to load a wagon to its proper capacity.

As yet, buyers do not seem to discriminate against horns but this could easily emerge in a buyers' market, where they are not clamouring to get their hands on everything that is available. Feedlotters certainly do not like horns and they are going to have an ever increasing influence in the store market. It is noticeable that, in the United States, there are fewer than 1% of horned animals in feedlots. The present lack of an apparent market penalty for horns probably arises from the small number of polled animals available so that even feedlotters cannot afford to discriminate against horns. But when they can, they will—and the sellers with dehorned herds will be in the box seat.

Disadvantages

So much for the benefits of dehorning. Is there anything to be said against the practice? The answer is, nothing of consequence.

Tradition and outdated show-ring criteria should be as dead as the dodo—though unfortunately they still have a lot of life left. Fear of losses from dehorning, concern at the time and trouble involved and a dislike for the slightly gory operation may deter some. However, those who regularly dehorn calves will testify that losses are negligible or non-existent, and that the operation is simple and easy and takes very little time. In any case, many of those who fail to dehorn calves will end up by wasting much more time at a later date 'tipping' fully grown steers—a practice that is far less effective and much more troublesome. There is, in fact, little excuse to leave those horns where they are.

Natural Polls

Does breeding polled animals provide an alternative to dehorning? Among British breeds, the gene for polledness is dominant over the recessive horn gene, so that the use of polled bulls, were they freely available, would rid a herd of horns. With the Zebu breeds, a cross between a naturally polled and a horned animal may produce one that has short stubby horns so that breeding out horns may not be so easy.

However, unless you have a naturally polled breed, selection for polledness is not worth while. Not only are polled bulls scarce, but more important selection criteria should be given priority. Having naturally polled cattle, while highly desirable, is not nearly as important has having animals that are fertile and fast growing. Consequently, if you favour a predominantly horned breed, then get rid of horns with a knife or shears rather than with a bull.

When to Dehorn

The best time to dehorn cattle is when they are calves. Weaning is not too late, but taking horns off yearlings or adults, though often necessary, is messy, painful, time-consuming and possibly dangerous.

In calves under 3 months old, dehorning causes no setback and can be done safely at any time of the year without much fear of fly strike. Nevertheless, avoid, if possible, any very wet and hot weather or dusty conditions.

A special muster for dehorning would be out of the question and so the operation has to be fitted in with branding or weaning, which may leave the grazier with little choice of time of year. As previously mentioned, this does not really matter with 3-month-old calves but, if you are dehorning older cattle, try to avoid the summer or autumn, particularly if the animals cannot be kept under close supervision and treated for fly strike if necessary. In addition, very wet weather facilitates infection of the sinus and can cause an appreciable setback in growth rate.

Dairy farmers generally dehorn calves within a week or two of birth and at this age it is very easy and safe but would be impracticable for most beef producers.

Anatomy

Before describing the various procedures of dehorning, it is worth drawing attention to the anatomy of the horn, as shown in the figure. The horn grows from the skin around its base, just as the wall of the hoof grows down from the skin of the coronet. To ensure that no scur arises from re-growing horn tissue, it is essential to cut away about 1 cm of skin around the base of the horn.

The horn core is a bony extension of the skull and the hollow centre of the core communicates directly with the sinuses of the skull. In an adult animal, it takes about 2 to 3 weeks for this aperture to close after dehorning and during this period the animal is prone to fly strike and sinus infection. Although sinus infection will very seldom cause death, it may cause some setback in growth.

Very Young Calves

Dehorning calves at 2 to 3 weeks of age could be feasible on some intensely managed beef, dairy-beef or stud properties. Three methods are commonly used:—1. Hot iron. 2. Knife. 3. Chemicals.

Dehorning irons have a heavy, metal cylindrical head, hollowed out at the working end and attached to a wooden handle. Electric dehorning irons, similar to electric soldering irons, are available but most people will use the type that requires heating in a fire. For this purpose a gas ring or blowlamp, or the gas heaters used for branding irons are preferred.

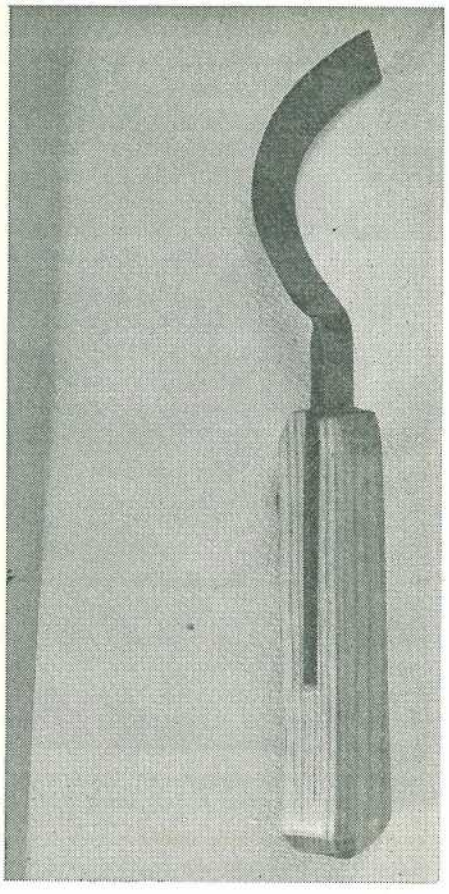
Hold the calf firmly on its side (at this age a cradle is not necessary), and when the iron is heated to a cherry red apply it firmly over the emerging horn bud. Sear a ring of tissue right around the bud by twisting the iron around several times. The burn should penetrate the full thickness of the skin. There is no wound to become infected and, in due course, the horn bud drops off. Older calves (up to 2 to 3 months) can be dehorned in the same way but different size irons are needed according to the size of the emerging horn. Consequently, it is probably not worth while using a hot iron unless all calves are always done at under 3 weeks.

The knife can also be used at this young age and the technique is similar to that described for 2 to 4 months old calves. However, because the horn bud is not so prominent, it may be a little more difficult to do a neat job and ensure that there is no regrowth.

Chemical dehorning, while reasonably effective, appears to offer no advantage over the knife or hot iron and is not recommended.

Branding-age Calves

The methods described below are recommended for calves 2 to 4 months old. At this age the choice generally lies between using the knife or one of the mechanical dehorners of the scoop or cup type. All are equally effective. It takes a little more practice to wield a dehorning knife with skill, but this method is simple and quick and, in practised hands, possibly makes the neatest job of all.



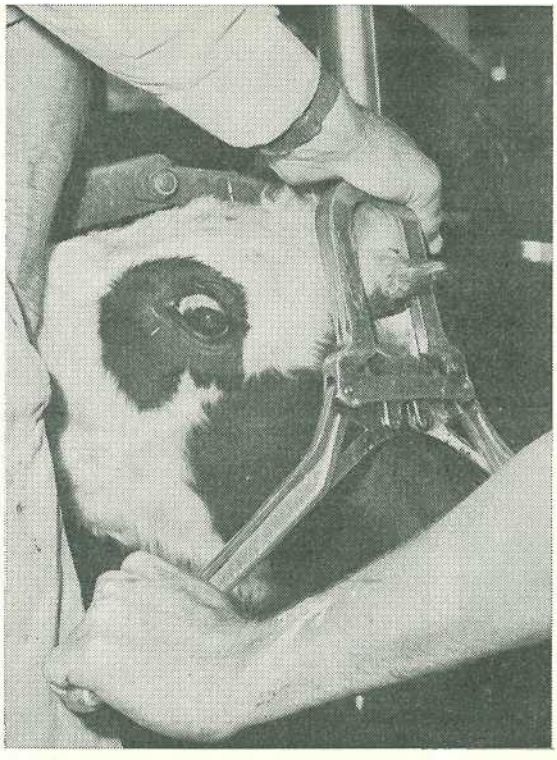
In practised hands, the dehorning knife is effective on calves up to 3 months old. It is cheap and easy to use.

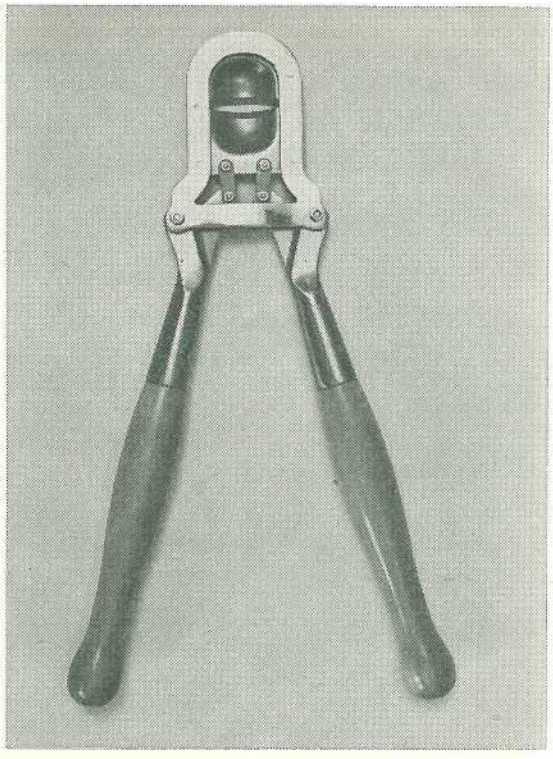
A dehorning knife resembles a farrier's knife, but has no hook on the end. While any sharp knife will do, the curve of the dehorning knife is an advantage. It must be kept sharp. Secure the calf in a cradle in the normal way; as a rule the animal will be branded, vaccinated, and cut at the same time. When removing the upper horn, hold the muzzle firmly on the ground with one hand. For the other horn, raise the head into a vertical position.

Start the cut about 2 cm away from the base of the horn and draw the blade through the skin slicing off the horn level with the skull. This removes an elliptical piece of skin with the horn in the centre. If the cut has gone too near the edge of the horn, less than 6 mm, then cut off a little more skin to ensure that there is no horn-forming tissue left from which a scur may grow. The operation needs a swift, firm cut with a knife and this becomes difficult in calves over 3 months, for which scoop or cup shears are preferable.

The cup shears operate like a pair of scissors and may need a second person to press down on the working end. This person can also restrain the calf's head. The scoop type is pressed down vertically on the horn by the operator, but he still needs an assistant to hold the animal's head. Both instruments are effective and easy to use, but the scoop is a lot cheaper.

When removing a horn with either, the same principle applies as with a knife, that is, remove at least 1 cm of skin around the base of the horn. The wound may need trimming with a





The cup type dehorner can be bought in various sizes suitable for animals up to 18 months old. It is probably the most widely used instrument in large herds. It costs from $37 to $42.

knife, especially if the subsequent appearance of the animal is important. If not, then the chance of an odd scur or stubby horn does not warrant wasting time on trimming.

People who are practised in using any of these methods will rightly claim that they are very quick and give excellent results with very few animals developing unsightly scurs.

Bleeding can be quite extensive but will stop of its own accord without treatment. Some people prefer to cauterize the wound with a hot iron to be quite certain but, when dealing with a large number of calves, any additional procedure such as this takes up extra time and slows the work. It is quite sufficient, instead, to quickly apply a dressing powder and then look over the calves soon after they have all been done and treat those, if any, that are still bleeding. Even these precautions are declared unnecessary by some experienced operators.

Proprietary wound dressing powders are suitable and most of these contain a fly repellent. Recipes for two cheap and effective dressings are:—

1. Two parts plain flour
One part sulphamezathine powder
One part iodoform

2. One part boric acid
One part zinc oxide
One part powdered alum
Six parts powdered starch (or flour)

Weaners

Both the cup and scoop type dehorners are suitable for weaners and, in fact, heavy duty instruments are available for animals up to 18 months old. A knife is inadequate, while a guillotine is unwieldly and unnecessary. With

these older animals, it is essential to get an assistant to hold down the end of the cup type shears if you want a neat result.

