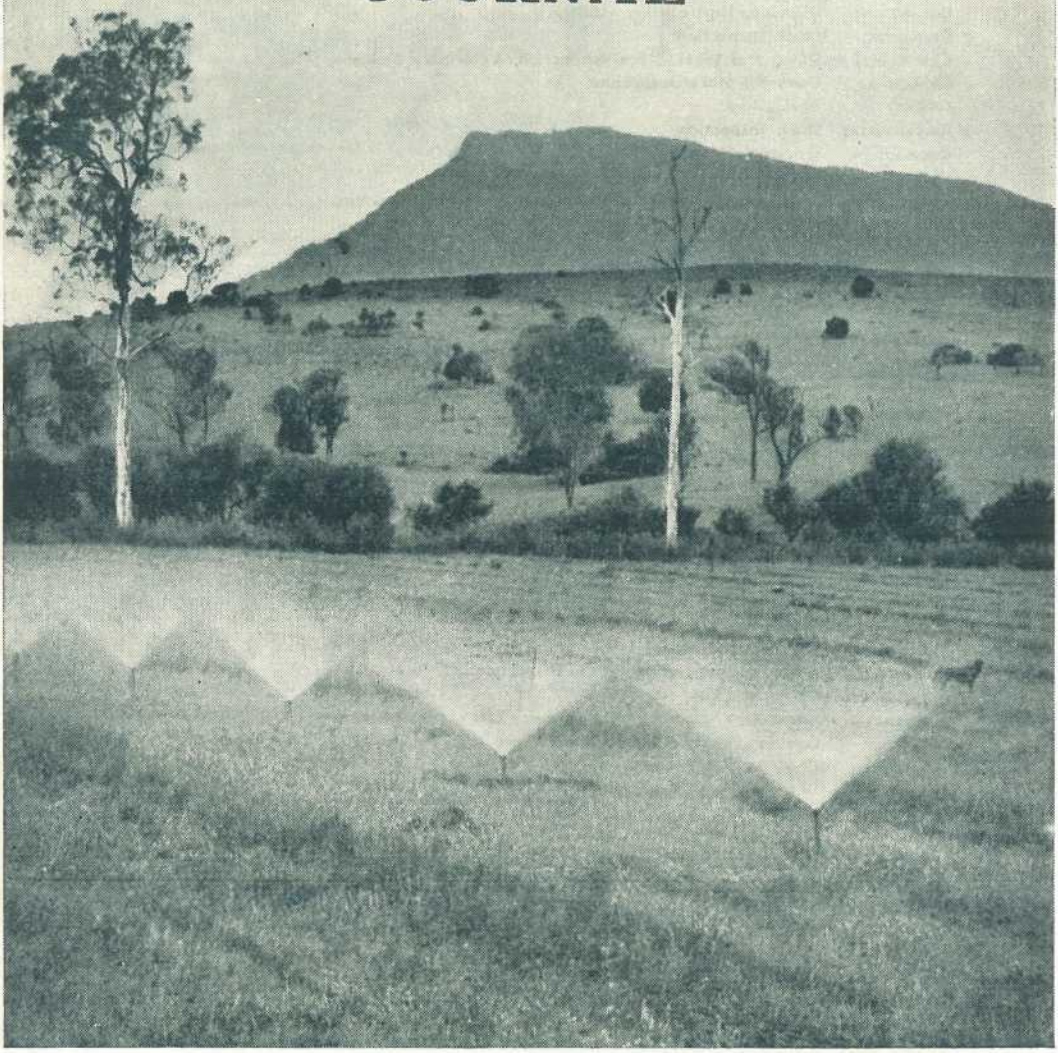
VOL. 82. PART 2 FEBRUARY, 1956

DEPARTMENT OF AGRICULTURE

QUEENSLAND AGRICULTURAL JOURNAL



Irrigating Pasture in the Fassifern.

LEADING FEATURES

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

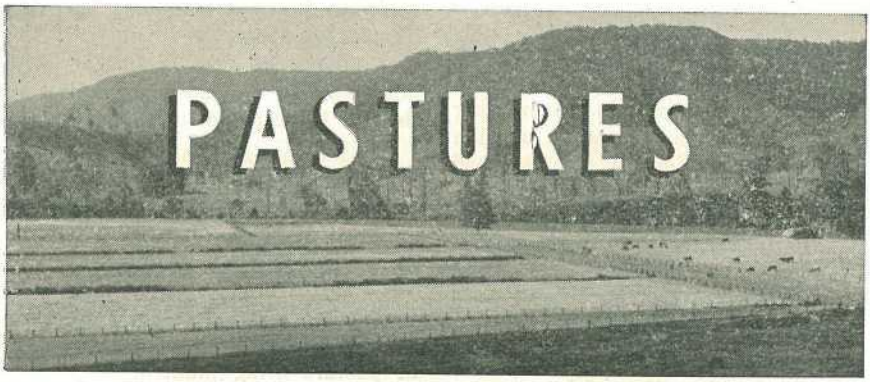
Queensland Agricultural Journal

Contents

Tuberculosis-Free Cattle Herds.

The studs listed below have fulfilled the conditions of the Department's Tuberculosis-free Herd Scheme to 28th January, 1956.

Breed.	Owner's Name and Address.
Aberdeen Angus ..	The Scottish Australian Company Ltd., Texas Station, Texas
A.I.S.	M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
	F. B. Sullivan, "Fermanagh," Pittsworth
	D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
	W. Henschell, "Yarranvale," Yarranlea
	Con. O'Sullivan, "Navillus" Stud, Greenmount
	H. V. Littleton, "Wongalea" Stud, Hillview, Crow's Nest
	J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
	Sullivan Bros., "Valera" Stud, Pittsworth
	Reushle Bros., "Reubydale" Stud, Ravensbourne
	H. F. Marquardt, "Chelmer" Stud, Wondai
	A. C. and C. R. Marquardt, "Cedar Valley," Wondai
	A. H. Sokoll, "Sunny Crest" Stud, Wondai
	W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
	G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
	C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
	W. H. Thompson, "Alfa Vale," Nanango
	S. R. Moore, Sunnyside, West Wooroolin
	H.M. State Farm, Numinbah
	D. G. Neale, "Groveley," Greenmount
	Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
	A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
	W. D. Davis, "Wamba" Stud, Chinchilla
	Queensland Agricultural High School and College, Lawes
	C. K. Roche, Freestone, Warwick
	Mrs. K. Henry, Greenmount
	D. B. Green, Deloraine Stud, Durong, Proston
	E. Evans, Wootha, Maleny
	T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
	J. Crookey, "Arolla A.I.S. Stud" Fairview, Allora
	M. F. Power, "Barfield," Kapaldo
	A. H. Webster, "Millievale," Derrymore
	W. H. Sanderson, "Sunlit Farm," Mulgildie
	R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
Ayrshire	L. Holmes, "Benbecula," Yarranlea
	J. N. Scott, "Auchen Eden," Camp Mountain
	"St. Christopher's" and "Iona" Studs, Brookfield road, Brisbane
	E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
	C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
	G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
	T. F. Dunn, Alanbank, Gleneagle
Friesian	C. H. Naumann, "Yarrabine" Stud, Yarraman
	D. J. Pender, "Camelot," Lytton road, Lindum
Guernsey	C. D. Holmes, "Springview," Yarraman
	A. B. Fletcher, Cossart Vale, Boonah
	W. H. Doss, Degilbo, *via* Biggenden
	A. C. Swendson, Coolabunia, Box 26, Kingaroy
	C. Scott, "Coralgrae," Din Din road, Nanango
	R. J. Wissemann, "Robnea," Headington Hill, Clifton
	G. L. Johnson, "Old Cannindah," Monto
Jersey	Queensland Agricultural High School and College, Lawes
	J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
	J. F. Lau, "Rosallen" Jersey Stud, Goombungee
	G. Harley, Hopewell, M.S. 189, Kingaroy
	Toowoomba Mental Hospital, Willowburn
	Farm Home for Boys, Westbrook
	F. J. Cox and Sons, "Rosel" Stud, Crawford, Kingaroy Line
	R. J. Browne, Hill 60, Yangan
	P. J. L. Bygrave, "The Craigan Farm," Aspley
	R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
	P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
	E. A. Matthews, "Yarradale," Yarraman
	A. L. Semgreen, "Tecoma," Coolabunia
	L. E. Meier, "Ardath" Stud, Boonah
	A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
	W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
	Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
	F. W. Verrall, "Coleburn," Walloon
	C. Beckingham, Trouts road, Everton Park
	W. E. O. Meier and Son, "Kingsford" Stud, Alberton, *via* Yatala
	G. H. Ralph, "Eyecombe," Ravensbourne
	Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
	W. and C. E. Tudor, "Boree" Jersey Stud, M.S. 498, Gayndah
	Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
	D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
	J. W. Carpenter, Flagstone Creek, Helidon
	H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
	W. S. Kirby, Tinana, Maryborough
	S. A. Cramb, "Trecarne Stud," Lockyer
	G. & V. Beattie, "Beauvern," Antigua, Maryborough
	J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
	W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
	T. Nock, Dallarnil
	P. Fowler & Sons, "Northlea," Coalstoun Lakes.
Poll Hereford ..	W. Maller, "Boreview," Pickanjinnie
	J. H. Anderson, "Inverary," Yandilla
	D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
	E. W. G. McCamley, Eulogie Park, Dululu
	Wilson and McDouall, Calliope Station, Calliope



Machine Sown Pastures on the Darling Downs.

By R. G. WILSON, Adviser in Agriculture.

PREPARATION OF THE SEEDBED.

The condition of the seedbed and the time of planting are major factors in the establishment of sown pastures in Queensland.

A fallowed, firm, moist, level seedbed of good fertility gives best results. Under these conditions the seeds will germinate quickly, and the seedlings will make vigorous growth immediately they emerge from the soil, unhampered by competition from weeds.

Land intended for sown pastures should therefore be carefully prepared. The selected area should first be cultivated thoroughly to a depth of 3-4 in. and harrowed to break down the large clods. This is followed by tine cultivation down to plough depth. This operation brings the clods to the surface while the fine soil sifts to the bottom, producing a firm, well consolidated seedbed.

Subsequent cultivations should be shallow. The main objects are to control weed growth in the seedling stage and to preserve soil moisture and soil nitrogen. These operations also gradually firm the seedbed, leaving only a shallow soil mulch of 1 in. or so on top.

When spring planting of summer pastures is desired, it is important to begin preparing the seedbed during the winter in order to take full advantage of winter or early spring rains.

Land preparation for summer pastures to be sown during January and February should be commenced in late spring. This will ensure the conservation of the summer rains.

When winter species are to be planted, land preparation should also be commenced in late spring, but cultivation to control weeds should extend to early February. This permits the maximum amount of soil moisture to be conserved and is an important part of seedbed preparation on account of the unreliable nature of the winter rainfall.

It can be said that a hurriedly prepared, loose seedbed has, in the past, been the major cause of failure to obtain satisfactory pasture stands. By preparing the seedbed properly, the necessity for rolling is often eliminated.

Virgin land should be cropped to oats for a few seasons before sowing to pasture or lucerne.

EROSION AND THE SEEDBED.

Although established pastures are themselves effective in preventing erosion, precautions against erosion during preparation of the seedbed should be taken into account. The most suitable planting times for this type of pasture coincide with periods when heavy rains are experienced and the risk of serious soil losses from erosion, especially on sloping land, is considerable.

On land with a slope of 3% or more the retention of a cloddy surface tilth may be necessary. Tine tillers and chisel ploughs are proving effective in producing this type of seedbed.

Additional protection to the seedbed may be required on very steep land, and contour strip planting or contour banks may be necessary.

Where cloddy seedbeds are used, mature seed should be sown dry, just prior to the wet season. The rain would then "melt" the soil clods and cover the small seeds. Success with this method depends on follow-up showers to keep the surface soil moist.

The feed hoses of the combine should either be removed or allowed to swing free of the shoe when sowing pastures on these rough seedbeds.

TIME OF SOWING.

Time of sowing depends on local seasonal conditions and on the type of pasture being planted.

Summer Pastures.

On the Darling Downs, frost-susceptible perennial summer pasture species such as green panic, buffel and Rhodes grasses are best planted in January and early February following good rains. The heavy rains and high soil temperatures which are normally

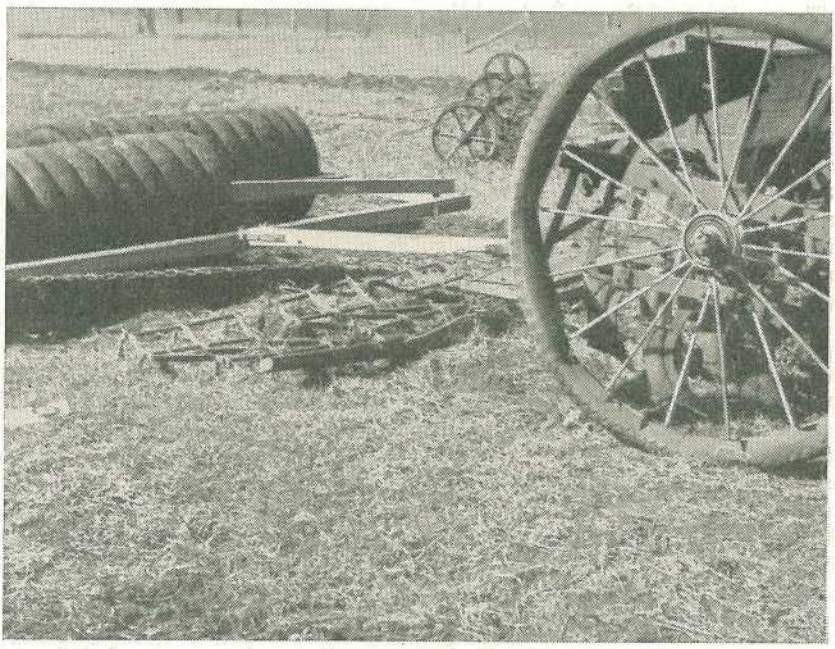


Plate 1.

A Useful Combination for Machine Sowing of Pastures on the Downs. The drill is followed by light tine harrows and a home-made tyre roller. Use of the roller improves germination and enables the seeding rate to be cut down.

experienced during February and March favour rapid germination and growth of the pastures. This should ensure firm establishment of the pastures prior to the advent of frosts.

Later sowings than this are generally fatal to green panic and buffel grasses, whilst early spring sowings are also risky, in that a late frost may occur or hot dry weather following sowing may destroy the seedlings. However, if good spring rains occur, it is often desirable to risk an early sowing in order to secure the advantage of early, bulky grazings prior to frost occurrence.

On clay soils, the early spring growth of grass may be slow. As the soil warms, and rain occurs from November on, growth is usually rapid.

Winter Pastures.