In animals older than 4 months, dehorning will result in a direct opening into the frontal sinus and so the time of year becomes important. Avoid periods of heavy rain or any time when blowflies are active. This generally rules out summer and early autumn. Weaning itself stresses an animal and it is preferable not to add the extra, though slight, stress of dehorning if it can be readily avoided. However, if for any reason dehorning at an earlier age cannot be carried out, then weaning offers a suitable opportunity at a time when the ill-effects are still very slight.

Older Cattle

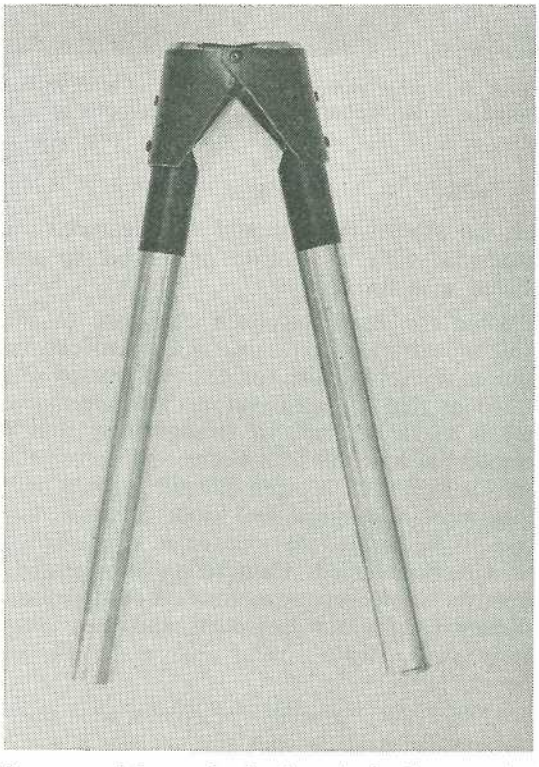
For adult animals, guillotine type shears are the only suitable mechanical dehorner. It must be strongly built and adequately geared so that it can remove the horn quickly and cleanly without the operator having to struggle and heave even with thick and heavy horns. A hydraulic variety, that works off a tractor, will take all the hard work out of dehorning.

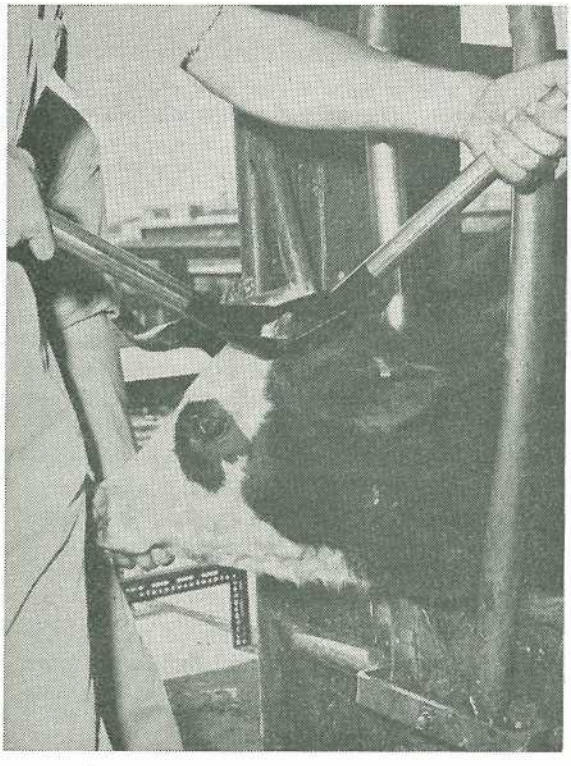
A head bail at the end of a crush is essential. One man must hold the animal's head and it is desirable, but not essential, to have a second man hold the end of the guillotine.

Some people prefer first to cut the skin around the base of the horn with a knife. This aids accurate placement and eliminates the ragged edge of skin often left by the guillotine.

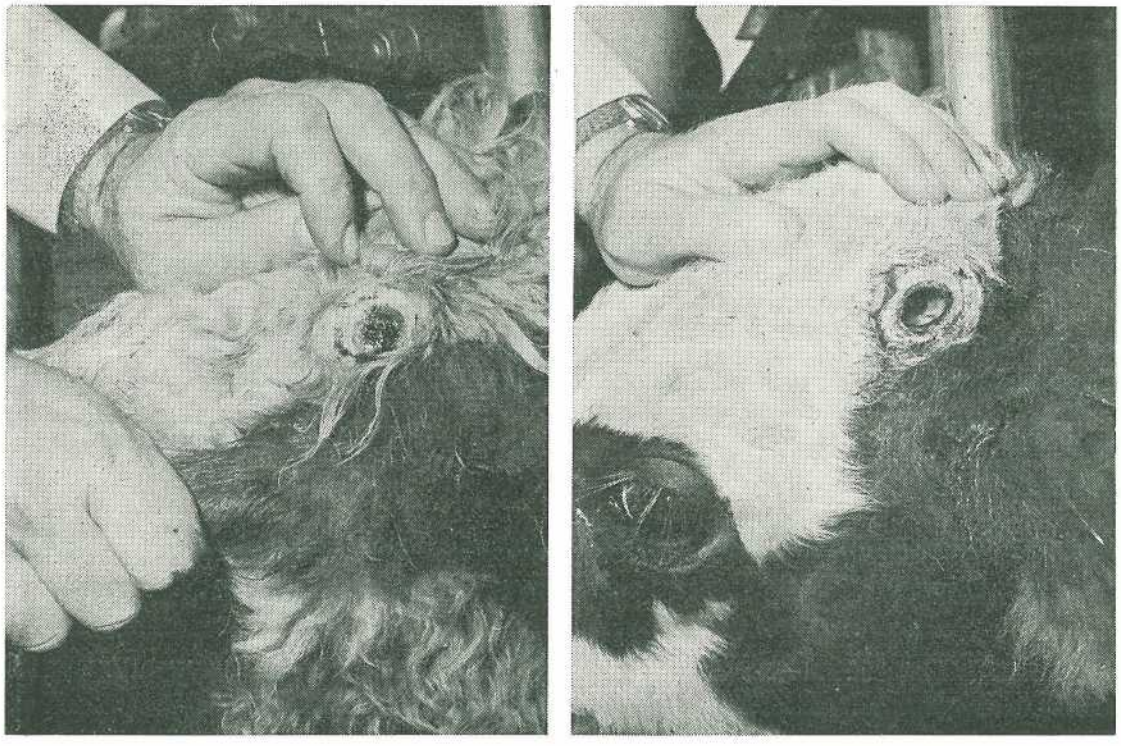
Place the guillotine over the horn and as near the skull as possible. Cut off the horn firmly and quickly. The degree of struggling suggests that the operation is not as painful as one might suppose.

Curved, ingrowing horns will make it impossible to place the dehorner in position. The quickest way to remedy this situation is to break the horn with an iron bar inserted between the horn and the head and used as a





The scoop dehorner is simple and effective on animals up to about 9 months and costs only $9.10. However, without replacement blades, it will not last as long as the cup type.



Dehorning should leave a neat and slightly elliptical wound and must remove 1 cm of skin from around the horn base. The animal on the right is about 5 months old and dehorning has left a direct opening into the frontal sinus.

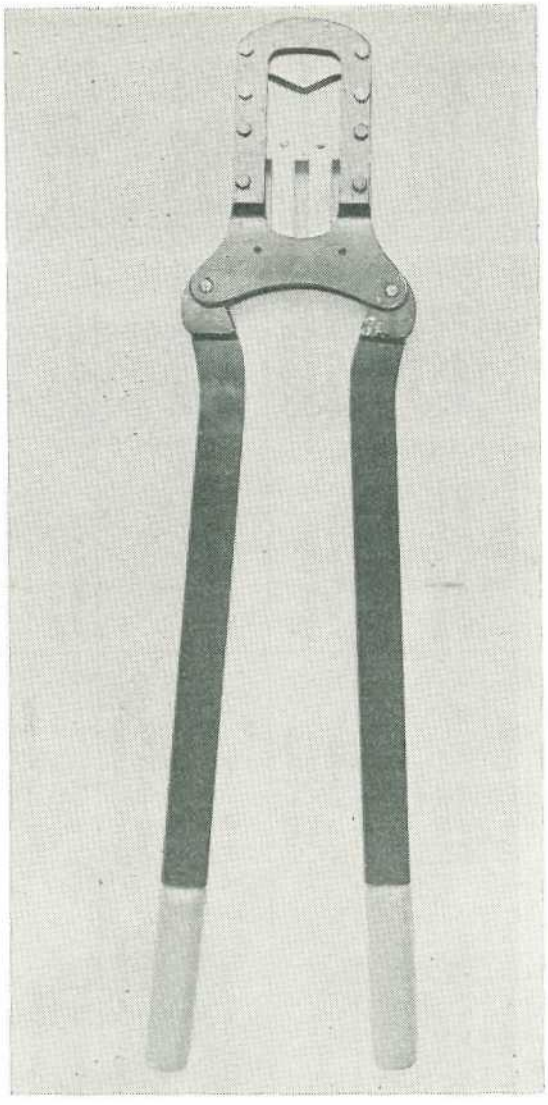
lever. A more humane method is to cut off the horn with a sharp tenon saw or embryotome wire. A saw is quick and easy if the head be held firmly and clear of any obstruction. Embryotome wire provides a useful alternative. The two ends are clamped in special handles and a vigorous sawing action will quickly cut through the horn.

It may also be necessary to use a saw or embryotome wire on old bulls whose horns are too thick for even the stoutest guillotine. But such an operation is best carried out, if possible, by a veterinary surgeon using a local anaesthetic.

After dehorning the cut ends of the arteries will spurt blood profusely and this looks more alarming than it really is As a rule, bleeding soon stops by itself, but an application of a powdered dressing will help. However, dehorned animals should be watched for a while and if any arteries are still spurting after half an hour, they should be ligatured or cauterized with a hot iron or picked up and twisted with forceps.

When the horn has been cut close to the skull the arteries lie in soft tissue and can be quite easily seized with forceps and twisted and pulled or tied off with cotton. An alternative way is to tie a piece of strong string tightly around the base of both horns and across the poll. It is, however, often difficult to keep such a ligature in position and since animals may have to be yarded to remove it, the method is not recommended. Cauterizing is moderately effective. However, as mentioned earlier, most animals require no treatment and only very rarely will death occur as a result of haemorrhage.

While we strongly recommend using a wound dressing powder and keeping a watch over animals after dehorning, the fact is that many operators, particularly those who must



The guillotine-type shears are necessary for older animals. The price varies from $42 to $56. (Illustrations of this and the other instruments are by courtesy of Hayes Veterinary Supplies).

handle large numbers of cattle with a minimum of assistance, often ignore even these simple precautions without incurring losses.

Older cattle may suffer some setback, particularly if dehorned in very wet weather, but seldom is this serious, and they recover rapidly.

Zebu Cattle

Zebu or Zebu-cross cattle are reputed to bleed more than British breeds when dehorned as adults. Whether or not this is so, they certainly tend to have horns that are thicker at the base making removal with a guillotine more difficult. Consequently, it is even more desirable to dehorn these breeds at an early age.

Tipping

If only 2 cm is cut off the end of the horn, there will be no tenderness or bleeding. This blunting of the horn is of doubtful value in preventing bruising and certainly does not quieten the animal. When more of the horn is cut off then part of the core is cut and the tip becomes tender and also bleeds.

Although the horn core is hollow its structure does help to prevent the entry of contamination into the sinuses. Thus even severe tipping, which leaves only a short horn stump, is regarded as less severe and less liable to infection than complete dehorning, although one might question whether in fact this is so.

The end heals fairly rapidly but remains tender for a couple of months at least and during this period the animal will avoid horning other cattle. For this reason, tipping may be of some value in preventing bruising. However, it seems pointless to tip animals a few months before sending them to slaughter when there are so many advantages to be had in dehorning them as calves.