Winter pastures are sown from the end of February to mid-April, with early March as the best time. This ensures establishment under the most suitable climatic conditions. Temperate climate pasture species such as phalaris, ryegrasses, cocksfoot, clovers and lucerne are usually sown at this period.

Winter pastures are regarded more as "chance" pastures depending on a favourable season for success. Also, it is very important that, on the north and central Downs, lucerne be included in all winter pasture mixtures, as this legume is more hardy than the normal winter species.

Depth of Sowing.

Most pasture seeds are small and the seedlings do not have the food reserves or the penetrating powers to emerge if planted at depths of three or four inches. An average depth of half an inch is desirable, though on the black soils which crack and contract on drying, the seed is generally drilled one inch deep in order to keep the seed in contact with the soil moisture.

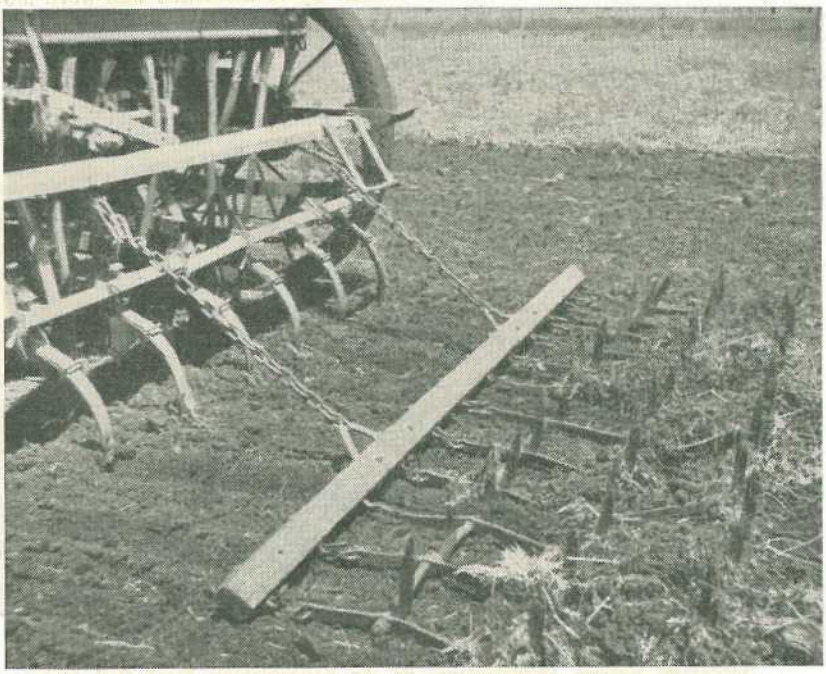


Plate 2.

Another Planting Device Which Has Proved Effective. In the absence of a roller, the seed is covered with inverted harrows.

It is also true that, on black soils, excellent strikes of lucerne, phalaris and ryegrasses occur when sown two inches deep, but this depth is disastrous for Rhodes grass. Rhodes is best sown at a depth of a quarter of an inch in a previously rolled seedbed, followed by a further rolling after sowing.

Again it is stressed that, for shallow sowing, the time of planting is an extremely important factor. For summer species it should be at a time when the bulk of the monsoonal rains is expected, in order to keep the soil moist and firm and so minimise, as much as possible, drying-out of the surface soil. This is particularly important on the black soils.

COVERING THE SEED.

The seed may be covered sufficiently in the drilling if the machine is adjusted to sow the shallowest depth which the lever will engage. This adjustment applies particularly if the drilling has occurred on the contour, as then every little furrow left by the tines acts as a trap for concentrating rain water on the seed, thus materially assisting germination.

Other methods of covering the seed involve the use of light trailing harrows, or of trailing harrows turned on their back. Metal chains attached to the foot-board and trailed out behind the drill are also frequently used. These chains give a light cover to the seed and help to level the soil. A good cover can also be obtained by using disc harrows set almost or quite straight.

ROLLING.

Should soil conditions require it, rolling of the seedbed prior to (and at times after) sowing has a lot to recommend it. Rolling gently firms the seed into close contact with the moist soil, thereby often ensuring a more uniform strike. This is particularly suitable for sandy loam soils.

The most common form of roller is the tyred-roller (Plate 1), which is made up of discarded well-worn motor tyres of uniform diameter, pressed together on a supporting frame and drawn behind the tractor or horses as

Plate 3.

Successful Pasture Establishment on the Self-mulching Black Soil Plains. Hitherto these soils have been regarded as most difficult for pasture establishment. This green panic pasture, only 4 weeks after germination, is showing excellent growth. Sowing rate was less than 1 lb. per acre in 28 in. drills, with seed germinating 40%.

a unit or in gangs. This form of roller is very efficient. The use of smooth tyres is essential as they pick up less moist earth. This type of flexible roller is usually most economical.

The cultipacker and the home-made light-log roller are also used successfully.

SOWING PASTURES WITH THE COMBINE.

Drilling of grass and legume seeds into a weed-free, moist and well consolidated seedbed is much superior to broadcasting. Not only is much less seed used when it is planted with a combine, but the seed is distributed more uniformly over the field and can be placed at the correct depth for good germination. Furthermore, little soil moisture is lost during drilling compared with the serious moisture losses experienced when broadcast seed is harrowed in.

Most pasture seeds are small and light and many carry fine bristles. This combination of characters prevents them from flowing freely through the drills. In addition, planting rates are usually very much lower than those used for wheat, oats or barley, for which the combines are designed.

Extensive tests which have been carried out on the Darling Downs have shown that existing cereal drills and combines can be adjusted to plant a variety of pasture mixtures.

Where the drills and combines are equipped with fertilizer compartments, little difficulty is experienced. The seed can be mixed with either fertilizer (if the soil requires it) or fine sand, and sown through the fertilizer compartment. If the drills have small-seed boxes attached, the smoother seeds can be sown direct through these.

Plate 4.

A Lush Drill-sown Pasture on a Shallow Sandy Soil of the North-eastern Darling Downs. This pasture, based mainly on Rhodes and buffel grasses, is in striking contrast with the low-producing native pastures on these shallow soils.

Most of the drills and combines in Queensland, however, are not fitted with these components and the grain box is all that is usually available for sowing the pasture mixtures. In order to reduce the planting rate to the low quantities required for pasture mixtures and at the same time maintain an even flow of seed, it is often necessary to mix the seeds with some diluent or carrier such as sawdust. In some cases where the seeds run freely, planting rates can be reduced by mechanical means.

Larger smooth seeds such as green panic and scrobic can be sown merely by using the wheat or oat side of the seed hoppers and adjusting the gears accordingly.

DILUENTS OR CARRIERS.

As mentioned above, the type of diluent or carrier which may be used will depend on the type of combine available.

If the pasture mixture is being sown through the grain box, the carriers which can be used include cypress pine sawdust, hardwood sawdust, rice hulls, cereals, cracked grains, and bran.

Where the soil requires fertilizer and the combine has a fertilizer box, grass seed may be mixed with the fertilizer. Inoculated legume seed should not be mixed with fertilizer except in special cases which are discussed later.

Plate 5.

Another Successful Pasture on the Shallow Timbered Country of the North-eastern Downs. This pasture, at Kaimkillenbun, is composed of green panic and Queensland buffel grasses with lucerne. The lucerne, which is clearly visible in the foreground, is a most valuable component of this pasture.

Other carriers less commonly used are fine soil, sand, and fine dry manure.

Cypress pine sawdust is possibly the most satisfactory and economical carrier for the Darling Downs. It is obtainable from most sawmills at little or no cost. Dry fine sieved cypress pine sawdust contains less dust than hardwood sawdust and has a more even flow, but it still has a tendency to "bridge" over the hoppers. Occasional stirring overcomes this difficulty.

It is important that the sawdust be dry and sieved through fly-gauze to remove the larger fragments which would obstruct the flow through the seed hoppers. Hardwood sawdust is more dusty than cypress pine sawdust and has less uniform particle size. This results in a greater tendency to "bridge" and prevent an even flow of the seed mixture, and more constant stirring of the seed mixture is required. Perfectly dry and sieved sawdust should be used.

Bridging has been noticed particularly when Rhodes grass is being sown with sawdust.

Rice hulls are more bulky than sawdust but make a satisfactory carrier. The curved hulls actually carry a big proportion of the small seeds and thus maintain a very even seed distribution in the grain box by preventing the heavy seeds from settling and the lighter seeds from rising. Rice hulls are not available in quantity but may be obtained from some hardware stores, where they are used for packing.

Oats, wheat and barley are all good carriers for pasture seed and there is little danger of bridging and interrupted seed flow. A big disadvantage

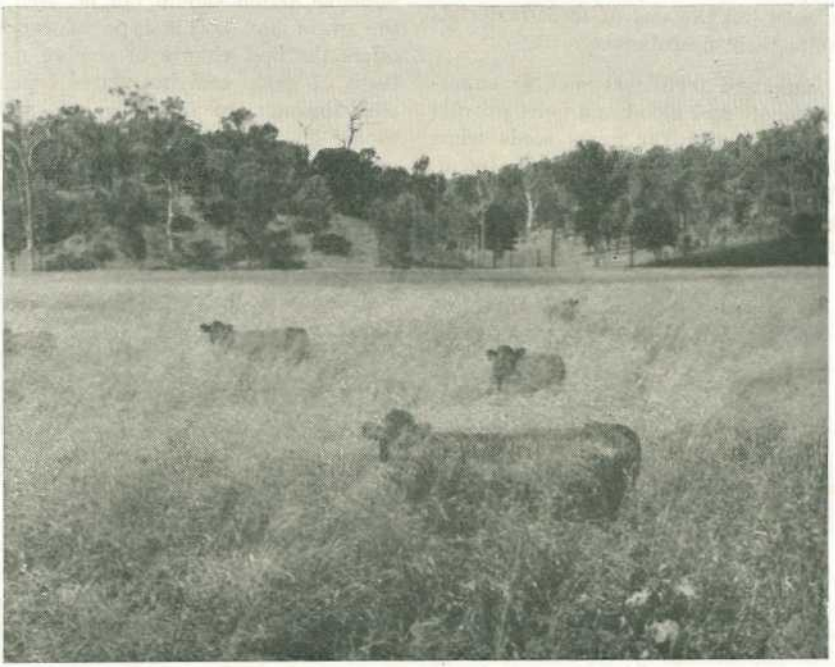


Plate 6.

Cows Grazing Machine Sown Pastures Near Cooyar. This pasture of green panic grass and phasey bean was successfully established on apple-tree creek flats.

is that the cereal crops provide serious competition to the young pastures with respect to soil moisture and light. If cereals are used as carriers for pasture seeds, the lowest planting rate possible should be used—for example, 12-14 lb. or lower per acre.

Barley at 14 lb. per acre is the most satisfactory cereal to use because of its upright habit which allows maximum penetration of light to pasture seedlings. Canary seed has been used successfully as a cover crop for phalaris (*Phalaris tuberosa*), while Japanese millet at a reduced planting rate has also provided a good early spring cover crop for Rhodes grass.

Where irrigation is used or where rainfall is adequate the cereals may be used more successfully, but mowing or grazing to prevent dwarfing of the pasture grasses may be necessary.

Cracked cereal grains or bran can be used but the cost of these materials limits their usefulness.

Lime and fertilizers such as superphosphate and blood and bone provide a good carrier for grass seeds when the soils require fertilizer treatment. These should be applied only through the fertilizer box of the drill and not through the grain compartment. Old discarded combines having only grain compartments, however, are sometimes used for applying fertilizer.

Where fertilizer is used as a carrier, light pasture seeds tend to float to the top and heavy seeds tend to sink during planting operations. Regular mixing is therefore necessary.

Inoculated legume seeds should not be mixed with inorganic fertilizers such as superphosphate, sulphate of ammonia, and muriate of potash. Agricultural lime is suitable for mixing with inoculated legume seed. Where it is wished to sow superphosphate with the seed, the superphosphate should be mixed with an equal weight of agricultural lime some weeks prior to its use.

Sand or fine dry soil from weed-free areas can also be used as a diluent. It will flow satisfactorily through the fertilizer box but because of its abrasive action should not be used in the grain box. This type of carrier offers the best chance of sowing mixtures of grass and inoculated legume seed through the fertilizer box. The use of fine dry manure as a carrier is not recommended on account of the risk of introducing weed seed into the pasture.

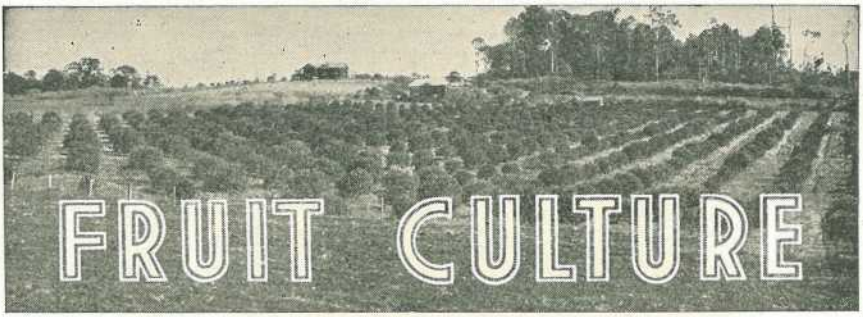
[TO BE CONTINUED.]

NEMATODE SAMPLES WANTED.

Mr. R. C. Colbran, a Departmental entomologist, is making a survey of the distribution of root knot nematodes in Queensland and desires to obtain fresh material from all districts. Samples from as many hosts as possible from each district are desirable.

As this material will be required for studies of host-parasite relationships, roots with well developed galls and adhering soil should be placed as soon as they are dug in screw-topped glass jars (approximately 3 oz. capacity). Details of host and locality should be clearly marked on the label. If the soil is damp (but not saturated) the nematode eggs and larvae will remain alive for some weeks.

Any specimens collected by you during the course of your work and forwarded to the Chief Entomologist would be of considerable help in the study of nematodes, which are important pests of a number of economic crops.



Soil Conservation in the Granite Belt (Queensland).

By W. J. ROCHE, Adviser, Soil Conservation.

THE DISTRICT.

The Granite Belt occupies an area reaching from Dalveen in the north to Wallangarra in the south. The New South Wales border forms the south-eastern boundary, with the northern section extending to the grazing country known as "the traprock."

The district covers an area approximately 40 miles long by 14 miles wide (See Plate 1).

The climate is cooler than would be expected from the latitudinal situation, its average July minimum temperature being 33.2 deg. and its average annual minimum only 47.4 deg. This is largely due to the elevation of the district, which varies from 2,500 to 3,500 ft. above sea level.

The rainfall for the district is approximately 30 inches per annum, made up of the following monthly averages:—

Month.	Points.	Month.	Points.
January ..	359	July ..	203
February ..	328	August ..	182
March ..	270	September	228
April ..	172	October ..	255
May ..	185	November	269
June ..	196	December ..	351

From the above figures it is apparent that the larger portion of the rainfall is received in the summer months. Frequently this summer rainfall is received as sudden high-intensity storms.

Erosion has developed on the sloping land of the district because of the fact that these high-intensity storms occur at a time when the soils are in a fine fallow and unprotected by vegetation or mulch.

SOILS.

The soils of the district have been derived from the weathering of granitic rocks. They are light-coloured (mostly light grey) and range in texture through sands, sandy loams, and loams. The loamy-textured soils, which occur generally in the north of the district, are approximately 9-12 in. deep and overlie a fairly permeable subsoil. Coarser-grained soils (sands and sandy loams) occur generally over the southern portion of the district.

The soils generally have a satisfactory physical condition, but have a low fertility status. However, they respond well to fertilizers, and with good husbandry methods give satisfactory yields.

The district is expanding, and areas of cultivation are being sought higher in the hills, as better drainage and less severe frosts often make these areas more attractive. Slopes of 15 per cent. have been encountered on recently cleared land of this type. If

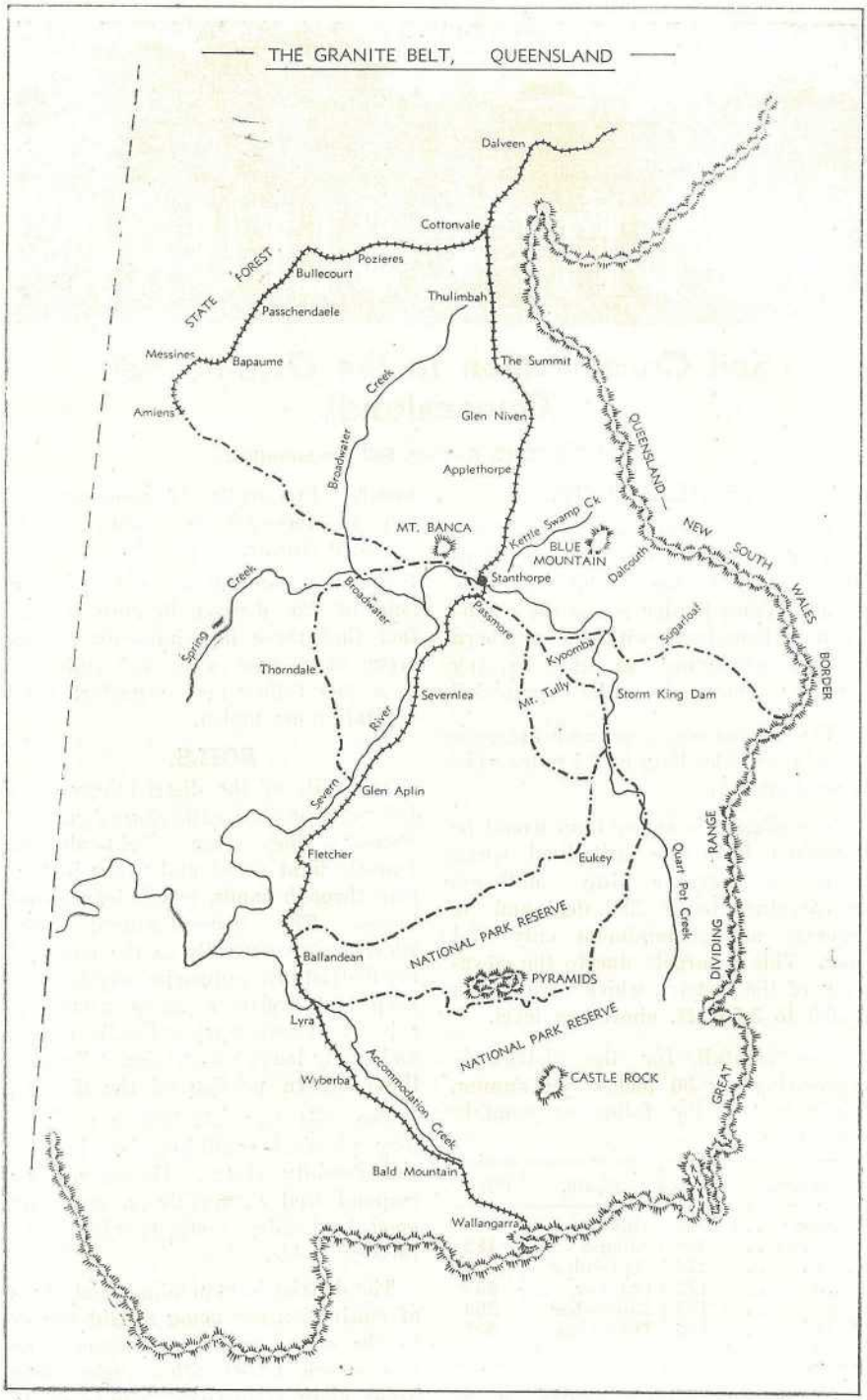


Plate 1.

Sketch Map of the Granite Belt, Showing Principal Features.

erosion control measures are not applied to these orchards severe erosion will result.

EROSION.

Within the district, both sheet and gully erosion are becoming obvious on the sloping cultivated areas. Naturally, the older orchards and vineyards on the steeper slopes are showing the most definite evidence of this trouble.

The erosion has taken place relatively quickly and in some areas has considerably lessened the economic life of the crop. This development points out clearly the need to incorporate soil conservation measures in all future work on sloping cultivated land.

Gully erosion (Plate 2) is most obvious, and its effects require no stressing.

Sheet erosion, on the other hand, may be more insidious, and often the seriousness of the soil loss is not realized until considerable damage has been done (Plate 3). Many orchards are netted and the netting fence on the lower side of the orchard frequently provides an excellent guide (through silt accumulation) to the extent of soil loss from the area above.

A weakness of the soil conservation work being carried out at present is the lack of a suitable protective cover for the soil surface during the summer months. The growing of a cover crop appears to be the natural solution but

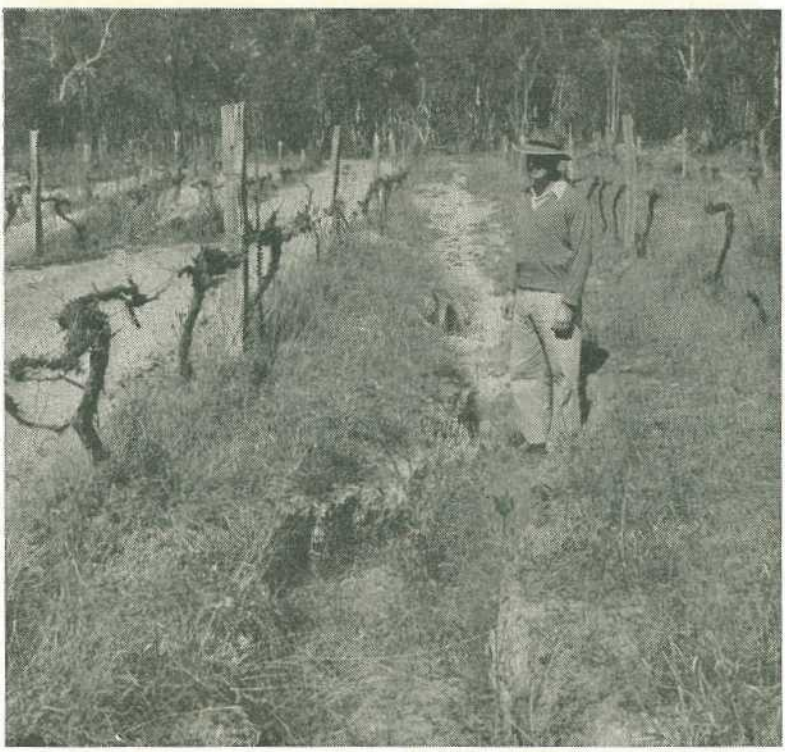


Plate 2.

Gully Erosion in a Granite Belt Vineyard. Serious gullying has occurred between trellises, indicating heavy soil loss, and preventing further cultivation in affected areas.

Plate 3.

Sheet Erosion. This picture shows ample evidence of sheet erosion following a storm of 125 points. Cultivation of this area might eliminate the visible damage, but a progression of such storms would cause serious loss of topsoil and depletion of soil fertility.

presents the serious objection of competition with trees or vines at a period when all available moisture may be necessary for crop development.

Investigations into sod culture with subterranean clover or cover crops with similar effect may lead to a solution of this problem. If a successful method of surface protection during the summer is developed it will considerably influence the design of soil conservation structures.

The following discussions on design are based on the assumption that the residues of the winter cover crop of lupins or black winter rye will be maintained on the surface for as long as possible into the summer, but that periods of bare tilth will inevitably occur.

The following designs have proved effective under the above conditions.

SOIL CONSERVATION DESIGN FOR A NEW ORCHARD.

It is recommended that all new plantings on slopes exceeding 2 per cent. should be established on a contour planting layout.

The initial additional work involved in establishing an orchard on the approximate contour (instead of by the commonly used square method) is very little. In view of this, it is easier and more effective to commence soil conservation work from the establishment of the orchard than to endeavour to combat erosion in a square-planted orchard when it develops.

In preparing the planting and drainage layout of a new orchard much will depend on the topography of the area to be planted. It may be desirable to prepare a contour plan of

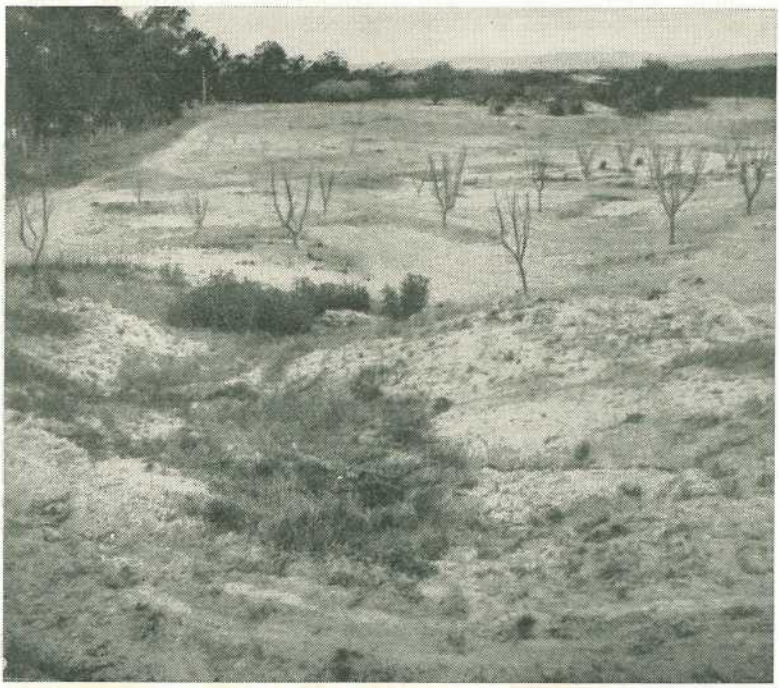


Plate 4.

Erosion in a Young Orchard. The situation has not yet become serious in this orchard, but there is ample evidence of soil loss already.

any very irregular areas and plot a theoretical layout before commencing the field survey of the layout. However, it has generally proved practicable to lay out the plan in conjunction with the preliminary survey.

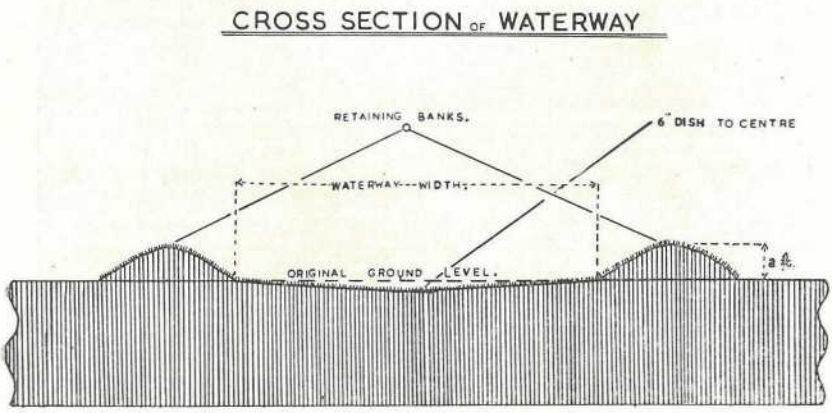


Plate 5.

Cross-Section of a Constructed Waterway. This sketch indicates clearly the dished cross-section and the type of retaining banks recommended.

The initial consideration in preparing a layout should be the provision of stable, satisfactorily located drainage lines. These may be available as natural features or may have to be constructed. Frequently, areas adjacent to the orchard may be suitable for the safe disposal of runoff, and if so, should be used. If natural pasture or woodland is used as a disposal area, care should be taken to locate channel outlets so as to dispose of runoff on as wide a face as possible.

Waterways.

Where safe natural drainage lines do not exist, waterways have to be constructed, and their location must be carefully chosen. Naturally, the location in a particular area will depend on local conditions, but the following points should be kept in mind.

The outlet of the waterway should enter the natural drainage line for the area or spill over a safe disposal area away from the orchard. If possible, it should be located in such a position as to minimise or eliminate the necessity for crossing it with implements, vehicles or stock.

The cross-sectional design of the waterway should be calculated in relation to—

(1) area to be drained to the waterway and the anticipated runoff;

(2) slope of waterway;

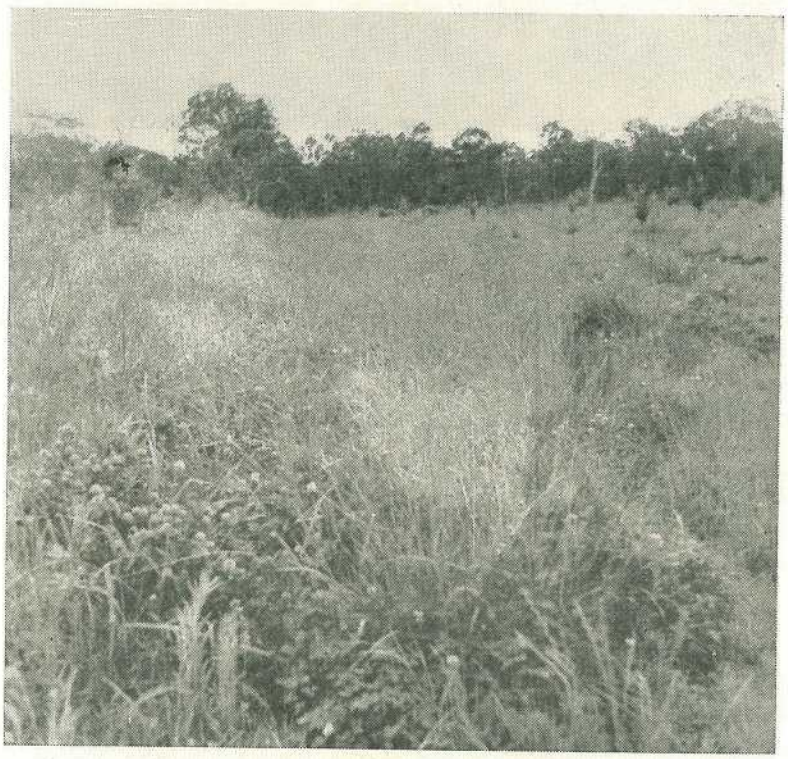


Plate 6.