The guillotine type shears used for dehorning are also used for tipping but they must be place squarely across the horn. A horn that is tipped at an angle is just as sharp and damaging as an untipped one. Bleeding may be quite profuse and ligatures are useless. Treatment is generally unnecessary but persistent bleeding can be stopped by cauterizing with a hot iron.

A horn that has been tipped will, of course, continue to grow but remains permanently blunted.

In conclusion, we suggest that dehorned cattle are a blessing to each other, to the grazier, to the transporter and to the meatworks. Dehorning at the right time is easy and safe—so why not start now?

Vegetables For March Plantings

by Officers of Horticulture Branch.

CROP	SUGGESTED VARIETIES*					
	Stanthorpe	Lockyer, Fassifern and Beaudesert	Coastal, South of Gladstone	Central Queensland (Gladstone to Mackay)	Bowen to Townsville	Far North Queensland (Tablelands)
Artichoke ..	..	..	Globe	..	..	..
Bean						
Fresh Market	..	Redlands Pioneer Redlands Autumncrop	Redlands Pioneer Redlands Autumncrop	Redlands Pioneer Redlands Autumncrop	Redlands Pioneer	Redlands Pioneer Redlands Autumncrop
Processing ..	..	Gallatin Apollo	Gallatin Apollo	..	..	..
Broad ..	Early Long Pod	..	Early Long Pod	..	..	..
Beetroot ..	..	Early Wonder Detroit strains	Early Wonder Detroit strains	Early Wonder	Early Wonder Detroit strains	Early Wonder Detroit strains
Broccoli ..	..	Green Sprouting Hybrid varieties	Green Sprouting Hybrid varieties	..	..	..
Brussels Sprouts	..	Hybrid varieties	Hybrid varieties	..	..	..
Cabbage ..	Greygreen Vanguard Sugarloaf types	Ballhead Hybrid Olympic Greygreen Sugarloaf types	Ballhead Hybrid Olympic Greygreen Greengold Sugarloaf types	Ballhead Hybrid Sugarloaf types	Ballhead Hybrid All Seasons Sugarloaf types	Ballhead Hybrid Superette Panorama
Capsicum ..	..	..	Yolo Wonder Green Giant Northern Belle	Yolo Wonder Green Giant	Yolo Wonder Green Giant California Wonder	Yolo Wonder California Wonder
Carrot						
Fresh Market	..	All Seasons Topweight	All Seasons Topweight Chantenay strains	All Seasons Topweight	All Seasons Topweight Western Red	All Seasons Topweight Chantenay strains
Processing ..	..	Amsterdam Forcing Royal Chantenay	Amsterdam Forcing Royal Chantenay	..	..	..
Cauliflower ..	Snowball Y Phenomenal strains	Snowball Y Snow Gem Phenomenal	Snowball Y Snow Gem Phenomenal Sharpes Shorts	Snowball Y Phenomenal	Snowball Y Phenomenal	Snowball Y Snow Gem

Celery ..	..	..	South Australian White	..	..	South Australian White
Cucumber ..	..	..	Green Gem Crystal Apple	Green Gem Crystal Apple	Green Gem Polaris Ashley Crystal Apple	Green Gem Polaris
Egg Fruit ..	..	..	Market Supreme Mission Belle	Market Supreme Mission Belle	Market Supreme Long Purple	Market Supreme Mission Belle Long Purple
Lettuce ..	..	Yatesdale Sunnylake Pennlake	Yatesdale Sunnylake Pennlake	Pennlake Yatesdale Sunnylake	Pennlake Yatesdale	Yatesdale Sunnylake
Marrow ..	..	..	Long White Bush	Long White Bush	Long White Bush	Long White Bush
Zucchini ..	..	..	Blackjack Ambassador	Blackjack Ambassador	Blackjack	Blackjack
Melon						
Rock ..	..	..	..	..	Hales Best Gulfstream Gold Pak	..
Water ..	..	..	..	..	Candy Red Crimson Sweet	..
Parsnip ..	..	..	Hollow Crown	..	..	..
Pea						
Market ..	..	Massey Gem	Massey Gem Fiesta	Massey Gem	Massey Gem Greenfeast	Massey Gem Greenfeast
Pumpkin ..	..	..	Queensland Blue Butternut	Queensland Blue	Queensland Blue	Queensland Blue Butternut
Rhubarb ..	..	..	Sydney Crimson Local strains	..	..	Sydney Crimson
Tomato ..	..	..	Floradel Indian River Tropic Grosse Lisse strains Walter F1 hybrids	Floradel Indian River Tropic Grosse Lisse strains	Walter C1402	Floradel Indian River Grosse Lisse strains
Turnip ..	Purple Top White Globe	Purple Top White Globe	Purple Top White Globe	Purple Top White Globe	Purple Top White Globe	Purple Top White Globe

* These suggestions are based on the more important commercial varieties.

Agriculture In The Taroom Shire—2

by I. N. McCLEMENT, Agriculture Branch.

Pastures

Native pastures are the mainstay of livestock production. The predominant species are perennial and make their biggest contribution from November to March, the summer storm season.

The soils of the Shire are well known for their quick response to moisture and cattle recover quickly, even after the hardest winters. Native pastures are capable of producing adequate liveweight gains in the summer.

The common species found in the Shire are Queensland blue, forest blue, pitted blue, the wire grasses and love grasses.

Some herbage growth can be expected in suitable seasons, although this is not as prolific as in the shires to the south.

A guide to stocking rates on native pastures is:—

Uncleared brigalow scrub	1 beast to 30–40 ac. (12–16 ha)
Pulled brigalow scrub	1 beast to 20–30 ac. (8–12 ha)
Uncleared box/sandalwood	1 beast to 40–50 ac. (16–20 ha)
Cleared box/sandalwood	1 beast to 30–40 ac. (12–16 ha)
Cypress pine/bull oak	1 beast to 60–80 ac. (24–32 ha)

Sown Pastures

Some 400 000 ac. (160 000 ha) of pastures have been sown since the war. Two methods of sowing pastures are employed:—

1. Sowing into scrub burns
2. Sowing into cultivated seedbeds.

SOWING INTO SCRUB BURNS. This has been the most popular method used in the past. After pulling, the former virgin scrub is allowed to lie for 9 to 10 months. The debris is burnt, and later, the seed sown. In the early stages of development, it was belived that the seed should be sown into the ash as soon as the ash was cool enough. However, research work at the Brigalow Research Station shows that the ash is of little importance. The main thing is a hot fire to sterilize the seedbed. Planting the pasture seed can be deferred until later in the season to permit a build-up in soil moisture.

Selection of species to be sown is important if suckers are to be sprayed. Tall growing species such as *Sorghum almum* are likely to shield the suckers at spraying time.

SOWING INTO CULTIVATED SEEDBEDS. This practice has not been as widely used as the former method. Sites selected for pastures are often cropped longer than originally planned. Areas are being reclaimed from woody regrowth, cropped with wheat for 5 years and longer and then sown to pastures where required.

Seedbeds should be well prepared (firm and have adequate moisture reserves). The planting time is from September to February. Early plantings will establish much better than later plantings. Plantings at times when heat waves are likely usually result in heavy losses of pasture seedlings.

Suitable Pasture Species

BUFFEL GRASS (*Cenchrus ciliaris*). Buffel grass has clearly shown that it is the most drought-tolerant species in the Shire. Its ability to remain dominant despite severe drought has been amply demonstrated during the last 7 years. The various strains of buffel grass usually become the dominant species in a pasture mixture and suppress timber regrowth, particularly sandalwood.

Although all strains of buffel grass are grown in the Shire, Biloela, Nunbank, Molopo and Gayndah strains are the most common.

GREEN PANIC (*Panicum maximum* var. *trichoglume*). Green panic is palatable to stock and highly suited to the softwood scrub soils. Because it is so palatable, green panic is usually grazed out of pasture mixtures in 3 to 5 years. However, as a pure stand, it can persist indefinitely. It is more tolerant to drought than Rhodes grass but not as tolerant as buffel grass.

It responds quickly to rain and provides a green pick in the warmer spells of the winter months.

RHODES GRASS (*Chloris gayana*). Rhodes grass is an extremely quick colonizer, providing runners that soon cover the ground. While Rhodes grass has fallen into disfavour because it does not withstand drought, it can be important as a short-term pasture in a rotation with cropping.

MAKARIKARI GRASS (*Pancium coloratum* var. *makarikari*). There are three commercial strains, Bambatsi, Burnett and Pollock. Although only limited areas are sown to this species, larger areas will be sown in the future.

COLUMBUS GRASS (*Sorghum almum*). The main use for Columbus grass has been its inclusion in mixtures sown into scrub burns to provide quick feed while other species were establishing.

Today, it is not used so frequently for this purpose but can be important as a short-lived perennial providing fodder while sown pastures are established in other areas. When a situation is reached when cultivation exceeds a safe limit of pasture, then the heavy carrying capacity of Columbus grass can assist the feed programme for 2 years.

This practice has been successfully adopted on several properties.

LUCERNE. Lucerne is grown throughout the Shire as a pure stand or as a pasture component. As a pasture component, livestock tend to graze the lucerne selectively until it disappears from the mixture.

It can be grown on most soils found in the Shire with the exception of the solodics where establishment is extremely unreliable.

Hunter River lucerne is the only variety grown.

ANNUAL MEDICS. The use of medics in pasture mixtures can prove beneficial. During years of adequate winter rainfall, they will provide good feed, particularly when associated grasses do not have a large bulk of material present.

Planting a mixture of species is considered desirable. In this way, one variety may perform better than the others depending on the seasonal conditions prevailing.

Varieties considered suitable are Harbinger, Cyprus, Hannaford and Jemalong.

Timber Control

Timber regrowth control measures have been of major interest over the past decade. Since the war, the destruction of the virgin scrub, burning, and sowing of Rhodes grass into the ash provided first-class grazing material for livestock.

However, during the 1960s with its series of dry summers, the sown pastures failed and timber regrowth flourished. The most popular method used to control this regrowth has been cultivation. In this way, the unwanted species are controlled and, at the same time, a cash return is being obtained.

Where cultivation and cropping are not practical because of topography and/or distance from railhead, other methods of control include fire and chemicals.

The use of fire initially appears to give good control, but really it is only a means of reducing the unwanted regrowth to ground level and is only a delaying tactic. Sooner or later, a more positive step will have to be taken. An important point to remember is that the grass, the carrier used for the fire, is wasted and most likely could have been profitably used by livestock.

Where brigalow suckers are the predominant species, chemicals offer a positive control measure. They can be controlled with 2, 4, 5-T in distillate by ground equipment or aerial application. Aerial spraying is more popular.

In recent years, sandalwood has become a major problem in pasture areas. Chemical control can be achieved by basal bark spraying with 2,4,5-T ester in distillate. Where the density of trees exceeds 200 per acre (500/ha), labour costs become too high to make this practice economical.

Eucalypt control with Tordon 50D has been widely used.

Winter Fodder Crops

Without a doubt, the most popular winter fodder crop is oats. On occasions, if the opportunity arises, a harvest of grain is made but grain production is relatively unimportant.

The district has the ability to provide a grazing period on oats of 90 to 120 days with an average of 100 days. Liveweight gains of 2 lb. (1 kg) per day are common.

Where crop fattening is practised, initial sowings are made in March and the late plantings are made in June. Both quick and slow maturing varieties are used.

The quick maturing varieties such as Benton and Bentland offer management problems that can often be overlooked by the grazier. These varieties can often reach an advanced state of maturity before grazing begins because of poor secondary root development. Heavy stocking rates are then employed to control these crops but if carried too far reduce the plants to a pipy stem with insufficient flag to satisfy the grazing animals' requirements. As a consequence, weight gains are considerably reduced.

On the other hand, slower maturing varieties, for example, Camellia and Algerian, do not present a management problem. Quite often, they are ready for grazing at the same time as the quicker varieties. They can be grazed at a set stocking rate throughout the season.

Dual-purpose wheats are used on some properties with the hope that sufficient spring rain will also produce a grain crop. Spring rain must be better than average if a grain harvest is to be made.