A Well Grassed Waterway. The picture shows a waterway constructed at the side of an orchard. This waterway had been established about 18 months previously, having been seeded with a mixture of phalaris, red clover and white clover with a light cover crop of wheat.

(3) anticipated effectiveness of the vegetative cover to be established.

The waterway is constructed with a slightly concave bottom (in cross-section) and is bounded on the sides by two retaining banks (Plates 5-7).

The following may be used as a guide for waterway design for catchment areas up to 15 acres. Advice should be sought from the Department on preparing waterways to drain areas over 15 acres.

Slope. Per cent.	Width of Waterway. Ft. per Acre.
3	1½
4	1½
5	1¾
6	1¾
7	1¾
8	2
9	2
10	2
In excess of 10	2½

Where the calculated width is above 15 ft. it is desirable to split the waterway into two. This means constructing two adjacent waterways separated by a common retaining bank. One of these waterways will run the full length of the field and will drain the top half. The second will commence halfway down the area and will drain the lower half. This method ensures better distribution of the water flow.

When the waterway is constructed it should be sown to a mixture of—

	Per acre
Rhodes grass	6 lb.
Phalaris	3 lb.
Red clover	2 lb.
White clover	2 lb.
Sub-clover	2 lb.

Plate 7.

A Close-up of the Vegetative Cover of the Waterway Shown in Plate 6.

On account of the generally low fertility of the granite soils a heavy topdressing of a mixed fertilizer rich in nitrogen and phosphate should be applied at planting. If a good stand of clovers is established, subsequent fertilization can be reduced to phosphate only, as the clovers should make available ample nitrogen for grass growth.

Particular care should be taken to inoculate the legume seeds prior to planting. The inoculated seed should not be mixed with fertilizer before planting, since the fertilizer would destroy the efficiency of the inoculum. The correct inoculum is obtainable, on application, from the Department of Agriculture and Stock.

Contour Banks.

The location and shape of contour banks to be constructed will depend on a number of factors, but chiefly on the slope of the area and the crop to be grown. Generally, broad-based contour banks should be constructed on slopes up to 6 per cent. Such banks should be 18-24 in. high, with a front batter of 8 ft. (from the water channel to the bank crest) and a back batter of 12 ft., giving a base of approximately 20 ft. (Plates 8 and 12). For slopes in excess of 6 per cent. a narrow-based non-cultivated bank should be used (Plates 11 and 13). A guide to bank spacing etc., is given as Tables 1 and 2.

TABLE 1.

BROAD-BASED CONTOUR BANKS.

Slope.	Bank Spacing.	Width of Base.
Per cent.	Ft.	Ft.
2	120	20
3	100	20
4	80	20
5	60	20
6	60	20

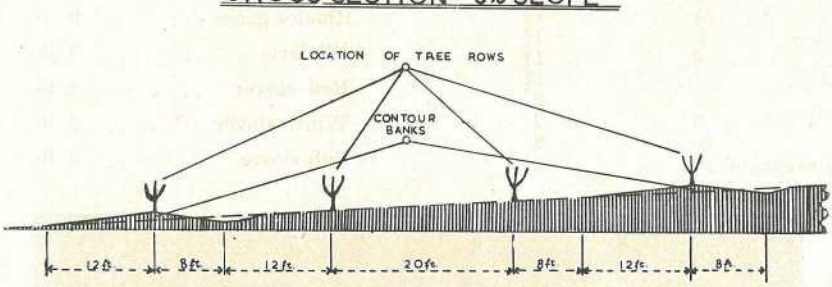


Plate 8.

Location of Tree Rows in Relation to Broad-based Banks. This section illustrates a method which may be used on slopes up to 6 per cent. where it is necessary to use the available land to full advantage. A tree-row is placed along each bank, and other rows are spaced between the banks.

TABLE 2.

NARROW-BASED CONTOUR BANKS.

Slope.	Bank Spacing.	Width of Base.
Per cent.	Ft.	Ft.
7	60	6–8
8	40	6–8
9	40	6–8
10	40	6–8
Exceeding 10	Every tree row	6–8

Modifications may be necessary to suit local conditions of soil type, machinery used, trees planted, &c. The bank spacings are in multiples of 20 ft. to conform with the normal tree spacing in the district. The length of the bank should not exceed 1,000 ft. in one direction of water flow. This bank length may be increased to a maximum of 2,000 ft. by allowing the

water to flow from the centre to both ends if suitable outlets are available.

LOCATION OF TREE ROWS.

Slopes Less Than 6 Per Cent.

Frequently on orchards in this district, it is desired to make the maximum use of available cleared land because of the high costs of additional clearing. With this in mind, on gentler (2-6 per cent.) slopes, appropriate tree rows are located on the crest of a broad-based bank. Such trees are planted slightly deeper than normally, to allow for initial settlement and soil drift from the crest of the bank (Plates 8 and 9).

If sufficient land is available, an alternative system may be used. Instead of certain tree rows being located on the banks, the banks are located *between* appropriate tree rows. The bank should be approximately 10 ft. wide, 18 in. high, and half-moon in shape. The spacing between the rows adjacent to the bank should be increased to 30 ft. (Plate 10).

On a 6 per cent. slope this means a reduction of planting area equivalent to one acre in six. This reduction is naturally less on flatter slopes. The bank may be sown to pasture grasses and legumes, but the shape should be such that channel capacity is adequate and crossing of the banks by farm machinery is possible.

Plate 9.

A Contoured Apple Orchard with Broad-based Banks. The picture shows 2-year-old apple trees located on the crest of a bank; other rows run parallel to the banks. Owners have reported increased growth in young trees planted on top of the banks.

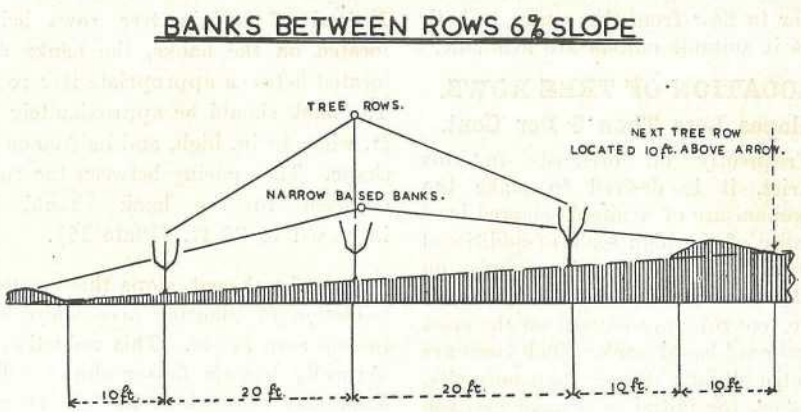


Plate 10.

Alternative Method of Location of Tree Rows on Slopes up to 6 per cent. In this method, the banks used are narrower at the base, and all such banks are located between rows of trees. Tree rows adjacent to the banks are separated by 30 ft. instead of the usual 20 ft.

This second layout has obvious advantages in bank maintenance, weed control between trees, &c., and is recommended where sufficient land is available for its adoption.

Slopes Exceeding 6 Per Cent.

With these slopes a narrow-based non-cultivated bank is used and the bank should be sown to a pasture mixture (Plate 11).

With this layout, the tree row is located immediately below the bank. Difficulties in weed control along this tree row may be encountered but are minimised by the use of directly attached power-lift implements. The alternative is to locate the bank midway between tree rows, as has been previously discussed for gentler slopes.

With slopes exceeding 10 per cent. the method is the same as above, with a bank to each tree row.

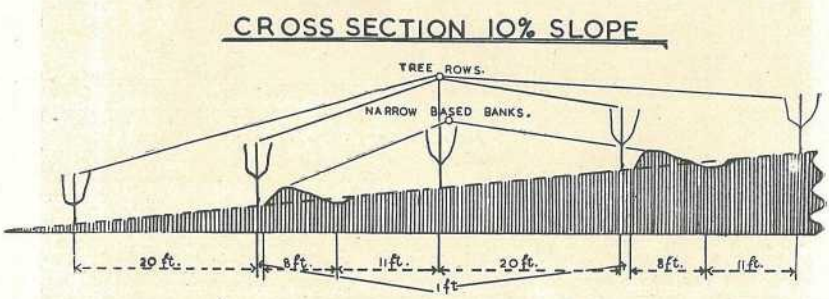


Plate 11.

Narrow-based Banks for a 10 per cent. Slope. This section shows an arrangement for slopes greater than 6 per cent., in which narrow-based banks are used at recommended intervals.

[TO BE CONTINUED.]

Seed Processing Equipment in Queensland.

By R. J. B. LINNETT, Inspector, Standards Branch.

The types of seed processing machines used in Queensland are the oscillating screen, rotating screen, pocketed discs, indented cylinders, and specific gravity or air float.

Oscillating Screen.

This type depends on the action of the oscillating screen to move the seed across the perforations and thus effect the size separation. Belonging to this group are the combine cleaners, hand-operated farm units, and commercial machines. Of the last, the most important are the Bodington and Clipper units. The first two types are for rough cleaning of small lots, on the farm, at harvesting, or in the shed.

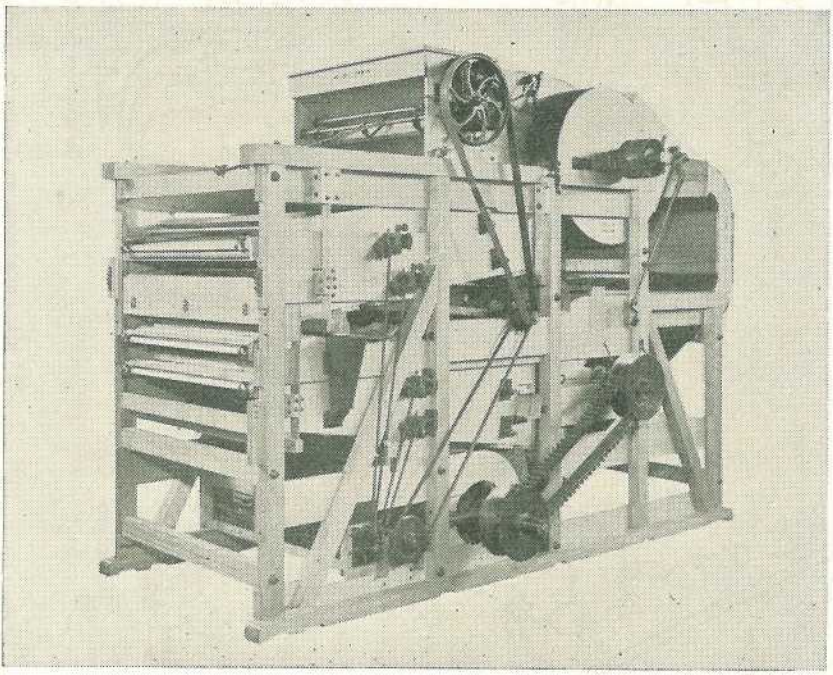


Plate 1.

The Oscillating Multiscreen Type Bodington Cleaning Machine used in Large Seed Establishments. The larger models of both Bodington and Clipper brands are similar in general appearance.

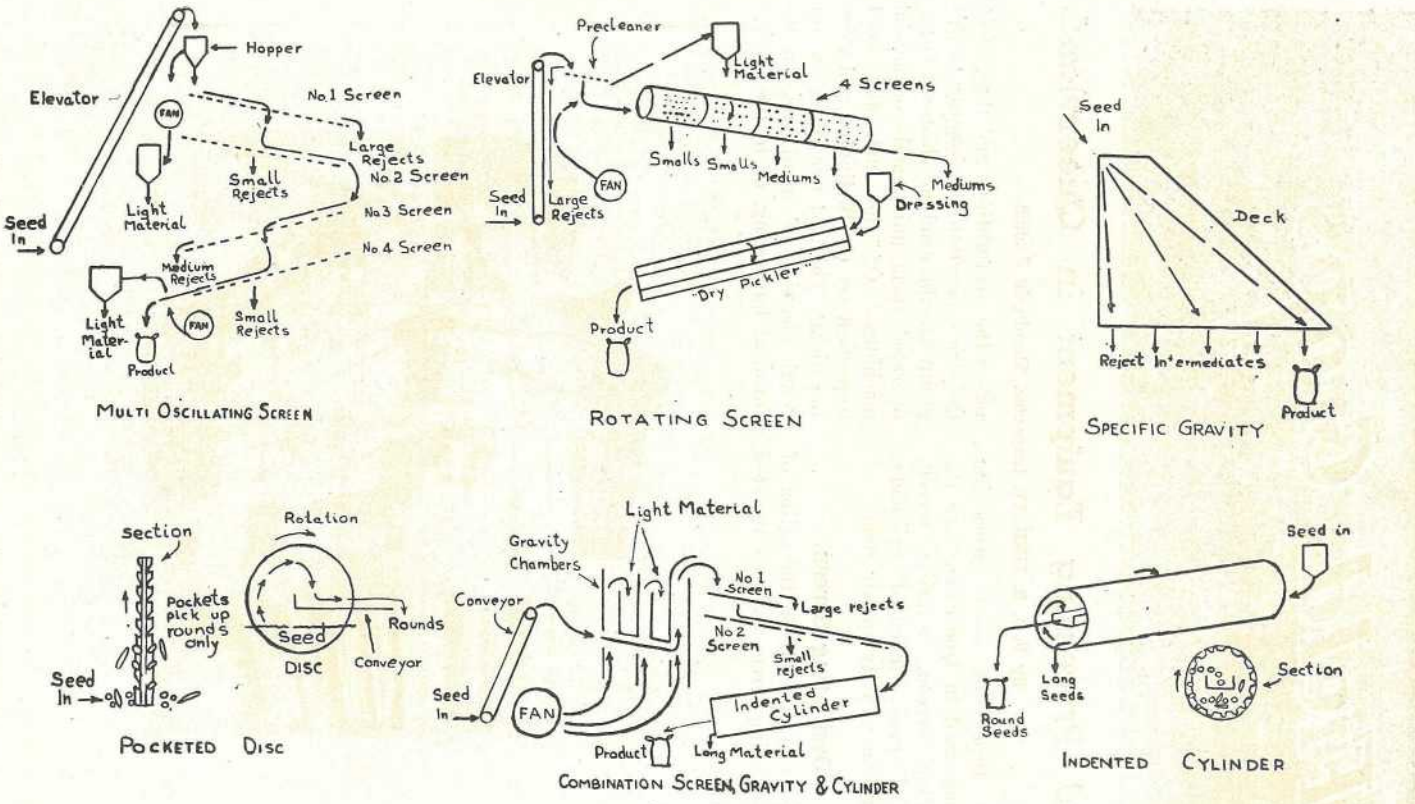


Plate 2.