Winter Grain Crops

Wheat is now the most important grain crop in the Taroom Shire. Some 200 000 ac (80 000 ha) are sown each year.

The system adopted for wheat growing involves a summer-autumn fallow in an endeavour to create a bank of soil moisture and reduce the weed seed burden in the soil. The retention of crop residues is attracting more interest each year and machinery is being modified to handle crop residues.

Climatic conditions determine grain quality and influence the time of planting. Internal plant moisture stress affects yield and grain quality and late frosts are also harmful. Plantings are carried out from mid May until July, with June the preferred month.

In an effort to reduce the effect of internal plant moisture stress, the rate of planting has been reduced in recent years to 20 to 25 lb. per acre (22 to 28 kg per hectare). This usually allows crops to mature rather than to "hay off" prematurely.

Weeds have been a pressing problem in wheat crops over the years. In those years when the fallowing period is dry, rains at planting time will germinate the weed seeds. Planting is usually deferred until the weeds germinate so they can be destroyed with the planting machinery. However, if the crop is planted on marginal rain, subsequent heavy falls will germinate weeds and chemical control will be required.

All grain harvested is now delivered in bulk to depots at Wandoan and Guluguba. Deliveries in the last 10 years have ranged from 210 000 bus. (5 730 tonnes) to 2 465 000 bus. (67 250 tonnes). In 1968-69, more than 99% of the wheat was classified prime hard, with a protein content of about 14.4%. The next year, these figures were 27% and 14.9%.

In various years, other winter crops have been grown in small areas. These have included linseed and safflower. However, these areas have not expanded.

Weeds of Winter Crops

New Zealand spinach (*Tetragonia tetragonioides*) first became a problem in 1964 when it prevented the passage of harvesting machinery in ripened wheat. Relief was obtained by applying a desiccant. Today, picloram offers control at a cost for the chemical ranging from 80c to $1 per acre ($2 to $2.50 per ha).

Climbing buckwheat or black bindweed (*Polygonum convolvulus*) is also present in crops. It can be controlled with three types of chemicals: phenoxy hormones, picloram and bromoxynil. Costs of chemicals range from 35c to $2.40 an ac. (90c to $6 per ha).

The turnip group, which includes turnip weed (*Rapistrum rugosum*), wild radish (*Raphanus raphanistrum*) and London rocket (*Sisymbrium irio*) is also present but these weeds are not considered problems because they can be controlled easily with hormone sprays. However, care must be taken to remove seed supply sources along roads, fencelines and contour structures.

The introduction of wild oats (*Avena ludoviciana*) and (*A. fatua*) has occurred in the wheat growing areas. Chemical control has not been practised but some crop rotations have been adopted.

Summer Fodder Crops

Summer fodder crops consist mainly of the fodder sorghums and there are many varieties of these. A wide range has been sown over the years and the variety used rests with individual preference.

Late summer plantings are usually restricted to Sugardrip sweet sorghum because of its ability to withstand frosting and provide standover grazing.

The grazing millets have not been popular. However, legumes such as cowpeas and lablab bean (*lablab purpurens*) have been grown to provide grazing, particularly in the autumn.

Summer fodder crops can be used under two circumstances: to provide alternative grazing while pastures are recovering from drought and when the pasture area is limited. Where sufficient pasture is available there does not seem any point in growing summer fodder crops as pasture, native or sown, will give a similar liveweight gain in the November-March period.

Summer Grain Crops

Very little attention was paid to summer grain crops until 1970-71 and 1971-72. The rapid increase in the area sown to these crops was because wheat was not planted in those years.

GRAIN SORGHAM. Because of the abundant rains in 1970-71, 100 000 ac. (40 000 ha) of grain sorghum were sown with an average yield 40 to 45 bus. per acre (3 000 kg per ha). However, a more realistic average would be about 15 to 20 bus. per acre (1 300 kg per ha). Climatically, late December and early January seem to be the best times for sowing grain sorghum. However, several other factors clash with sowing at this time of the year.

For example, if sufficient rain falls to give promise of a worthwhile crop, then fodder sorghums (including *Sorghum almum*), volunteer and sown, will lead to a large build up in sorghum midge populations to attack the later sown grain crops causing losses in grain production. Later sown crops are more likely to have disease problems, particularly sugarcane mosaic virus. When mice are a problem, they are likely to damage later crops more as the mice population increases.

SUNFLOWERS. The area sown to sunflowers has increased greatly over the last few years. Almost all the crop has been grown under contract for oil seed purposes. Yields have been as high as ½ ton per ac. (1.2 tonnes per ha) but an average for the Shire would be 3 ton per ac. (840 kg per ha).

Because of its tolerance to frost in the seedling stage, sunflower can be planted early in the season on well-prepared seedbeds. Early plantings are preferred because diseases, particularly rust, are less likely to be a problem.

Weeds of Summer Crops

Weeds were a major problem in summer grain crops in 1970-71 and 1971-72. The problem has stemmed from the fact that these crops were mostly planted as an opportunity and no special thought or care was given to weed control. The situation was further aggravated by lack of rain in the previous summers, thus preventing the germination and eradication of weeds.

The answer to the summer weed problem is not easy. Herbicides cannot be used in sunflowers at all, and their use in grain sorghum is restricted to the period when the

crop is 3 to 9 in. tall, (8 to 24 cm). Therefore, the answer to the weed problem must be found before the crop is planted. This will involve clean sites and/or mechanical control before planting.

Fodder Conservation

Following a succession of severe droughts during the 1960s, interest has become widespread in fodder conservation as a means of lessening the impact of drought.

In 1969, some 30 000 tons (30 600 tonnes) of crop were ensiled, chiefly fodder sorguhms. In addition, several hundred tons of grain were stored in underground pits.

Beef Cattle Industry

A story on the Taroom Shire would not be complete without reference to the beef industry. Today, the Shire ranks fourth in Queensland for cattle numbers and thus beef cattle form a very important part of the economy.

The beef enterprises carried out include breeding and selling stores in the northern part of the Shire, breeding, fattening and selling throughout most of the remainder of the Shire and buying stores and fattening on crop.

The size of the herd varies according to property size which is coupled with locality. The larger herds and larger holdings are in the north, north-west, west and eastern portions of the Shire. The smaller properties and smaller herds are found in the central areas, particularly around Wandoan.

Age of turn-off has gradually decreased over the years. It now varies from 12 months to 20 or 24 months.

Herd management is becoming ever more important, especially in drought mitigation. Controlled mating, seasonal calving and early weaning all assist in leaving the herd less vulnerable to drought. Branding percentages vary from 60 to 85%.

Most of the Taroom Shire is situated in the tick area and most properties are equipped with cattle dips. Cattle are sold by auction at yards in Wandoan, Taroom and also in the paddock.

The brigalow soils of the Taroom Shire are well known for their quick response to rain. Even after a severe drought, cattle recover very quickly.

Brigalow Development

Area 1A of the Fitzroy Basin Land Development Scheme was initiated in the Shire during 1967. By early 1968, 14 ballots had been conducted and five blocks sold by auction.

Development of these blocks was fairly rapid and in only a few years large areas of virgin scrub were converted to productive pastures. Yards and dips were installed and many miles of fencing constructed.

Unlike development in the earlier years, brigalow suckers did not prove a problem to these settlers. In the first year after burning, large areas were aerially sprayed with 2, 4, 5-T and results were good.

Today, most of these properties have built up commercial beef breeding herds and further development will take place.

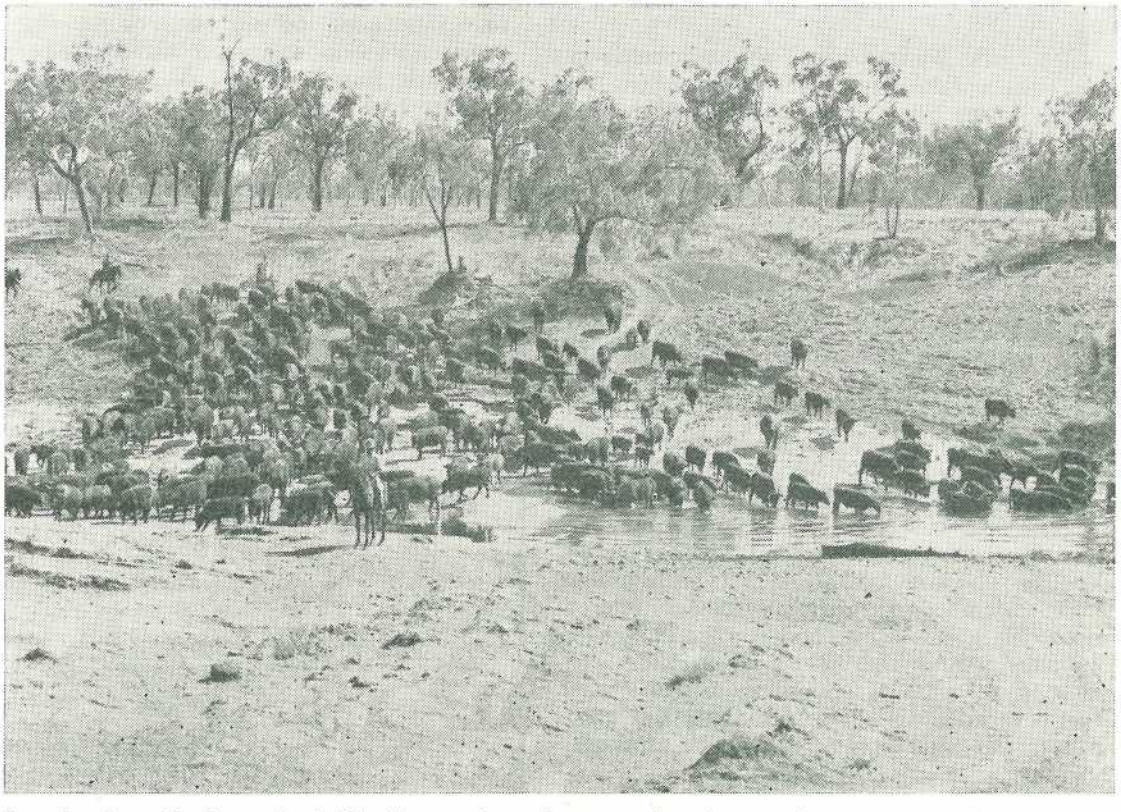
Beef Cattle Breeds-I

by J. J. DALY, Beef Cattle Husbandry Branch.

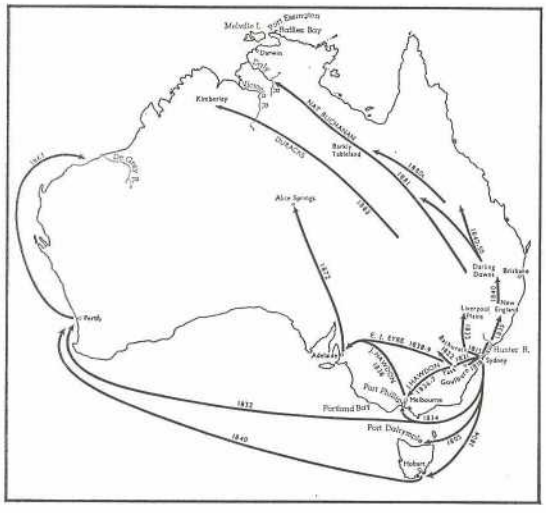
CATTLE are the most important of all the animals domesticated by man and, next to the dog, the most ancient. Throughout the world more than 1 000 million head of cattle are used for various purposes ranging from draft and food to that of a religious symbol.

Cattle were probably first domesticated in Europe and Asia during the New Stone Age. According to most authorities, today's cattle bear the blood of either or both of two ancient ancestors, *Bos taurus* and *Bos indicus*. Other species or subspecies were frequently listed in early writings but these are seldom referred to today.

Bos taurus. This type includes those domestic cattle common to the more temperate zones and appears to have been derived from a mixture of the descendants of the aurochs (*Bos primigenius*) and Celtic Shorthorn (*Bos longifrons*). The aurochs were massive animals standing 6 to 7 ft. high at the withers and were hunted by early man. These animals roamed the forests of Central Europe down to historic times and became extinct round 1627.



A mob of north Queensland Shorthorns at a river crossing. Its good temperament has made the Shorthorn the leading breed in the extensive grazing areas of north and western Queensland. (Queensland Country Life *picture).*



Historic movements of cattle. (Source: The Australian Encyclopaedia)

The Celtic Shorthorn was the only cattle in the British Isles until 500 A.D. when the Anglo-Saxons introduced animals derived from the aurochs of Europe. The Celtic Shorthorn was smaller than the aurochs and possessed a dish face.

Bos indicus. This type includes the humped cattle of tropical countries that belong to the Zebu group. Cattle of this type were first domesticated anywhere from 2100 to 4000 B.C. A hump of fleshy tissue over the withers which can weigh up to 50 lb. (23 kg) is typical of these animals. They have a large dewlap, large drooping ears and a voice that is more of a grunt than a low. They have more resistance to heat and parasites than the *Bos taurus* breeds.

Domesticated cattle belong to the family Bovidae, which includes ruminants with hollow horns. Members of this family possess one or more enlargements for food storage along the oesophagus and they chew their cud. In addition to what is commonly called cattle, family Bovidae (and the sub-family Bovinae) include the true buffalo, the bison, musk-ox, banteng, gaue, gayal, yak and Zebu.

The following outline shows the basic position of the domesticated cow in the zoological scheme.

Kingdom Animalia. Animals collectively; the animal kingdom.

Phylum Chordata. One of approximately 21 phyla of the animal kingdom in which there is either a backbone (in the vertebrates) or the rudiment of a backbone, the chorda.

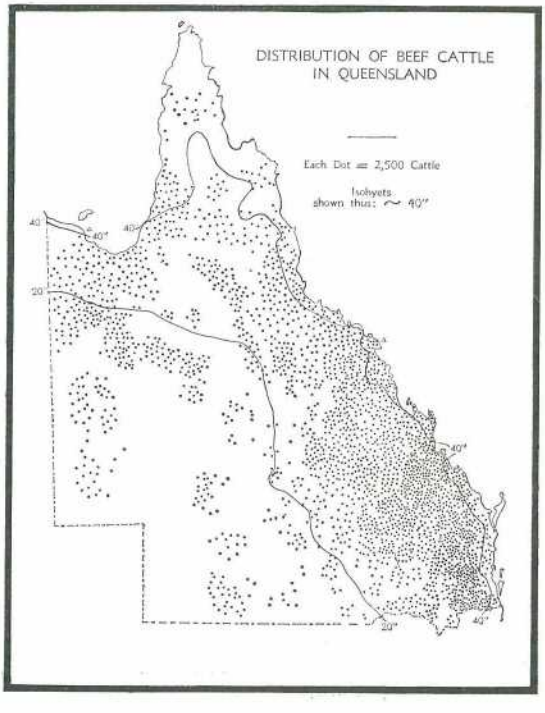
Class Mammalia. Warm-blooded, hairy animals that produce their young alive and suckle them for a variable period on a secretion from the mammary glands.

Order Artiodactyla. Even-toed, hoofed mammals.

Family Bovidae. Ruminants having polycotyledonary placenta; hollow, non-deciduous, up-branched horns; and nearly universal presence of a gall bladder.

Genus *Bos.* Ruminant quadrupeds, including wild and domestic cattle, distinguished by a stout body and hollow, curved horns standing out laterally from the skull.

Species *Bos taurus* and *Bos indicus. Bos taurus* includes the ancestors of the European cattle and represents the majority of the cattle found in Australia. *Bos indicus* is represented by the humped cattle (Zebu)



of India and Africa. (The Brahman breed was developed in the U.S.A. from the Indian Zebu).

Over a time, differing breeds of cattle evolved through both accidental crossing caused by migrations of cattle and man's deliberate interference. Both species and breeds crossed to evolve new breeds and man assisted in the process through selecting animals for specific purposes such as milk production, beef, draught, or dual purpose types according to his needs.

This process was assisted once agrarian conditions improved with the end of the feudal commons and the beginnings of the enclosure system about the middle of the sixteenth century. Previously, individuals could do little selection when cattle were grazed on the commons.

Enclosing began in England about the sixteenth century but progress was slow. It was not until the eighteenth century that a combination of improved agriculture and the influence of men like Bakewell made significant improvements in stock breeding.

Early History in Australia

Cattle were first brought to Australia by European settlers. In an attempt to provide a diet and living conditions similar to that of the settlers' country of origin, livestock of varying types were imported to provide milk, meat and draught.

The first importations were made to develop a government herd that could be used as a source of food in time of need. Over a time, private settlers imported stock and played an increasingly important part developing the nation's beef industry.

In the early days, no distinction was made between beef and dairy cattle. Most stock performed both roles and a distinction cannot be made between the two industries in the following outline. As the grass plains in the interior were discovered, enterprises became separate and beef raisers were often in the vanguard of settlement driving herds ever farther into the inland. At the same time, the dairy industry became more specialized and concentrated on the better watered coastal areas.

Governor Phillip's First Fleet arrived at Port Jackson with two bulls and five cows from the Cape of Good Hope in 1788. These were small, humped cattle referred to as Black cattle and appear to be of Africander extraction. These cattle were grazed at Farm Cove but later in 1788 two bulls and four of the cows went bush. The remaining cow was slaughtered and eaten.

The next consignment of cattle arrived in 1791 with H.M.S. Gorgon when one bull calf and 16 cows were landed. These were Zebu types from India and by 1793 their number had increased to three bulls, 13 cows and five calves. These animals were grazed at Cumberland Park out of Parramatta and formed the basis for the new Government herd.

From 1799 to 1800, about every ship from England brought a few British bred cattle for use either in the Government herd or for private use. Some stock were used to provide milk for immigrants on the voyage and these were generally sold privately on arrival.

In 1800, the first stud stock were landed in the colony, a Devon bull and a few Shorthorn cows. Through natural increase and importations, stock numbers in 1800 had increased to around 1 000 head of cattle of diverse origin from Africa, India, England and Spain.

At about this time, it was also discovered that the Africanders that were originally lost had survived and had increased. A herd of approximately 170 head of wild cattle was found in what was then called the "cow pastures" across the Nepean River. By 1801 this herd of wild cattle had increased to 500 or 600 head.

By 1803, the government herd, including the wild cattle in the "cow pastures", totalled 1 530, and those owned by settlers amounted to 640. By 1811, Governor Macquarie reported that the government herd, including the wild cattle, had increased to about 3 600 and individual settlers were able to buy stock from these herds.

Between 1811 and 1820 the settlement expanded west of the Blue Mountains and more favourable grazing promoted the expansion of beef cattle numbers. By 1820, there were 54 103 cattle in the colony and by 1840

the number had increased to 371 699. During this period, the development of new settlements and exploration, assisted the dispersion of cattle and the New South Wales colony provided a nucleus from which cattle were overlanded over the whole continent.

Queensland's First Cattle

In Queensland, cattle were first introduced in 1827. However, a significant introduction did not take place until 1840 when squatters moved large numbers of stock from the Hunter and New England areas on to the Darling Downs. From here, cattle spread north and west throughout Queensland and into the Northern Territory and the top end of Western Australia.

Subsequently, Queensland developed into Australia's principal cattle producing State. By 1870, Queensland contained almost 25% of the Australian total and by 1890 about 50% of the cattle population.

The following table illustrates the expansion of the beef industry within Queensland and Australia.

TABLE 1

LIVESTOCK STATISTICS
(BEEF AND DAIRY)

Year	Queensland	Australia
1788	—	7
1791	—	18
1794	—	40
1795	—	176
1796	—	227
1800	—	1 044*

Between 1800 and 1860, livestock statistics are defective because of the expansion in the industry and difficulties in collecting statistics.

Rounded to '000

Year	Queensland	Australia
1860	433	3 958
1870	1 077	4 276
1880	3 163	7 527
1890	5 558	10 300
1900	4 078	8 640
1910	5 132	11 745
1920	6 455	13 500
1930	5 464	11 721
1940	6 199	13 080
1950	6 305	14 640
1960	7 012	16 503
1970	7 515	22 162
1971	7 944	24 373
1972	9 022	27 894

Source: Bureau of Census and Statistics and Year Book Numbers 35 and 57.

* Excluding the wild cattle on the "cow pastures."

Early statistics did not list beef and dairy herds separately and, because of this, no distinction has been made between these animals in the above table. At present Queensland has about 9 800 000 head of cattle, more than 9 million of these beef cattle. This compares with an Australian total of 29 million cattle, almost 25 million being used for beef. Thus Queensland has approximately 30% of the Australian total beef cattle population.

During the past 20 years or so, the average annual rate of expansion in the beef industry in Queensland has been low, about 2%. In the last 5 years, in spite of bad seasons, the of expansion has been around 6%.

This increase can be attributed to the pull of expanding market opportunities and a developing capacity to satisfy this demand. Other things that have assisted in this expansion include: wider acceptance of improved husbandry practices, an increased awareness of breeding for the environment, the use of tropical breeds and an increase in the allocation of resources used for beef production as a result of enterprise changes in the wheat and sheep and dairying areas. Death rates have been falling and beef production per unit has been increased through both fewer deaths and trends towards younger beef.

The annual production of beef and veal in Australia in recent years has been round 1 million tons. Of this, Queensland produces approximately 300 000 tons. Australia exports a round 500 000 tons or close to half the total production. (Australian Meat Board Report 1971). Queensland accounts for nearly 50% of total exports and, in recent years, Queensland's exports amount to 50% of its total production. On a carcass weight basis these figures may vary.

Queensland has more cattle than any other State and produces most of this country's beef. In recent years, Victoria has risen as a close second to Queensland in beef production but has not the resources to make the same expansion. Queensland has more than twice the beef cattle population of Victoria and, with 4·2 million breeders, has nearly four times as many breeders. The potential for expansion in the Queensland beef industry is extensive.

Breed Distribution in Queensland

In the early development of the cattle industry, Shorthorns were the most popular breed, and were dominant in most parts of Queensland. As Herefords were introduced, this breed became popular in the central and southern coastal and hinterland areas. About the turn of the century, some authorities estimate that Shorthorns and Herefords accounted for 80% and 16% respectively of the Queensland cattle population with other beef breeds and dairy stock making up the remaining 4%.

Hereford numbers increased and around the 1950s accounted for approximately 50 to 60% of the beef cattle with Shorthorns around 30% and tropical breeds and various crosses making up the remainder.

Zebu (*Bos indicus*) types were first introduced into Queensland in 1910 and again during the 1930s and 1950s. Because of their suitability to the tropics and resistance to ticks, Zebu crosses have been used extensively and new breeds have been developed. Because of import restrictions, the greater use of tropical breeds has been restricted by the limitations of natural increase. It is only in recent years that numbers have been sufficiently large to meet commercial demand.

According to a survey conducted by the Commonwealth Bureau of Agricultural Economics in 1965, the distribution of breeds in Queeensland was: Hereford 50%, Shorthorns 25%, Tropical breeds and crosses 12%, and all other breeds and crosses 13%. In 1971, a Department of Primary Industries survey indicated that nearly 50% of the Queensland's total cattle population and 31% of all breeders had some Zebu blood. The greatest use of tropical breeds and their crosses has been in the coastal and hinterland areas extending from Gladstone in the south to Port Douglas in the north. In this area, more than 80% of all breeders surveyed has same Zebu blood.

In the 1970s, the continuing trend to lean meat and an increasing awareness of the performance characteristics of the European breeds have promoted the introduction of European breeds never before seen in this country. Quarantine regulations prevent imports of cattle into Australia except from New Zealand subject to certain health conditions. However, semen from numerous breeds is being imported in substantial quantities from certain accredited countries, subject also to certain health conditions. As pure breeds, these breeds appear to be restricted to the more favourable, better-developed parts of the State. They could be used more extensively in cross-breeding programmes, particularly when crossed with the Zebu types.