Simplified Flow Sheets of Queensland Seed Cleaning Machines.

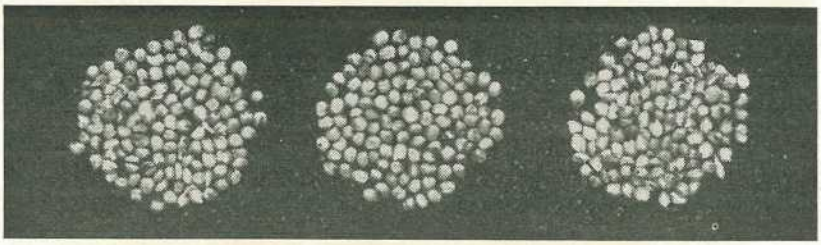


Plate 3.

Sorghum Seed Cleaned by a Multiscreen Clipper. On the left the sample contains many cracked grains and after cleaning (centre) only a few half-sized or greater cracked seeds remain. The right-hand sample represents rejected seed.

The Bodington and the Clipper are respectively Australian and American built commercial machines of similar design, available in several models, of which the most popular are the 4-screen units. Screens have a large surface area, enabling efficient high output to be attained, and this makes the design one of the best for accurate general-purpose cleaning. Two auxiliary air cleaners complete these machines.

Several of the smaller 2-screen medium output models of each make are also in use.

A machine new to Queensland is the Vac-a-way. The 4-screen, 1 air-control model is of comparatively small size and has a medium output.

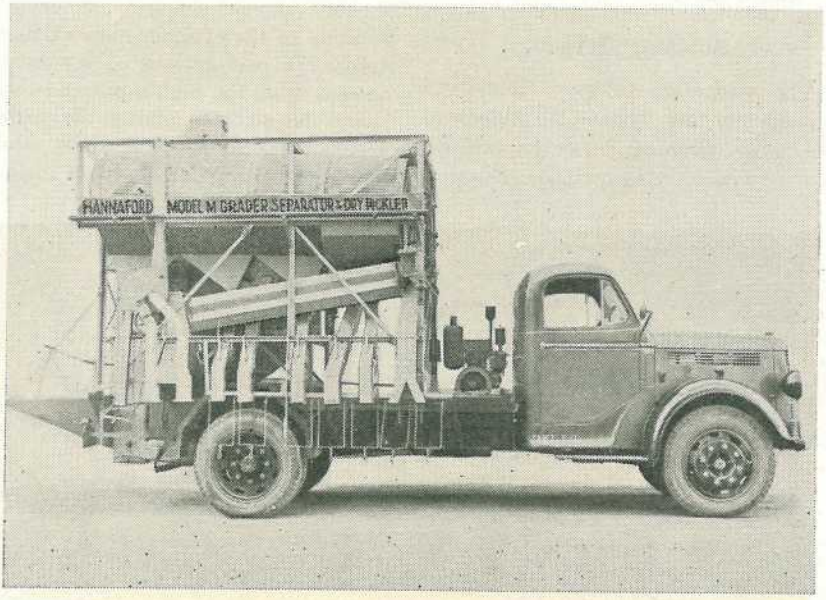


Plate 4.

The Rotary Screen Cleaner. A Hannaford Model M mounted as a mobile unit. Note the adjustable input hopper at the rear, the four screens forming the cylinder at the top, the diagonally placed dressing or "dry pickling" unit and the outlet chutes brought to one side of the unit for convenience.

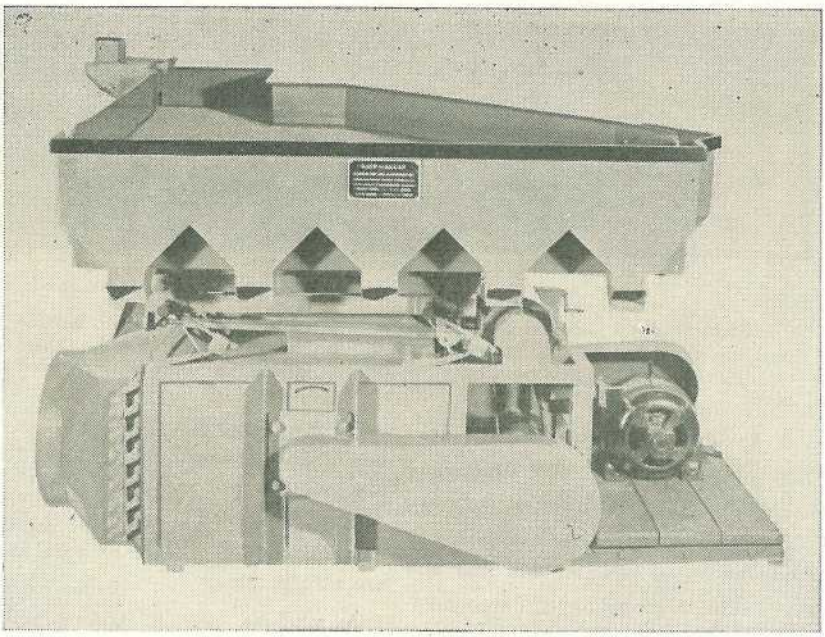


Plate 5.

The Specific Gravity Separator. This is a Kipp Kelly similar to the units used in Queensland. Note the large diameter air inlet on the left and the five outlets along the front of the deck.

Rotating Screen.

The Australian designed Hannaford belongs to this type. It utilises as the major cleaning device an inclined multiscreen rotating cylinder. The slow rotation of the cylinder moves the seed across the perforations of the various screens from the high input end to the lower output end, giving the various separations. Standard auxiliary equipment on the popular Model M includes

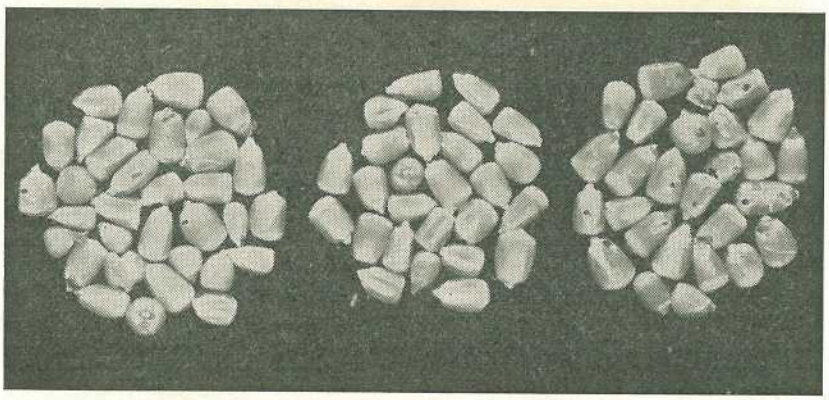


Plate 6.

Maize Seed Cleaned by Gravity. Left: uncleaned seed containing weevil damaged grains. Centre: sound, undamaged seed from the apex of machine deck. Right: rejected maize composed of damaged and light seed.

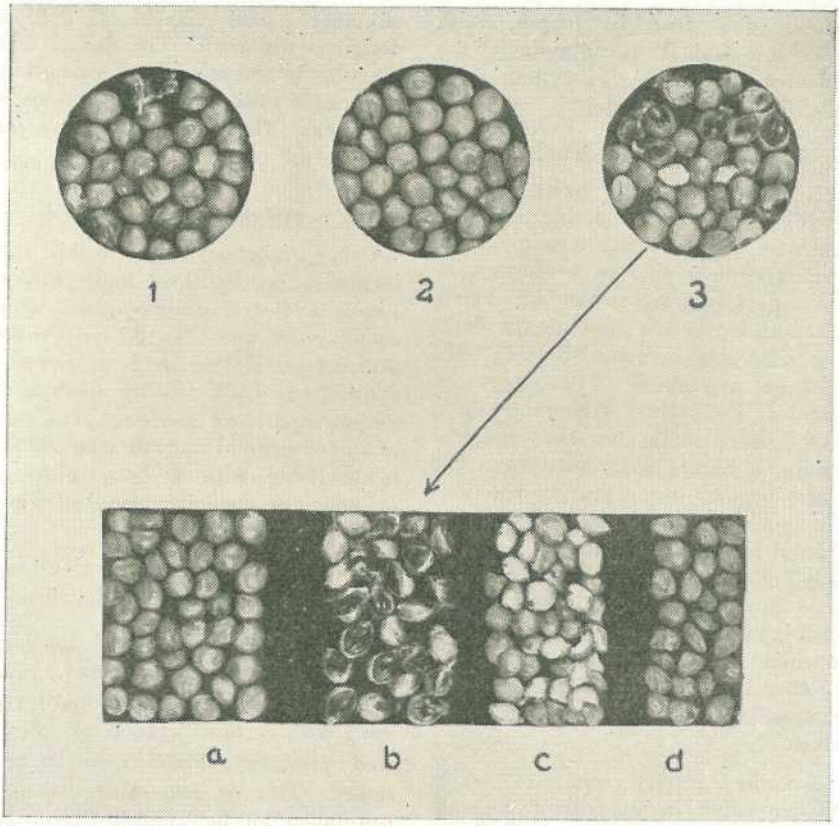


Plate 7.

Sorghum Seed Cleaned by Gravity. 1. Uncleaned seed containing cracked and glumed seed. 2. Cleaned seed showing sound even seed. 3. Rejects composed of (a) low germinating light seed; (b) undesirable glumed seed; (c) cracked seed; and (d) mouldy grain.

a peg drum, single oscillating screen with aspirator, several sets of pocket discs and a "dry pickler" for dressing. The Hannaford may be installed either as a stationary plant or as a mobile unit. It is, in fact, the only make in use in this State serving the dual purpose. Output is medium.

Pocketed Discs.

The Carter disc machines form this group. They are useful for making length separations—that is, separating seeds of the same diameter but having different lengths. Screens would be inefficient with this type of separation. A unit consists of up to 18 metal discs the faces of which contain depressions or pockets of set sizes. As the discs rotate they dip into the seed, pick up the short or round seeds and deposit them in a delivery chute, but long seeds remain and are delivered to another chute. The discs are interchangeable. The Carter disc machines have, to some extent, replaced the indented cylinders. These machines are in use as separate units, and are also built into Hannaford equipment as auxiliary units. Output is low to medium. Carters are very useful when used in conjunction with other types.

Indented Cylinder.

The indented cylinders have similar uses to the pocketed discs but construction is different. The cylinder is

usually 6-8 feet in length, with removable shells containing the indented pockets. A few cylinders are still in use in this State.

Specific Gravity Machines.

The Canadian Kipp Kelly and the Swedish Kaybee specific gravity machines representing group 2 are cleaner-graders able to perform very fine separations due to the high degree of control over the seed on the deck. The principle involves "floating" the seed on a cushion of air over an inclined, oscillating, triangular deck, feeding seed to the low base end and obtaining high gravity seed from the apex; various lower gravity fractions are spouted from one side of the deck. Output is medium but quality is invariably high. These units are particularly good for raising germination where such is possible. When this specialised machine is used in conjunction with another type or types, practically all classes of processing may be undertaken.

Another gravity separator which has appeared in Queensland recently is the Oliver. This brand is of American design and is built in Australia under licence. The principle of operation is similar to that of other gravity machines, but the design is different. The deck is rectangular in shape and the air cushion is variable over individual sections of the deck. The other types have one air control only.

Other Equipment.

Other equipment in use in this State includes the Swedish built Petkus-Linde, a cleaner-grader-pickler which combines groups 1 (a), 1 (d) and 2, utilising oscillating screens, indented cylinders and air floating mediums as major separating devices. This unit is a good general-purpose machine and is available with a "dry pickling" cylinder for applying chemical dressings and a peg drum.

Output is medium and a wide range of seeds may be efficiently handled.

Also in use are several machines specially adapted for processing beans and maize. These are standard type units with certain "extras" to suit the seed primarily intended to be processed. One or two other makes of equipment will be found in Queensland but their importance and use are limited and description is not warranted.

ANIMAL HEALTH

Distemper in Working Dogs.

By M. S. STEVENS, Veterinary Officer.

Do you value your working dog? If so, you will want to protect him against distemper. Your district veterinarian will advise you on preventive vaccination.

Each year distemper takes a heavy toll of working dogs. Many die and many are permanently disabled in the extensive outbreaks which sweep through country areas. Most of these losses can be avoided.

WHAT CAUSES DISTEMPER?

Distemper is a contagious disease. It is caused by a virus—just as human influenza is caused by a virus. It is spread directly by dogs suffering from the disease and by contact with surroundings which have been contaminated by the discharges from affected dogs.

Distemper does not cause serious illness in all dogs infected. The actual virus itself, especially in puppies, may produce only a very slight illness lasting 2-3 days. This is marked by a rise in temperature, and during this period the dog does not relish his food and appears listless. These signs may not be seen by the owner. Such an attack renders the dog immune to more serious attacks.

This mild distemper is encountered more frequently in town dogs, which are generally infected at an early age. Country dogs only encounter the virus spasmodically and usually during waves of the disease, when the virus is more virulent. For this reason they are often more severely affected than their town counterparts.

In a typical attack in a fully susceptible dog the fever tends to drop in a few days, but is followed about a week later by a second fever rise. Other germs, which normally do not get a chance to multiply and cause illness in a healthy dog, then attack the lungs, intestines or kidneys, causing pneumonia, gastroenteritis or nephritis. These secondary invaders, as they are called, are responsible for many of the obvious symptoms of the disease and the original sickness caused by the virus alone may pass unnoticed. Signs of nervous derangement may occur at this stage or later, and these are always extremely serious and frequently incurable.

Generally, canine distemper infects only dogs and members of closely related families, such as dingoes, foxes, and wolves. Ferrets are highly susceptible, as are the allied weasel and stoat tribes. Cats and other domesticated animals are not susceptible.

SIGNS OF DISTEMPER.

One of the earliest signs indicating that a dog has distemper is a rise in body temperature up to as much as

105°F., as against the normal body temperature of 101.5°F. At this stage the dog appears listless, but this may disappear on interest or excitement. He may not eat his food, though this is not a constant sign.

Running from the eyes and nose is a common early sign. This also occurs when the dog is run-down or ill from other reasons, such as worm infestation. At this stage the thermometer is the best guide. A temperature of over 103° indicates that treatment is needed.