BREEDS OF BEEF CATTLE

A breed can be defined as a group of animals that have a common origin and possess certain well-fixed and distinctive characteristics not common to other members of the same species. These characteristics are uniformly transmitted.

The most obvious heritable characteristics that distinguish breeds of cattle are coat colour, presence or absence or horns, presence or absence of a hump, and body conformation. These characters do not have any direct productive significance but are useful markers to identify breeds that have established production characters.

All farm animals were domesticated long before historic times. The practice of breeding from those anmials that the owner considered were the most desirable ones must have begun with domestication itself. There is evidence that castration was practised at least 2000 BC and so artificial selection has been practised by man for thousands of years.

Over a time, both natural and artificial selection led to breeds and strains with particular uses for man: draught, milk and beef. In more recent times, once a new breed is evolved, a breed association is usually formed to guard standards and ensure survival.

No one breed is best for all environments and comparative studies of the performance of different breeds in a particular environment have to be interpreted carefully. Environmental and genetic interaction exists and the productivity of different breeds can vary from one environment to another. However, this subject is controversial. At one extreme are those who suggest that only two breeds are needed, Friesian for milk and the Charolais

for beef. At the other extreme are those who attempt to allocate breeds to carefully defined climatic zones.

In Queensland, a wide range of environmental conditions exist. While indiviual breeds are highly adapted to different environments, greater adaptability and better performance will follow the use of many different breeds. This gives a wide gene pool from which superior stock can be selected.

Individual breeds have particular aptitudes to particular environments. Sometimes gains can be made by combining the attributes of two or more breeds to evolve a new breed selected specifically for a particular environment.

Older established breeds were evolved in this way and supporters of these breeds should be careful to avoid derogatory terms such as "mongrelization" that are sometimes used when referring to the newer breeds. All breeds were mongrelized at one stage.

In what follows, a brief description will be given of all the breeds now in Australia or being developed through artificial insemination. These breeds will be broadly grouped according to origin into British, Tropical and European.

In Queensland, 1 700 producers are breeding and promoting the various breeds discussed in this article. The distribution of these studs gives some indication of the relative popularity and suitability of the various breeds for the differing environments.

In next month's issue the 13 main British breeds represented in Australia are described.

[To be Continued]

Sale of Unbranded Cattle Prohibited

A recent amendment to the Brands Acts will make it an offence soon for a person to sell any cattle of a liveweight in excess of 100 kg (220 lb.) unless such cattle are branded with a horse and cattle brand.

This requirement becomes effective as from 31 March 1974 and applies to cattle only.

The new provision was a result of a recommendation from a committee consisting of representatives of various Government Departments and an association concerned with the grazing industry assisted by officers of the Justice Department.

It should be noted that the Act requires that, although it is compulsory for any cattle offered for sale to bear one brand, cross branding is still at the discretion of the owner.

Provision exists for certain persons or class of cattle to be exempted from the regulation and applications so received will be judged by the Minister for Primary Industries on their merits.

It is intended that the new provisions will help curb cattle stealing offences by allowing a more positive means of identification of sale cattle.

—K. M. VERNON, Registrar of Brands.

Grazing Oats Varieties For 1974

by Officers of Agriculture Branch.

OATS are normally grown in Queensland south of the Tropic of Capricorn for grazing, hay and silage. Most of the 280 000 hectares sown annually are used for grazing and less than 12% of this area for seed, hay and silage.

Oats are usually classified according to their rate of growth, into either 'quick' or 'slow' maturing types.

The varieties Bentland and Minhafer are examples of quick-maturing types which have an erect plant habit, high early growth rate and often present grazing management problems under normal seasonal conditions. Algerian and Camellia, on the other hand, have a slower growth rate, are semi-prostrate to prostrate in habit and are usually easier to manage in a forage sequence than the quick-maturing types.

Five varieties have been recommended this year together with varieties that may be sown if seed of the recommended varieties is not available. Where this problem arises, farmers should contact their local Department of Primary Industries office or consult the table of oat varietal characteristics to determine a useful alternative.

District recommendations are given in order of preference. Fertilizer recommendations and any further information should be obtained from the local D.P.I. officer.

DISTRICT RECOMMENDATIONS

District (Shires)	Planting Months	Varieties	Planting Rates kg/ha
East Moreton			
Caboolture, Pine Rivers, Albert, Beaudesert	April–May	Saia, Bentland, Minhafer, Camellia, Algerian	RAIN-GROWN 40–60 (Saia lower end of range)
	June	Saia, Bentland, Minhafer	IRRIGATED AND SOD-SEEDED 50–90 (Saia lower end of range)

DISTRICT RECOMMENDATIONS—continued

District (Shires)	Planting Months	Varieties	Planting Rates kg/ha
West Moreton			
Kilcoy, Esk, Gatton, Laidley, Moreton, Boonah	March–April	Saia, Minhafer, Bentland, Algerian, Camellia	RAIN-GROWN 40–60 (Saia lower rate)
	May	Saia, Minhafer, Bentland	IRRIGATED AND SOD-SEEDED 50–90 (Saia lower)
Near North Coast			
Landsborough, Noosa, Maroochy, Widgee, Tiaro	April–May	Saia, Bentland, Minhafer, Camellia, Algerian	RAIN-GROWN 40–60 (Saia lower end of range)
	June	Saia, Bentland, Minhafer	IRRIGATED AND SOD-SEEDED 50–90 (Saia lower end of range)
South Burnett			
Kilkivan, Kingaroy, Murgon, Nanango, Wondai, Rosalie–Cooyar only	Feb.–March	Camellia, Algerian	40–50
	April–June	Camellia, Algerian, Minhafer Bentland	
Burnett			
Biggenden, Gayndah, Mundubbera, Perry, Eidsvold, Monto	Feb.–April	Camellia, Algerian	30–50
	March–June	Minhafer, Saia, Bentland	
Coast			
Gooburrum, Isis, Kolan, Miriam Vale, Woongarra, Burrum, Woocoo (limited application)	March–June	Minhafer, Saia, Bentland	30–50
Central Queensland			
CENTRAL COAST			
Broadsound, Calliope, Fitzroy, Livingstone, Mirani, Nebo, Pioneer, Proserpine, Sarina	March–April	Camellia	40–50
	April–May	Bentland, Minhafer	
INLAND			
Banana, Duaringa, Bauhinia, Belyando, Emerald, Peak Downs	February	Algerian	
	March–April and May–June	Camellia	20–40
Near South West			
Tara, Murilla, Taroom	March–June	Minhafer, Bentland	25–30 (35–late planting)
	March–April and June–July	Camellia, Algerian	20–25 (30–late planting)
	HAY		
Bendemere, Bungil, Waroo, Booringa	April–June	Minhafer, Bentland	20–25
	March–July	Minhafer, Bentland Camellia, Algerian	25 20–25
	HAY		
Balonne, Waggamba	April–June	Minhafer, Bentland, Saia	(30–35 late sowings)
	March–July	Minhafer, Bentland Camellia, Algerian	20–25 (30–35 late sowings)
Darling Downs			
Allora, Cambooya, Chinchilla, Clifton, Crow's Nest, Glengallan, Inglewood, Jondaryan, Millmerran, Pittsworth, Rosalie, (Downs portion) Rosenthal, Stanthorpe, Wambo	Feb.–March	Algerian, Camellia	RAIN-GROWN 36–45
	March–June	Camellia, Bentland, Minhafer	IRRIGATION 55–66
	July	Camellia, Bentland, Minhafer, Algerian	SOD-SEEDED up to 80

CHARACTERISTICS OF OAT VARIETIES

Variety	Growth to Flowering	Early Plant Habit	Growth to First Grazing	Frost Tolerance	Rust Resistance		Seed Colour	Awns	Tillering Ability	Grain Yield
					Crown	Stem				
Recommended Varieties										
Algerian ..	Sl	Prostrate	Sl	Good	S	S	Brown	Fine X	Good	Fair
Camellia ..	Med–Sl	Semi-prst.	Med–Sl	V. good	Mod R	S	Yellow	Few fine	Good	Fair
Saia	Med–Sl	Semi-erect	Med	Poor	S	S	Black	Med	Fair	Poor
Bentland ..	Med–Sl	Erect	Q	Fair	S	S	Yellow	Few fine	Fair	Fair
Minhafer ..	Med–Sl	Erect	Q	Fair	Mod R	R	Cream	Few strong	Fair	Fair
Others May be sown when seed of above not available										
Avon	Med	Erect	Med	Poor	S	V.S.	Cream	Nil	Poor	Poor
Belar	Med	Semi-erect	Med	Fair	S	S	Lt. brown	Strong*	Good	Good
Benton ..	Med–Sl	Erect	Q	Fair	S	S	Yellow	Fine	Fair	Fair
Cooba ..	Sl	Prostrate	Sl	V. good	V.S.	S	Lt. brown	Nil	V. good	V. good
Coolabah ..	Med	Semi-erect	Med	Good	V.S.	S	Cream	Strong*	Good	Fair
Fulghum ..	Q–Med	Semi-erect	Med	Good	V.S.	S	Lt. brown	Nil	Fair	Good
Garry	Sl	Semi-erect	Q	Fair	Mod R	S	Yellow	Few strong*	Fair	Fair
Klein	Sl	Prostrate	Sl	V. good	Mod R	S	Lt. brown	Fine X	V. good	Poor
Lampton ..	Sl	Semi-erect	Med	Poor	S	S	Lt. brown	Strong	Fair	Fair
Landhafer ..	V. Sl	Semi-prst.	Med	Good	Mod R	S	Brown	Fine X	Good	Fair
Rodney ..	V. Sl	Erect	Q	Fair	Mod R	S	Cream	Few strong*	Fair	Fair
Santa Fe ..	Sl	Prostrate	Sl	Good	Mod R	S	Cream	Nil	Good	Poor
Swan	Q	Erect	Q	Fair	V.S.	V.S.	Lt. brown	Few strong*	Fair	Good
Trispernia ..	V. Sl	Prostrate	Sl	Good	Mod R	S	Brown	Strong*	Good	Poor
P8642	Sl	Semi-erect	Sl	Fair	Mod R	R	Lt. brown	Strong*	Good	V. good

Sl = Slow; Med = Medium; Q = Quick; V.Sl = Very slow; S = Susceptible; V.S. = Very susceptible; R = Resistant; Mod R = Moderately resistant; X= Awns on both grains; * Strong awns indicated by twisted black base.

Grain And Seed Crop Forecasting

by I. J. S. DREW, Marketing Officer.

A FORECAST is not a prediction of a future outcome but, at best, a reasoned statement of what is likely to happen.

The Division of Marketing, Department of Primary Industries, began crop forecasting in October 1947 when it published a report on the wheat crop covering six production areas in the State. In July 1948, a separate report on the barley crop was produced. These were both superseded, in September 1957, by a Winter Grains and Seeds Crops forecast embracing wheat, barley, oats, linseed and canary seed. Safflower displaced oats in June 1966.

Forecasting of grain sorghum and maize was initiated in February 1948 and produced as separate publications. These were ultimately replaced in January 1958 by a report on Summer Grains and Seeds which included grain sorghum, maize, panicum and white French millet. Sunflower seed was added in January 1971. At present 23 production areas are surveyed.

Throughout the growing season, three forecasts are made on each crop. The first is concerned with intended planting, the second with the area sown, and the third with production. When external factors subsequent to a forecast being made radically change and have a drastic effect on a crop, a supplementary forecast is made.

Crop Correspondents

The Queensland forecasting system is based on information supplied by producers who are known as Honorary Crop Correspondents because they receive no remuneration for the work they undertake for the Department. For each forecast, they complete and return a questionnaire. Correspondents were originally selected by a gridding process whereby the 23 main production areas of the State were divided into 7-mile (11 km) grid squares. One correspondent was selected in each grid square and was asked to report on properties within a 2-mile (3 km) radius of his own. In practice, it proved better to use two correspondents in each grid square. The method of selecting these correspondents was equivalent to stratified random sampling. While the number of correspondents, 300, may be relatively small, their reports encompass up to 25% of particular production areas.