More serious signs are coughing and quickened or exaggerated breathing. These indicate that the dog is running a high fever or that he has congestion of the lungs or pneumonia.

A fluid, evil-smelling scour is sometimes seen. This is most common in pups about four months old and is generally associated with marked nervous signs.

In some cases thin-walled yellowish pustules are found on the skin of the belly and thighs. These pustules may reach the size of a dried pea.

A great number of nervous signs occur. These are all serious. The worst types are fits, which commonly affect dogs under one year of age. The dog froths at the mouth, champs its jaws rapidly, falls on its side and paddles with its legs. Such fits last for about 30 seconds. They tend to become more frequent till the pup dies. Some do recover, but the majority of these are left with some permanent disability such as blindness, deafness, walking in circles or constant twitching.

This type of nervous distemper may strike very suddenly and fits may be the first sign noticed by the owner. However, they are always preceded by a period of increased nervousness, during which the pup often has a vacant wild look in its eye, especially when handled. Normally docile pups often snap and yelp in this stage.

Corns may be seen on the pads of the feet in this type of distemper, which is sometimes called "hard pad." It is not yet clear whether "hard pad" is a modified form of distemper or a separate but similar disease.

Involuntary and constant twitching of some muscles or of whole parts of the body may occur. This is sometimes called chorea. The muscle twitching may appear early in the disease and often precedes fits, but usually the gross twitching of whole parts of the body appears after the acute stage of the attack is over. In fact, the dog may seem to have recovered completely, then within three weeks of the acute attack these nervous signs appear. A staggering gait which leads to complete paralysis of the hindquarters usually appears in this way also. These signs are caused by the distemper virus destroying the nerve cells. What parts of the body are affected depends on where the controlling nerve cells have been damaged. Generally such damage to the nerve cells is permanent and the animals never recover completely. Usually if they show no improvement within six weeks the case is considered to be hopeless.

TREATMENT.

As soon as distemper is suspected, give an injection of canine anti-distemper serum under the skin. The neck is the usual site of injection. This serum is effective only against the virus and not against the secondary invaders, so its use is logical in the early stages but only of limited use where the disease has been present for more than say seven days.

The dose rate must be adjusted to the size of the dog and the stage of the disease. As a preliminary dose for small dogs 10 c.c. may be sufficient, but for larger dogs the first dose should be at least 20 c.c. When treatment is delayed until the later stages of the disease, a dose of 1 c.c. for

every 1 lb. weight should be used. Administration of serum should be repeated, if necessary, every 24 hours until improvement is noted. Your veterinary surgeon can judge whether the use of serum is justified, and if so, the correct dose to give.

In conjunction with serum, give two 250 mgm. capsules of aureomycin, followed by one capsule per day for at least four days. It may be necessary to continue this treatment for eight days. Dogs over 25 lb. in weight may need two capsules per day. Half these doses are sufficient for puppies up to 10 lb. in weight.

Sulphadimidine may be given in place of aureomycin. The dose rate is one gram to each 15 lb. weight, divided into two daily doses. It should not be given for more than seven days.

Both these drugs are effective only against the secondary invaders.

Affected dogs should be isolated, kept warm and always provided with drinking water. They should be tempted to eat with warm semi-cooked liver or meat stews. The cardinal rule is to find something light and nourishing which he can be coaxed to eat and offer it frequently in small amounts. Never offer large quantities, especially of milk foods, and leave them by the patient in the hope that he will eat sooner or later. Also, do not attempt to force-feed except on veterinary instructions. Some patients never lose their appetites.

In spite of all the advantages offered by immune sera and modern antibiotics, canine distemper is still one of those diseases in which a successful outcome frequently depends as much on the nursing as on the medicinal treatment.

Once serious nervous symptoms have become established, chances of complete recovery are very slight and painless destruction is wise.

It should be realized that the disease is highly infectious and that sick dogs should be strictly isolated from other susceptible dogs during the course of the illness and for several weeks after. Infection can be carried through the air for some distance but not as far as 200 feet.

Bedding and so on used with a sick dog is infective and should be carefully burnt after use.

It is useless giving affected dogs gunpowder, cordite, whole bullets or filed-up pennies. Squeezing their anal glands has no bearing on this disease.

PROTECT YOUR DOG!

Dogs can be permanently immunised against distemper by the living virus and the egg-adapted virus methods. Only healthy dogs can be immunised. The immunity produced is very effective. Dogs are best immunised in puppyhood, and the job can only be done by a veterinary surgeon.

The original method of vaccination consisted of giving the animal a dose of virus which on its own would produce an active and possibly fatal attack of distemper. This attack was partly prevented by giving, at the same time, a dose of immune serum which prevented the virus getting a good hold. In this way a very mild sickness was produced, which was usually unnoticed by the owner but which produced sufficient antibodies to neutralise any subsequent infection.

Two disadvantages of this type of immunisation may be mentioned. First, during the course of the immunisation the dog was fully infective to other susceptible dogs, who could contract virulent and fatal distemper from him if allowed to come into contact; secondly, in some rare cases the virus got the upper hand of the serum, with disastrous results. A very careful veterinary inspection was necessary before inoculation to make sure that the dog was not suffering from worm

infestation or any other condition which would weaken his resistance to the virus.

Because of these drawbacks, virus which has been weakened by passing through eggs has come into fairly general use. The vaccine does not require serum injection and is claimed to give a much more rapid build-up of immunity as well as being non-infective to other dogs during the fever period after injection.

The use of this vaccine is too recent for a full evaluation of its usefulness to be made, but in the hands of properly trained veterinarians it appears very promising.

An injection of anti-serum will protect a dog for from two to three weeks. This is useful in preventing the disease in healthy dogs known to have been in close contact with the disease.

A third type of vaccine is available which gives some protection from the secondary bacterial invaders.

It is always wise to consult a veterinary surgeon on the question of this complicated disease.

DAIRY PASTURE ADVISORY COMMITTEE.

Experimental work on Queensland's dairy pastures will be assisted materially by a further grant of £1,500 to the Queensland Dairy Pasture Improvement Advisory Committee, made by the Australian Dairy Produce Board through its State Committee.

The decision of the Australian Dairy Produce Board to make the grant was announced at the annual meeting of the Advisory Committee.

Stating this recently, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said that the committee would use portion of this money to purchase a second sod-seeding outfit, including a heavy duty tiller. The committee's first sod-seeder is in use on the Atherton Tableland, where a number of sod-seeding and fertilizer plots have been laid down for both demonstration and research purposes. The new sod-seeder will be used initially in south-eastern Queensland.

The committee has decided to give attention this year to a study of the effects of nitrogenous fertilizers on dairy pastures in south-eastern Queensland. Special studies by Departmental officers will be made in those areas where, in the past, it has been difficult to establish good stands of clover.

Chairman of the Committee is Dr. W. A. T. Summerville, Director of the Division of Plant Industry in the Department of Agriculture and Stock. Other members of the committee are drawn from the industry and the Department.

The committee's annual report shows that work on the improvement of the State's dairy pastures involved 140 trial plots last year. This is an increase of nine plots over the 1953-54 figure. The plots are scattered through all dairying districts from the Atherton Tableland to the southern Darling Downs.

A total of 32 pasture pilot plots has been established in 11 districts of the State. They are serving a valuable purpose in bringing useful pastures to the notice of local farmers. Some 35 pasture establishment and sod-seeding trials are in progress in 10 districts. A great deal of information on the sowing and management of two pasture mixtures (green panic and lucerne, and Rhodes grass and lucerne) is being obtained from these trials.

Trace element and fertilizer trials are being carried out on 30 plots in eight districts. As in previous years, the outstanding feature is the remarkable response to superphosphate in all but a few plots. It is pleasing to note that the use of superphosphate on dairy pastures is growing rapidly in eastern Queensland.

Valuable information on the performance of pastures under grazing is being provided by a series of 13 grazing trials. The committee has also sponsored the establishment of 15 irrigated pasture plots. Interest in irrigated pastures is being maintained because of the greatly increased returns and the marked reduction in the quantity of concentrates used when irrigated pastures are grazed.

How to Immunise Cattle Against Tick Fever.

By G. D. DALY, Animal Research Institute, Yeerongpilly.

Though blood vaccine is available from the Department of Agriculture and Stock, many stock owners find it more convenient to collect blood on the spot from specially prepared steers.

This article describes how blood should be taken from these "bleeders" and how inoculation should be performed.

Blood vaccine is widely used for immunising cattle against the common form of tick fever (babesiosis) in Queensland. Although many owners inoculate their own stock and are familiar with the various operations involved, enquiries are frequently received from others regarding the correct procedure.

Immunisation against tick fever depends on the fact that susceptible cattle inoculated with blood carrying the organisms suffer a reaction and on recovering are resistant to the disease for a long time.

BLOOD IS AVAILABLE.

Suitable blood is procurable from the Animal Research Institute, Yeerongpilly, or the Animal Health Station, Oonoonba, near Townsville. It is prepared with every care, but as this blood contains living organisms its failure to produce any reaction on the one hand, or too violent a reaction on the other, is beyond the control of the laboratory.

The blood should be used immediately after it is received and not later than 36 hours after despatch. If stored, it should be kept in a cool dark place but not frozen. The cost is 6d. per dose (minimum charge 1s. 6d.) plus freight. When ordering blood vaccine, at least one day's notice should be given, and full forwarding directions should accompany the order.

"BLEEDERS" SOMETIMES PREFERABLE.

Where large numbers of cattle are to be inoculated, or where it would be impossible to obtain the vaccine within the prescribed time, blood for inoculation may be taken from "bleeders".

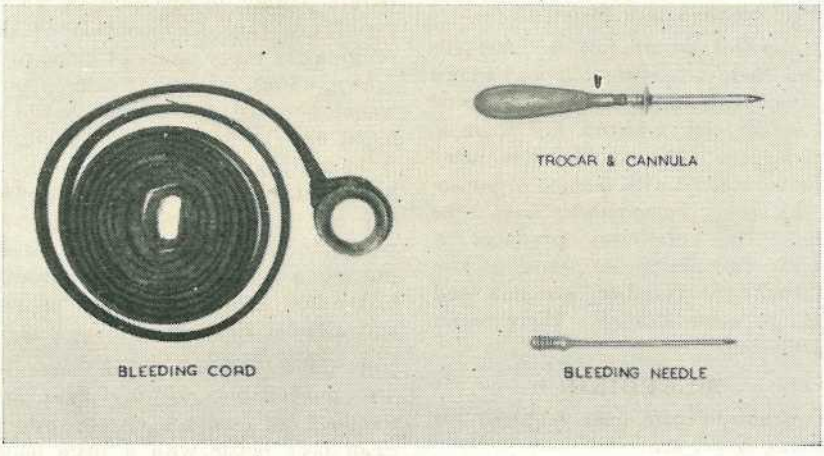


Plate 1.

Equipment Used in Drawing Blood for Inoculation.

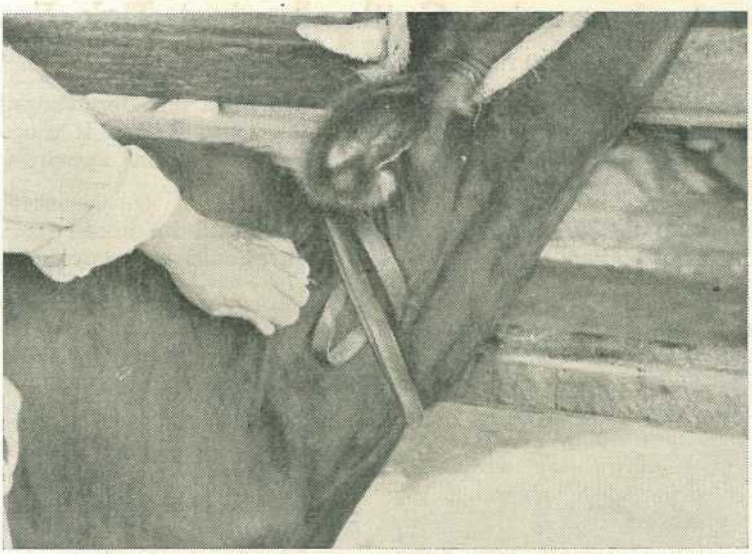


Plate 2.
Bleeder Secured and Bleeding Cord in Position.

These animals are supplied at a cost of £20 on rail at Yeerongpilly or Oonoonba. They are young Shorthorn-cross steers that have never been in contact with ticks and have been inoculated with the two common tick fever organisms. As their blood gives reliable results for only a few months, they are prepared when needed. Preparation takes about six weeks, so orders should be placed six weeks before bleeders are required.

A bleeder should not be used for longer than six months. It may retain its usefulness much longer if allowed to become tick infested, but there is always the danger that it may become infected with a third organism (*Anaplasma marginale*) from the ticks. This organism produces a disease (anaplasmosis) causing loss of condition, jaundice, anaemia and death of some animals. There is no reliable cure.

BLEEDING.

Instruments and gear required for drawing blood are:

(1) Trocar and cannula, or bleeding needle (Plate 1).

(2) Bleeding cord or strap (Plate 1).

(3) Halter and leg rope.

(4) Sufficient sterile bottles containing sodium citrate solution.

Preparing Citrate Bottles.

Sodium citrate solution is made by dissolving 1 ounce (have 1 ounce packets weighed by a chemist) of the citrate powder in one pint of water; use 4 c.c. (one teaspoonful) of this solution for every ounce of blood to be drawn. Thus, 100 c.c. (6 tablespoons) would be used for a beer bottle of blood and would inoculate 130 head. A measuring (medicine) glass should be used if available. The correct quantity of citrate solution having been placed in the bottles, they are corked, put into a pot with cold water, brought to the boil and boiled for 15 minutes and allowed to cool.

A quick method, when measures are unavailable, is to place one teaspoon of sodium citrate into a clean beer bottle with a little boiled water and bleed directly into the bottle, shaking well.

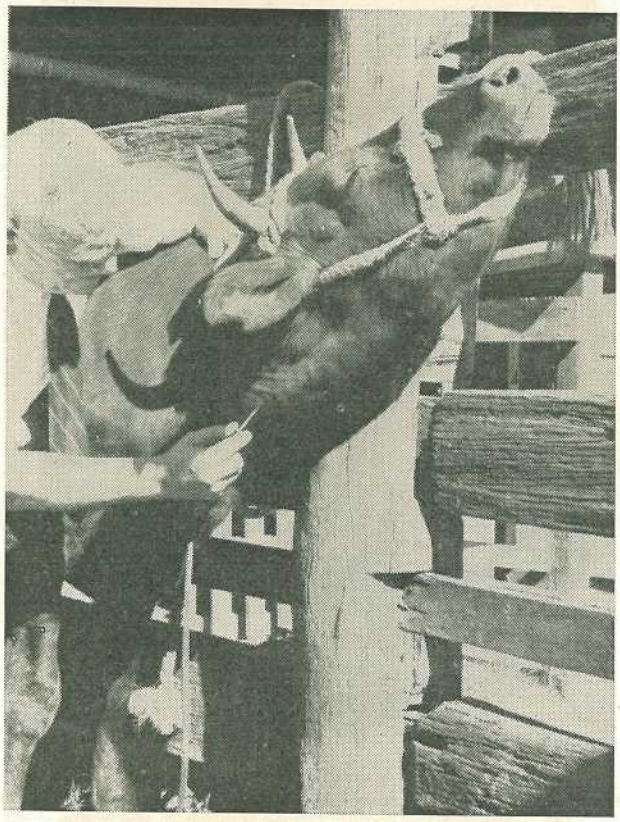


Plate 3.
Inserting the Trocar and Cannula.