Analysis

The completed questionnaire is returned to Marketing Services Branch in a reply-paid envelope for computer processing and analysis.

Each return contains information relating to the acreage sown to a particular crop in the current season and in the previous season as well as the percentage change from the previous season. Yields are also reported on similarly, and additional information indicates the percentage of crop planted, the area abandoned for grain, date of commencement of the main harvest, the date of flowering and crop conditions, together with general comments on weather, diseases and pests.

As well as the input of correspondents' data, the basic statistical data of total acreage sown and yield by production area are also added.

The forecast figures are finalized after critical analysis of the print-out in the light of the latest information available from field officers, marketing boards and processors. The sheet anchor of the system, however, is the Honorary Crop Correspondent.

The report as published sets out the forecast information as well as conditions in the production areas and in the State as whole. Important factors which do or could influence growing conditions and production are commented upon.

The forecasts have a wide circulation and are sent to representative firms of most, if not all, those industries which service the farmer. These industries include banks and other financial institutions, fertilizer firms, engineering and transport concerns, as well as other Government departments.

Planning For Drought—2

Property Development And Management

by I. H. RAYNER, Division of Dairying.

LONG-TERM PLANNING

Conservation of Natural Resources

Most property managers in Queensland need to consider the conservation of natural resources in their long-term planning.

In the higher rainfall regions, soil erosion is probably the most important conservation problem for the landholder. In more arid regions, physical loss of soil can be no less serious but, added to this, is the risk of long term loss of productivity through killing some of the more useful native fodder plants. These problems are aggravated by the bare cultivations and overgrazed pastures which are common in drought.

Preservation of Flocks and Herds

It is obvious that, for the livestock producer to resume production after a drought, he must either preserve the nucleus of his flock or herd or be able to buy new stock. For the individual producer, selling all his stock and subsequently replacing them is a drought strategy that deserves serious consideration. Often it will be the best alternative. However, for the industry as a whole, stock losses during drought cannot be simply replaced by purchase. A long-term loss in productivity results.

It can be demonstrated that from the national point of view it is, in general, worth much more to preserve livestock during drought than the individual producer can afford and still run his business profitably.

Although those two factors are very different, they have one common aspect of overriding importance: they are of concern to the community as a whole, not only the individual producer or his industry.

It is quite appropriate for producers to play their part in making other sections of the community aware of the national importance of conservation and preservation of flocks and herds in times of crisis, and the need for government assistance to accomplish these things. However, it is not necessary for them to make personal financial sacrifices because of their concern.

The most profitable use of land in agriculture generally includes appropriate attention to maintaining the productivity of the basic resources. It is now recognized that soil erosion or depletion of natural pastures leads to a rapid reduction in productivity and then profits. This is soon reflected in property values. When the joint measures of annual profit and change in asset value are used there will seldom be any conflict between conservation of resources and long term financial advantage.

In leasehold land, where changes in the value of the land are not so directly reflected in the asset value of the landholder, it is appropriate for the administering authority to be more directly concerned with land use in the interest of conservation. However, it is also appropriate that areas should be adjusted as necessary to remove any pressure for overexploitation by producers attempting to improve short run profits.

Governments have accepted their responsibility in the national interest to assist producers to preserve their flocks and herds. Producers are helped in various ways to make financial and physical provision in anticipation of drought. Patterns of assistance during drought have been established so that, in their long-term planning, managers can base decisions on the expectations of the forms of assistance provided in the past being available in future droughts.

Conservations of resources in general and preservation of flocks and herds in drought are important special considerations, but they do not require any charge in the basic procedures of long-term planning. The individual producer should still use long-term profitability as the main criterion in his planning decisions.

DEVELOPMENT AND MANAGEMENT

It is not a new idea that all the decisions in running a property and all the procedures and facilities employed have long-term implications. The effects and place of each in the long-term management plan must accordingly be considered.

It is also necessary to recognize that it is not possible to give any general ordering of the priority of even the major items. This varies between properties and changes over a time even for the same property. In one situation, for example, improvement in the feed supply may warrant first attention. The particular procedure involved may range from an additional watering point to allow more country to be used to the conservation of fodder. In another case, a change in the breed or composition of the herd may give the best returns.

The important function of the manager in planning is to select those developments and procedures which will give best results in his own particular situation. As discussed previously, his basis for decision is the assessment of long-term physical effects and associated financial results.

The items discussed below are, accordingly, not an exhaustive list, neither are they arranged in order of importance. Stock management is so important that a separate article will be published on this subject.

Flexibility

It has been stressed earlier that fluctuations in the major factors that affect volume and method of production are normal in agriculture. Variations in seasons and markets affect most producers. Availability of inputs, for example, store cattle for fattening, also varies. In general, the more readily a producer can vary his operations in harmony with these changes, the better his returns. The aim of flexibility is simply to make the best of each situation.

Some farming enterprises, such as small crop production, are inherently flexible while in others, such as orchards, it takes a long time to change. However, our concern is not with inherent flexibility, but the extent to which a manager in a particular industry and locality may be able to increase his flexibility so that it is an advantage economically.

Diversification, involving several enterprises on the one property or under the same management, permits flexibility. In fact, this may be the major value of diversification. However, diversified farms may be less profitable than those which specialize if the level of technical efficiency with several enterprises is much below that of the specialist producer. This does not mean that diversification cannot prove profitable and so well worth consideration. Combinations of enterprises in which each assists the other are most likely to prove profitable. Examples are combinations of cattle with sheep and crop production with livestock.

Within enterprises, flexibility can vary considerably and this may be the more important consideration in drought planning. Buying store cattle for fattening permits much more flexibility than a breeding enterprise. Similarly, the woolgrower using wethers can vary flock size more readily than the man with a ewe flock. A beef enterprise using surplus calves on a dairy farm also allows flexibility because the calves can be sold off or greater numbers reared depending on the feed supply. The flexibility of a beef crop fattening operation is increased by storing grain for supplementary or even lot feeding to maintain or increase turnover in response to feed supplies and market demands.

Many examples of procedures for varying flexibility could be mentioned. However, the important point is that producers should consider carefully ways in which the flexibility of their own particular operations could be increased. Each possibility should be evaluated. It is likely that some will be found which will prove profitable.

Changing Plans

It will seem obvious to many producers that long-term plans and production methods must change as more profitable alternatives become available. The good manager is always ready

to try something new, such as a different crop variety, breed of cattle or plant or animal husbandry technique, as soon as there is sufficient evidence that it may be useful and profitable on his property. A few people go too far and do not wait for "sufficient evidence", but the more common problem is being too slow to change.

It is not likely that extremely conservative managers will become progressive merely because they read these few lines. However, this is such an important problem in management that it must be mentioned.

Intensity of Development

More intensive development can make a property more or less drought prone. In livestock production, intensification involves increased feed production and/or increased utilization. If the increase in feed production is greater than the change in use the property will probably be less susceptible to drought. When the opposite occurs, that is, when the increase in feed use is greater than production, it is obvious that there will be more risk of drought.

In general, intensification alone results in greater drought risk. This follows simply from the fact that improved pastures and crops will carry many more stock than native pastures during good and average seasons. In a drought, neither the improved species nor native pastures produce fodder, so the owner may find that he has more stock but no more feed than before. This is a over-simplification because improved pastures can give a sufficient increase in production to support more stock and still allow a greater carry-over of feed into the dry season. The important factor is that, with intensification, the situation changes over the whole range of seasonal conditions.

This requires a more careful study of what is likely to happen in drought. As intensification increases advance preparation for drought becomes more important in the long term plan.

Water Supply and Subdivision

The two special points about stock water are:—

1. You either have permanent water or you cannot hope to maintain stock on the property during drought.
2. In the fairly common situation where some watering points are temporary while others are permanent, the way in which they are used can be very important. It makes a tremendous difference in normal dry seasons, as well as in droughts, if the areas with least reliable water supply are eaten out first and the stock are moved to more permanent water as both the temporary water supplies and the feed around them are used up. This appears to be a fairly obvious strategy. However, every dry season reveals cases where the areas near permanent water are eaten bare while feed on other parts of the property is inaccessible through lack of water.

Water supply and fencing are considered together because they are necessarily used together as basic requirements for herd and feed management. Apart from the example where additional watering points allow access to previously unused areas, water and fencing will do little to improve production and assist drought mitigation unless they are actively used to manage the herd and feed supply.

Fodder Reserves

The intention here is to give some guidelines for management decisions on fodder reserves. For the individual property, the questions whether to reserve or conserve fodder for dry seasons and droughts, what type or types and how much can be answered without a great deal of difficulty. Given knowledge of the seasonal variations that occur, the characteristics of the property, the financial resources, the ability and interest of the manager and so on, the technical and financial effects of the feasible alternative methods of dealing with shortage of paddock feed can be estimated with sufficient reliability to provide a sound basis for decision.

Two points are important. The method of arriving at these estimates is not difficult. It can be done by the simple budgeting technique discussed earlier but it may be rather tedious if you consider all the practical methods and all the important factors involved. However, there is no alternative to making these estimates or having them prepared for you, if you are really serious in trying to select the most suitable long-term plan.

Secondly, the best plan is specific to a particular property. The fact that a particular programme works well for your neighbour, or even for many producers in the district, does not mean that it will suit you. The conservation programme which is popular in the district may suit you, but usually some modifications will be necessary. Sometimes, a completely different approach will be best.

The appropriate fodder conservation programme for a particular property will vary over a wide range. At one extreme, a reserve sufficient to maintain normal production may be best for a dairy farm, an intensive cattle fattening property or a fat lamb enterprise. The minimum fodder conservation programme may be firebreaks on an extensive and remote grazing property to ensure that dry, standing roughage is available when it is needed. This last suggestion arises from one of the very important lessons of the droughts of the 1960s: given water and a sufficient amount of even quite poor quality roughage stock can be kept alive for a very long time with cheap protein or nitrogenous supplements.

With our present knowledge of drought management and feeding, some form of fodder reserve is probably a sound proposition for most stock owners in Queensland. The reserve may be conventional stored feed, standing pasture or edible trees. This is not to suggest that all, or even most, should attempt to conserve sufficient fodder to maintain their flock or herds through major droughts. Often, the practical and economical fodder reserves will be sufficient for only short droughts or for a portion of the stock for longer periods, with other strategies such as agistment or selling becoming more important in extended dry periods.

Irrigation

Irrigation appears to have great advantages as a drought mitigation method, but is seldom justified on the basis of using it during drought only.

Generally, irrigated production is relatively costly, in both capital outlay and operating expenses. This means that irrigation facilities have to be used at a high level of capacity to be economical.

Any potential for irrigation should certainly be examined carefully in planning the development and long-term management of a property. The likely effects, costs and returns over the whole range of seasonal conditions must be taken into account. Where crop production for sale is involved, these estimates are relatively straight forward.

For the livestock producer, irrigation will provide green feed during dry years. This is valuable, but should not be over-valued. During non-drought years, the main use of irrigation will often be for stockpiling fodder. The alternative of buying feed should be considered. If the irrigated area is small and the distance from commercial producers not too great, buying feed during good seasons may be cheaper than growing it.

Multiple Properties

Operators of single properties often feel at a disadvantage compared with those who have several, while the managers of chains of properties are often excessively concerned about operating them in conjunction. In general, both propositions are incorrect. For the same levels of investment and managerial effort, a single unit is not necessarily less profitable than several smaller ones. In fact, the larger single unit should, on the average, give better results.

With multiple properties, the best overall result will generally be obtained by operating each as effectively as possible as an independent unit, with any joint activities being incidental. For example, rather than move store cattle to the same owner's fattening property, it may be more profitable to sell them to the highest bidder and buy animals from another source for fattening. If store cattle are likely to be scarce and expensive in the long term, the the owner of jointly operated breeding and fattening properties may be better off to give up fattening and concentrate on the more profitable store production.