The Operation.

The bleeder is placed in a crush or secured to a fence. The halter is placed behind the ears and well up on the cheek to allow the beast to breathe freely. The head is raised and secured with neck stretched. It is most important to tie the animal securely. The bleeding cord is put round the neck close to the shoulders, and tightened till the jugular vein (running in the groove between the point of the jaw and the point of the shoulder) stands out very prominently. The cord is secured with a quick-release knot in case of choking (Plate 2).

The trocar with cannula in place (or needle) is then inserted into the jugular vein in an upward and forward direction at a sloping angle (Plate 3), piercing the skin and vein wall together. Holding the cannula in place, withdraw the trocar and allow the blood to flow directly into the citrate solution at the bottom of the bottle (Plate 4), shaking it at the same time.

When sufficient blood has been obtained, first loosen off the bleeding cord, then remove the cannula, squeezing the skin between thumb and forefinger.

The blood is now ready for use and should be used as soon as possible.

Plate 4.
Collecting the Blood. As the blood flows, the bottle is shaken tc mix the blood and the sodium citrate solution in the bottle.

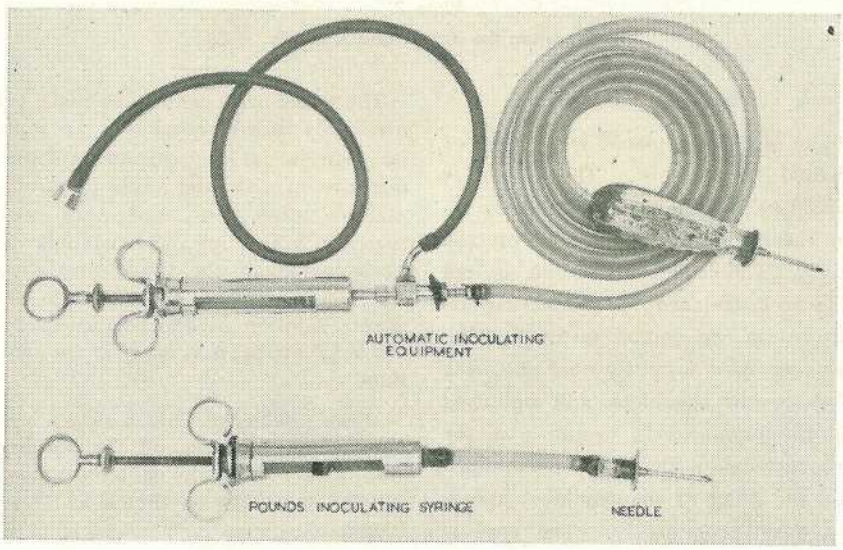


Plate 5.
Inoculation Equipment.

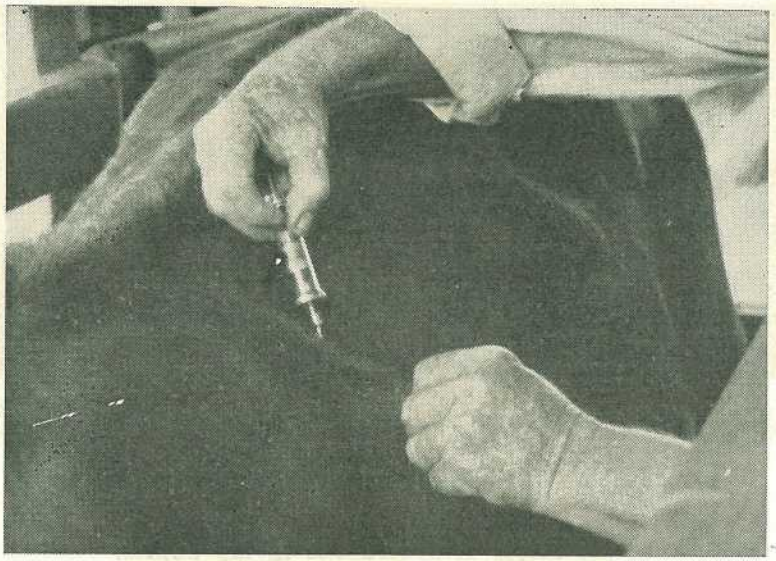


Plate 6.
Inoculating Beneath the Skin Behind the Shoulder.

Don't Bleed Too Often.

Up to 8 pints (sufficient for 800 head) may be drawn from a well-grown bleeder at one time, but a few weeks' spell must be allowed after drawing this amount. Two beer bottles (sufficient for 260 head) per week or four beer bottles per fortnight can be drawn over the season without harmful results.

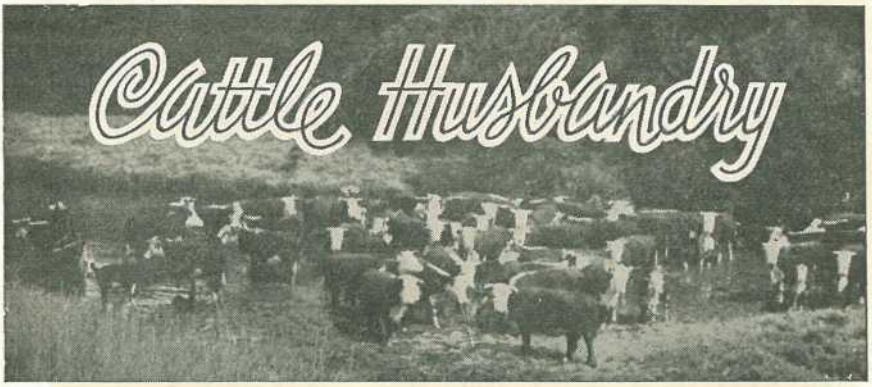
INOCULATION.

A 5 c.c. dose is injected with a hypodermic syringe and needle or automatic outfit (Plate 5) directly into the loose tissue under the skin, behind the shoulder (Plate 6). Cows more than 4-5 months pregnant should not be inoculated. Where large numbers of animals are involved the automatic inoculating equipment will be found helpful.

Reaction.

A reaction of varying severity is to be expected 7-14 days (even up to 3 weeks) after inoculation. Symptoms of fever (a high temperature, loss of appetite, etc.) are usually seen. Red urine may be passed, and in these cases death may follow unless treatment is given early.

Treatment is indicated when severe symptoms and/or a temperature of 105 deg. are present. The treatment consists of injections of one of the recommended drugs (Babesan, Acaprin, Piroparv, Pirevan, etc.) in the manner and at the dose rate prescribed by the makers. The animals should be disturbed as little as possible during the reaction and especially before and after treatment, and should not be travelled for 6-8 weeks after inoculation.



Behaviour of Cattle under Tropical Conditions.

By R. M. LARKIN, Cattle Husbandry Branch.

If you are running British breeds of cattle, feed, shade and water are major considerations in the tropics.

Cattle rest more in hot weather. The pasture must be in good condition if the cattle are to get their fill in the shorter grazing period.

Heat distress means lower weight gains. Shade is essential to good husbandry.

Production suffers if plenty of good water is not easily accessible to the cattle.

In recent years attention has been paid by many workers to the habits of cattle, especially their grazing behaviour. When studying livestock, most observers group their various activities under the following broad headings:—

Grazing—All the time spent gathering herbage, including the time involved in the selection of herbage.

Lying down—All the time actually spent lying down.

Loafing—All activity other than grazing and lying down and including time spent standing about, drinking, rubbing, fighting, and walking to and from water, shade, dairy or pasture areas.

Attention has also been paid to such items as time spent chewing the cud, time spent in the shade, distance walked, number of drinks taken and frequency of passing dung (defecation) and urination.

Information gathered by these men shows that cattle under a wide variety of climate and pasture conditions may—

(1) Graze for periods of 5-10 hours per day, with the average figure being in the vicinity of 7-7½ hours.

(2) Spend 9-11 hours lying down.

(3) Loaf for an average of 5-7 hours.

Apart from the total periods devoted to these activities their distribution throughout the day is also of importance. For example, it is interesting to note that New Zealand workers found that dairy cows under temperate climatic conditions did 60 per cent. of their total grazing during the day, whereas in the tropical climate of Fiji

dairy cattle do 67 per cent. of their grazing at night. This difference in distribution of grazing time can be attributed mainly to climatic differences between the two countries.

INVESTIGATIONS IN QUEENSLAND.

Since 1952 a number of observations on cattle have been made at the Bureau of Tropical Agriculture, South Johnstone, and at the Ayr Regional Experiment Station. Both of these centres are coastal and are in the tropics but their climates differ.

South Johnstone receives an average annual rainfall of 120 inches; temperatures throughout the year are seldom over 90 deg. and only rarely fall below 50 deg. Most of the rain is received in the January-June period, while the remainder of the year, though dry by comparison, experiences variable rainfall. Humidity as a rule is high, and the area is aptly described as being in the "high rainfall tropical belt."

The climate of the Ayr Regional Experiment Station is described as the "dry tropics." An annual average of 40 inches of rain is received, and most of this falls in the December-March period, with the remaining portion of the year being normally dry. In summer, temperatures are frequently over 90 deg., while in the winter occasional frosts are experienced. Humidity is generally not very high.

Investigations to date have been made with Shorthorn and Hereford steers grazing small areas (up to 2-acre paddocks) of improved tropical pastures, under natural rainfall conditions at South Johnstone and under irrigation at Ayr.

The pastures on which cattle were running during this work consisted of guinea grass (*Panicum maximum* var. *typica*), molasses grass (*Melinis minutiflora*) and para grass (*Brachiaria mutica*) grown in association with the legumes centro (*Centrosema pubescens*), stylo (*Stylosanthes gracilis*), puero (*Pueraria phaseoloides*), and calopo (*Calopogonium mucunoides*). These pastures provided adequate good quality grazing at all times and weight

TABLE 1.

HOURS SPENT GRAZING, LOAFING AND LYING DOWN.

Shorthorns—South Johnstone 1952–53.

——	October.	December.	February.	April.	June.
Grazing	6·43	6·63	7·68	7·12	8·48
Loafing	8·34	6·44	7·82	6·27	3·75
Lying down	9·23	10·93	8·49	10·61	11·77

Shorthorns—Ayr 1952–53.

——	November.*	January.	March.*	May.	July.
Grazing	6·38	6·20	5·08	9·92	9·37
Loafing	8·08	6·32	9·88	3·38	3·38
Lying down	9·53	11·48	9·03	10·70	11·25

Herefords—South Johnstone 1954.

——	January.	February.	March.	April.	May.	June.	July.
Grazing	7·35	5·30	7·31	7·52	6·77	7·09	8·02
Loafing	8·25	10·68	8·03	9·57	9·06	5·32	6·39
Lying down ..	8·40	8·01	8·67	6·92	8·17	11·59	9·59

* No shade available.

gains of 2 lb. per day were made for short periods by steers fattening on these pastures.

Summary of Behaviour.

Table 1 shows in no uncertain manner the effect of environmental conditions on behaviour. For instance, during the summer months grazing time may be as low as five hours per day and in the cool months of winter nearly 10 hours.

The pattern of activity of Shorthorn steers during two 24-hour periods at South Johnstone is depicted in Fig. 1.

Fig. 1 (top) is typical of the pattern followed during hot weather in that a grazing period occurs in the early morning, then most of the day (4 hours each side of noon) is spent loafing and lying down, with very little grazing. Grazing activity again commences during late afternoon and occurs in intermittent periods during the night, that

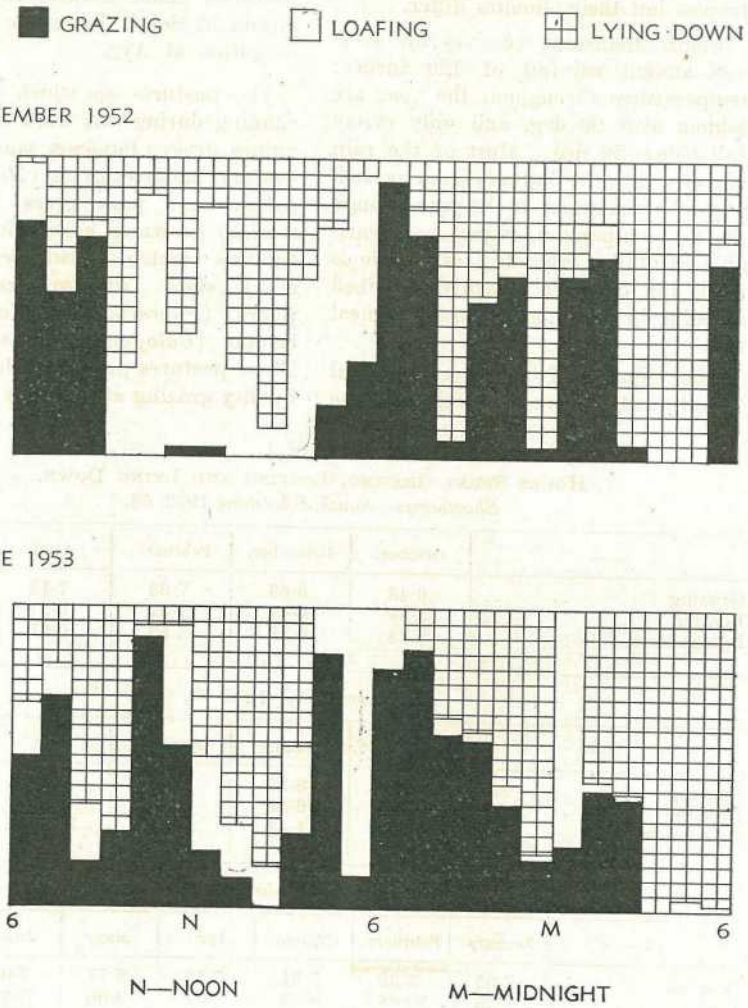


Fig. 1.

Graph Showing Behaviour of Shorthorn Steers at South Johnstone.

portion of the night not spent grazing being mostly spent lying down.

Under cooler conditions in winter—as illustrated in Fig. 1 (bottom)—the early morning grazing period is followed by another later in the morning. Grazing also commences earlier in the afternoon, and the night grazing periods are not so long.