The only important advantage of multiple properties is when they are close enough together for plant, labour and other resources to be more efficiently employed by being shared between them. This, in effect, is more like a relatively large, single unit.

Owners of multiple properties have two apparent advantages in drought management. Usually they have greater financial resources. The need for adequate funds to allow sound management in good as well as bad seasons has been discussed previously.

The other advantage of several properties, particularly if they are in different climatic regions, is that some will often be unaffected while others are drought stricken. Stock can be agisted without increasing cash costs other than for transport. The real value and cost of this method of drought relief is debatable.

In general, if the group of properties is being well managed so that each is stocked and producing at the most profitable level, it will not be possible to increase stock numbers without reducing production. The immediate and long-term effects on the properties used for agistment may amount to about the same cost as would have been incurred for outside agistment.

Probably the real advantages for the manager who uses his own property for relief are that he has, in effect, arranged early enough for agistment to be available and that he does not delay unduly in moving stock to it. These are merely matters of managerial competence not necessarily related to the number of properties owned or the size of enterprise.

Learning from Experience

Experience is a great teacher, but in drought planning and management it can be very misleading.

Using meteorological records we can, for any particular locality, predict the types of drought that will occur in future, and their frequency. We cannot predict when they will occur and, once in a drought, we cannot predict how long or how severe it will be. Because of this uncertainty, we can only accidentally follow a programme that proves the best for a particular drought. What we can do with quite satisfactory reliability is work out the programme that gives the best long-term results, the one which, on the average, comes out ahead.

This means that the experience of any particular drought must be interpreted with a fair degree of caution. On a particular property, it may be apparent, for example, that a different approach would have given better results during the last drought. However, this is not sufficient reason to adopt the different plan in readiness for the next drought. The next drought is likely to be quite different from the last. It could even happen that the programme that failed previously turns out to be the most successful next time.

Similarly, success on one occasion is, alone, no guarantee that you have arrived at the best long-term plan. In fact, because of continuing changes in important factors, such as technical knowledge, markets and transport, long-term plans have to be revised frequently so that they represent the soundest decisions in the present situation.

It is in the long-term planning of factors such as development programmes, flock or herd composition and fodder or financial reserves that it is important to look ahead against the background of predictable seasonal variations. Decisions on these points determine, not only how the property will be affected by drought, but also what can be done to mitigate its effects. Once in a drought, short-term decisions become most important. With these, previous experience is a valuable guide but still, of course, with some prediction of the likely duration of the drought.

Long-term Planning

Once in drought, prompt, timely action is important with most of the procedures that combine to give successful drought management. In selling off stock, obtaining agistment, weaning and beginning to feed, as only a few examples, the timing of the operation can make a great difference to its cost. The timing may even determine whether it can be done at all or whether it will be effective.

These are all decisions that can only be made on the spot at the time. But the manager who has thought about them in advance is more likely to make the right decision at the right time.

This is rather an interesting procedure in drought mitigation because it is so cheap. The cost is only a few hours spent thinking about

the drought situations that will occur in future, perhaps discussing plans for action in the various situations, and making some notes. The yield from this investment can be quite substantial financially.

One interesting consideration is to compare the costs of acting early to meet a drought that does not eventuate with the alternative of acting too late when a drought does occur. Examples are starting to lighten off stock numbers in a season that appears doubtful but turns out to be average compared with holding on until a drought is so obvious that most people are trying to sell, or taking an early option on agistment that later is not needed rather than waiting until the demand for relief country is heavy.

You may find that the cost of a premature decision is small in comparison with the opposite mistake of delaying too long. This means that you can afford some mistakes through acting too early and still be ahead through avoiding being caught when a drought does occur.

Long-term planning is essential for the effective development and management of a property. As recurring drought is an unavoidable fact, planning to meet it is in no way a separate consideration, but simply one of the important factors in a sound, long-term management plan. If, from the whole of this article, producers accept only these points and act on them, they will be making a good start towards overcoming the drought problem.

Fruit Trade Commended

THE Premier (Mr. J. Bjelke-Petersen) commended the action of the Brisbane wholesale fruit and vegetable trade in regulating supplies to the Brisbane market during the flood.

He said the trade acted in a most responsible manner under extremely difficult conditions. It set up an emergency distribution centre following the flooding of the Brisbane Markets at Rocklea and a special committee from the fruit and vegetable wholesale trade decided voluntarily to peg prices at those operating in Brisbane the previous Friday.

It was a fine co-operative effort and a most responsible decision to ensure that ample supplies of fruit and vegetables were distributed to flood-hit Brisbane people at reasonable prices.

The Premier said the trade operated under most difficult and trying conditions.

He said he had been assured that there were ample supplies of fruit and vegetables available and distribution should get back to normal by next week.

Mr. Bjelke-Petersen said the Committee of Direction of Fruit Marketing had taken steps to regulate the normal flow of fruit and vegetables from interstate and from country centres not affected by the flood.

S. G. Reid, Government Printer, Brisbane

Halo Blight of French Beans

HALO BLIGHT **(Pseudomonas phaseolicola)** is the most serious bacterial disease of French beans in Queensland.

It is a seed-borne disease and can be extremely destructive in cool, damp weather.

Symptoms

Leaf symptoms appear as very small, tan, angular spots each surrounded by a wide, diffuse, lemon-green halo. If the weather favours the disease, leaf infection inevitably leads to infection of the pods. Pod spots are circular, dark-green, and watersoaked.

From the centre of these spots, a pearly-white ooze develops and this darkens with time to a cream-coloured exudate. The watersoaked appearance of these spots has given rise to the popular names 'grease spot' and 'candle grease'. These spots may eventually become slightly depressed and rusty-brown in colour. Systemic infection of plants, resulting from the disease invading the water-conducting system, may produce wilting, yellowing of the leaves and even death. Dark-green, water-soaked areas may also be visible on the stems of affected plants.

The halo so characteristic of the disease on leaves may sometimes be difficult to detect. This is particularly so during hot, dry weather. Sometimes the infection is caused by a strain of the organism that does not produce a halo.

Spread

The seed is the most common way of carrying the bacteria from one season to the next and of introducing it into a new area. The bacterium can be carried internally in the seed or on its surface. Most seed infection occurs as a result of pod infection or contamination of the seed coat by plant debris during harvesting and subsequent handling.

Cool, showery weather favours the disease. Its spread takes place during periods of wind-driven rain and contact with contaminated agricultural implements, insects, animals and people's clothes. Spread can be extremely rapid. Under favourable conditions, small pockets of infection are all that is necessary for extensive outbreaks to occur.

Some tropical legumes are a source of infection for neighbouring French bean crops. In fact, it is known that the disease is well established in many tropical legume pastures in the Near North Coast district.

The bacteria can survive for more than a year on infected crop trash which, if not decomposed, may be a source of infection for future bean crops.

Control

The most successful way of controlling halo blight is to use disease-free seed. A scheme to produce disease-free bean seed began in the Burdekin River valley in 1967 with the implementation of the Burdekin Bean Seed Quarantine Area. Here, seed production is strictly controlled by the Department of Primary Industries to ensure freedom from seed-borne diseases. Seed from this scheme is now readily available to growers.

Certain hygiene measures are also important in controlling the disease. Refuse from infected crops should be ploughed in as soon as harvesting has been completed to ensure rapid and complete decomposition of any diseased plants. Movement of machines and people between diseased and disease-free areas of crop should be avoided, especially while the crops are wet with rain or dew.

Machinery such as planters and harvesters should be decontaminated after use by cleaning thoroughly and then spraying with a disinfectant solution of 1.5% chlorhexidine and 15% cetrimide (Savlon*), diluted 1 part in 200 parts of water, to which is added 0.1% sodium nitrite.

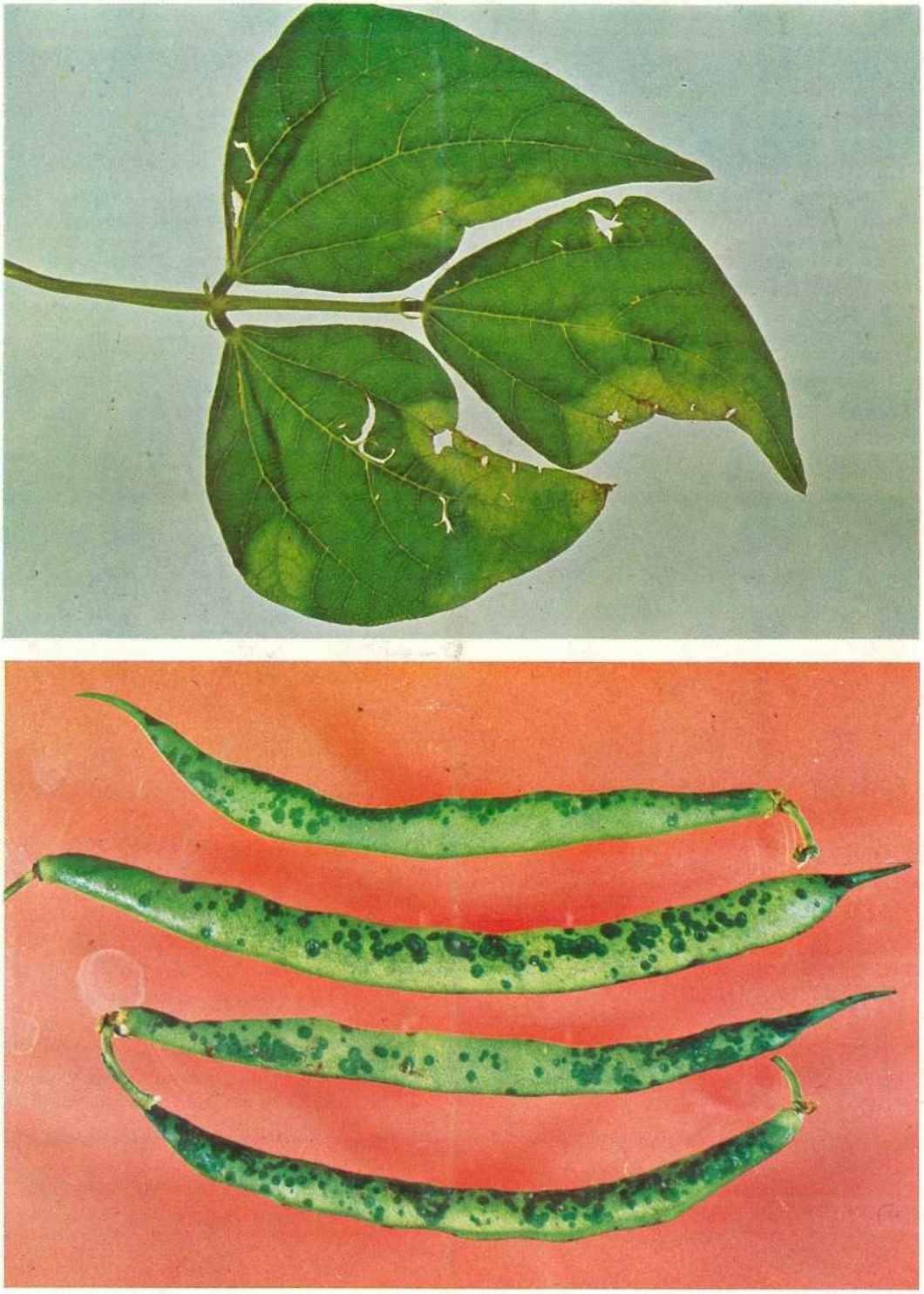
As tropical legumes such as Siratro and glycine provide a perennial reservoir of infection with halo blight, it is inadvisable to plant French beans near these pastures.

—Plant Pathology Branch

[Further information can be obtained from the nearest Plant Pathology office or by writing to the Director, Plant Pathology Branch, Meiers Road, Indooroopilly, Q., 4068.]

*Registered trade name.

Diseases of French Beans — 1



HALO BLIGHT. Upper: leaf symptoms. Lower: pod symptoms.