The distribution of time spent loafing and lying down does not vary much between the two sets of climatic conditions, except that under adverse conditions more time during the day is devoted to loafing. In a temperate climate, where British-type cattle are in full harmony with their environment, still further grazing during the day would be expected than is depicted in Fig. 1 (bottom), and night grazing would be of lesser importance.

As shown by Table 2, grazing between 8 a.m. and 4 p.m. is greatly reduced by hot humid conditions and night grazing becomes more important.

TABLE 2.

DAILY GRAZING TIME OF SHORTHORN STEERS AT SOUTH JOHNSTONE, 1952–53

Month.	Total.	Period.	
		4 p.m. to 8 a.m.	8 a.m. to 4 p.m.
	Hours.	Hours.	Hours.
October ..	6·43	6·43 (100%)	— —
December..	6·63	6·31 (95%)	0·32 (5%)
February ..	7·68	7·24 (94%)	0·44 (6%)
April ..	7·12	6·19 (87%)	0·93 (13%)
June ..	9·48	6·61 (78%)	1·87 (22%)

During hot weather in October, December, and February, very little grazing occurred (0—6%) in the 8 a.m. to 4 p.m. period, and even in the coolest month of the year (June) only reached 22 per cent. This pattern of behaviour is in marked contrast to that reported for dairy cows in New

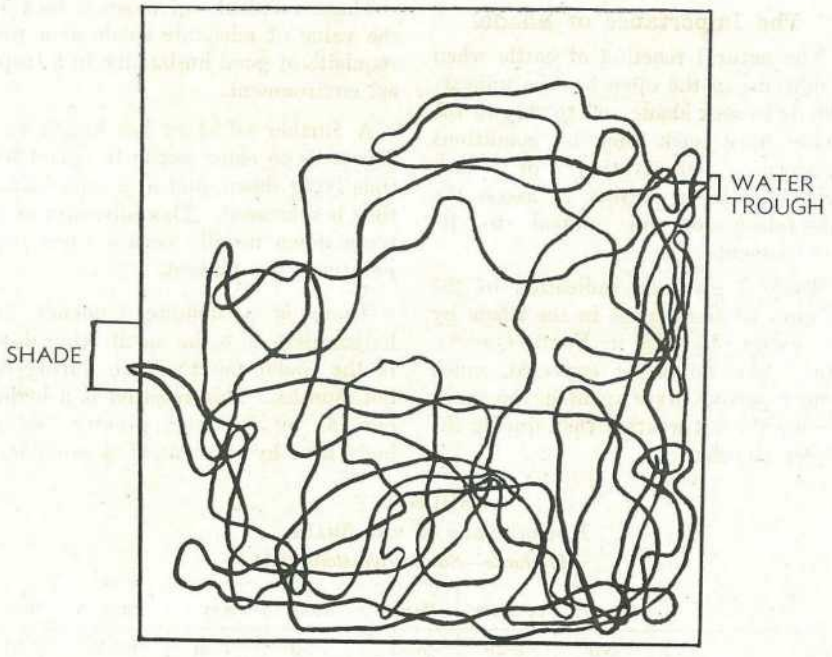


Fig. 2.

Diagram Showing the Path of One Steer During 24 Hours on a Paddock of 1¼ acres
The distance travelled was 1,845 yards.

Zealand, when on a yearly average 58 per cent. of the grazing time occurred in the 7 a.m. to 3 p.m. period (that is, between milkings).

It is quite apparent that cattle prefer not to graze during the heat of the day and endeavour to make the most of environmental conditions by changing the pattern of their activities to suit the climate. Despite this, total grazing time suffers under hot humid conditions.

Pasture quality and quantity play an important part in determining the length of the grazing period and are consequently responsible for some of the variation in the figures quoted. However, it seems apparent that despite changes in pasture conditions, climate has an influence on the total grazing time, and cattle grazing under conditions of climatic stress on pastures of inadequate quality and quantity must suffer from reduced feed intake, and hence have lowered production performance.

The Importance of Shade.

The natural reaction of cattle when conditions in the open become unbearable is to seek shade and to stay in the shade until such time as conditions improve. Observation of such behaviour helps further to assess the adaptation of an animal to its environment.

Table 3 gives an indication of the amount of time spent in the shade by the cattle observed in North Queensland. As would be expected, much longer periods were spent in the shade during the hot weather than during the cooler months.

At the Ayr Regional Experiment Station in 1952-53, temperatures during the periods of observation were similar in the months of November, January, and March. It was, however, only in January that shade was allowed to the trial cattle.

From a perusal of Table 1 it is seen that grazing time varied a little over these three months but that loafing time was increased by 2—3 hours in November and March, when shade was not available. This increase was at the expense of lying-down time and illustrates the discomfort of the stock concerned. During these two months much of the loafing period was spent in apparently aimless wandering and standing about tongueing and panting (symptoms of heat distress).

However, in January, with shade provided, lying-down time was more normal, cattle were obviously more comfortable and signs of heat distress were not evident.

These incidents give some idea of the value of adequate shade as a prerequisite of good husbandry in a tropical environment.

A further effect of hot humid conditions is to cause cattle to spend less time lying down, and as a rule loafing time is increased. This interruption to lying down usually occurs when temperatures are highest.

There is a definite tendency for longer periods to be spent lying down in the cooler months than during the hot months. This reaction is a logical one, as by standing, greater loss of body heat by the animal is possible.

TABLE 3.

HOURS SPENT IN THE SHADE.

Herefords—South Johnstone 1954.

——	January.	February.	March.	April.	May.	June.	July.
Time	Nil	9·29	8·81	7·89	7·59	6·75	2·61
Percentage of Day	—	39	37	33	32	28	11

NOTE.—Observations in January made during almost continuous rain.

Water Consumption.

Drinking practices seem to be very variable and to follow closely prevailing weather conditions. During periods of heavy rainfall, when pastures carry a large amount of "free" water, it is quite possible for cattle to satisfy their total water requirements in the course of grazing and so make no use of water provided by troughing, etc. Similarly, following a heavy dew less use is made of water provided by troughs. In the hot months of the year, without the influence of rain and dew, more drinks are generally taken per day—perhaps two or three per day—than during the cooler months of the year, when probably only one drink per day is taken.

Of course, these results were observed under conditions when cattle were always less than half a mile distant from water. Entirely different habits would apply when cattle are forced to walk out some miles from water to graze, as is the case under some pastoral conditions.

The Grazing Pattern.

Under improved pasture conditions the distance that cattle walk when grazing was found to vary with the stage of growth of the pasture. When pastures were lush and plentiful, as during the wet season, as little as three-quarters of a mile per day might be covered whilst grazing and walking about. When pastures were not of such high quality or were carrying less feed, the distance walked per day was increased to 1½ miles.

The thoroughness of cattle in endeavouring to find the greatest quantity of best quality grazing available in a certain area is well illustrated in Fig. 2, which depicts the path traversed by one steer during one 24-hour period.

Effects on British Breeds.

The British types of cattle in tropical Queensland behave far differently from similar breeds of cattle run under the temperate climate conditions in which they were originally selected and bred. The main difference in the behaviour pattern is in the distribution of time spent grazing during the day. There is a change from day-time to night-time grazing in the tropics, especially during periods of high temperature. In this respect the results obtained here follow somewhat the results obtained for dairy cattle in Fiji.

In brief, the overall results of these investigations indicate that high temperature and humidity have the following influences on British-type cattle:—

(1) There is a reduction in the amount of grazing occurring between 8 a.m. and 4 p.m., with subsequent increase in grazing activity in the 4 p.m. to 8 a.m. period.
(2) Total grazing time is restricted despite the change outlined in (1).
(3) Long periods are spent in the shade.
(4) The lying-down period is reduced.

PRACTICAL CONSIDERATIONS.

It is evident that British-type cattle are able, to some extent, to adapt themselves to unfavourable climatic conditions by changing their pattern of behaviour. The change could be such that factors limiting production are introduced. For example, reduced grazing time during hot weather may result in lowered feed intake and consequently lowered production of milk or weight gain of beef. On this account everything possible in the form of suitable management practices should be undertaken to enable livestock to produce at a high level of efficiency during periods of heat stress.

The main considerations are feed, shade and water. Each is important, and all three interact to the benefit of the animal.

Feed.

It is desirable at all times that good pasture be available in adequate quantities so that cattle which may be forced to reduce their grazing activity because of high temperatures are able to eat their fill of pasture quickly.

A further point about pasture which is of prime importance on the dairy farm—though of little significance to the beef producer owing to differences in management practices—relates to its availability at night time. During summer months, the greater percentage of grazing occurs at night and so it is necessary to provide good grazing in this period, otherwise "night starvation" with lowered production will follow. Where the quality of pastures varies, the dairy farmer would be well advised to use the better pastures as night paddocks and not as day paddocks, as is often the case.

Irrespective of climatic conditions, better pastures mean that cattle are required to walk less in search of and collection of food. The maintenance requirements of a beast are thus reduced, leaving a greater amount of nutrients available for production purposes.

Shade.

The availability of shade plays an important part in good husbandry under hot conditions. The presence or absence of shade largely determines the degree of heat stress exhibited by cattle under trying conditions.

Good shade in most instances can be supplied without trouble or expense, as our countryside is well endowed with trees, but one frequently sees instances where all trees are cleared and little effort is made to preserve areas for cattle camps. When clearing is being undertaken, the future shade requirements of stock should always be considered.

Water.

Good clean water should be available at all times so that cattle can take their fill as and when they please. It is natural for cattle to drink frequently during hot weather. If water is available only by travelling considerable distances, either low feed intake or low water consumption must result. In either event production suffers.

Remember!

Cattle can only adapt themselves to environmental circumstances to the best of their ability. British types will benefit greatly from improved management practices designed to assist them in meeting successfully the stress of hot humid environments. The end result will be greater and more efficient production.

READING FOR THE FAMILY.

Country readers of the Journal are reminded of the library service rendered by the Bush Book Club to country people.

The Club has an extensive library of fiction and general reading. The membership fee is 3s. 6d. a year. Books are carried free on the Queensland Railways to the nearest railway station, but members are asked to pay the freight on their outward parcels, which are despatched direct to other members of the Club.

The address of the Bush Book Club is Victory Chambers, 249 Adelaide street, Brisbane.

Fleece Measurement for Queensland Stud Masters.

Part 3. Fleece Measurement in Practice.

By G. R. MOULE, Director of Sheep Husbandry.

It is important for you to remember that clean fleece weight is the cornerstone of selection. Therefore, you will have to start your fleece measurement programme in the shed at shearing time.

Fleece measurement is not a substitute for present methods of classing. It is an aid to selection when you are choosing sheep for their desirable characters as distinct from selection against undesirable ones. Fleece measurement is of greatest use in comparing animals of the same age and sex and carrying fleeces that have been grown under the same environmental conditions. Preferably, the conditions should be those under which the sheep will have to live and produce.

Progress achieved by a stud as the result of breeding and selection will be passed on to the flocks that draw their rams from that stud. Improvement in studs is effected mainly through the selection of their top rams. Only a few top rams are required by a stud each year; you can choose the very cream of your ram drop. This should mean that a large selection differential results from your ram selection. Of course, ewe selection also makes some contribution, especially when a few ewes are required annually as replacements in the top flock used to breed rams. Similarly the rams selected to work in the top flock are chosen primarily to breed rams, just as are the rams chosen for mating with the ram breeding flock. You can also select rams to breed ewes and ewes to breed rams, but your main gains will come from the selection of rams to breed rams. This means that in practice fleece measurement should concentrate on the reserve rams.

MEASURING THE "RESERVES."

Most Merino studs take out their reserve rams at their first classing when the sheep are about 18 months of age. The sheep are usually identified, shorn and then run together in a handy paddock where they can be easily watched. Final selection for breeding purposes is made a year later when the rams are about 30 months old. Performance due to highly heritable characters is usually repeated.

This means the ram that is a high producer as a two-tooth is usually a high producer as a four-tooth too. In other words, the amount and quality

of the wool cut by a ram when he is a two-tooth is a fair indication of how he will produce as a four-tooth. Therefore, the obvious time to start fleece measurement is when the reserve rams are shorn as two-tooths. Doing so gives the laboratory time to make all the detailed measurements required and the stud master time to consider and apply the results.

With ewes less time is available. They are usually selected as replacements at their two-tooth classing and the stud master may wish to mate them soon after. In these circumstances fleece measurement can still be used, although fewer details can be considered.

ORGANISING FLEECE MEASUREMENT AT SHEARING TIME.

Organisation in the shearing shed is the key to success in applying fleece measurement. You will need one extra man in the shed for every four shearers. Most studs can organise their work so that a team of four shearers or less puts the reserve rams through. There is no need to have a special shearing, but if your shed is a large one it might be better to do so. To get the best results from fleece measurement, select three times the number of rams you require as reserves and make your final selection with the aid of fleece measurement. Tag your reserve rams before you start shearing. Soon after they are penned and before shearing starts, go through them and place a mark on the middle of their right-hand side with a piece of raddle. This is to guide you in selecting your sample of wool for laboratory examination. Take care to make the mark just on the middle of the sheep's right-hand side. Be sure to explain to the shearers and the shed hands what you are doing and how you wish to organise the work. Here is an easy way of fitting fleece weighing into shed routine.

Hang your scales between the shearing board and the wool table as shown in Figure 1.

Place a small table against the wall near the scales. Keep your fleece weight sheets and cards on the table and the sample tins near the table. Keep the cards in a little tray with four compartments carrying numbers 1 to 4 for the stands or the initials of the shearers.

As the rams are pulled out of the catching pen, read the number of their ear tag. Write it on the card at the top of the pile in the pigeon hole carrying the appropriate shearer's stand number or initial (see Fig. 2).

Arrange for the boy on the board to place the belly wool on the scales and tell you the name of the shearer or the number of the stand he took it from. Write the belly weight on the card and put the wool in the pack or basket just to the right of the recording table. Write the sheep's number and the weight of the belly wool in the appropriate columns on the record sheet (see Fig. 3).

Treat the fleece wool in the same way. Have the boy pick up the fleece in the usual manner and place it on the scale, telling you who sheared it. Record the fleece weight on the recording sheet and the card; then pick up the fleece and throw it out on the classer's table in the usual way. Pick out a sample of about 4 oz. of wool from under the raddle mark on the middle of the right-hand side and place it in the sample tin. Place the card carrying the ear tag number, belly weight and fleece weight in the tin (Fig. 4) and close it firmly. As soon as you have drawn your sample the fleece can be skirted, rolled and classed in the usual way.

As soon as the reserve rams are shorn send the samples of wool to the laboratory together with the weight sheets. Do not forget to place your name and address on the identification card inside the box containing the tins.

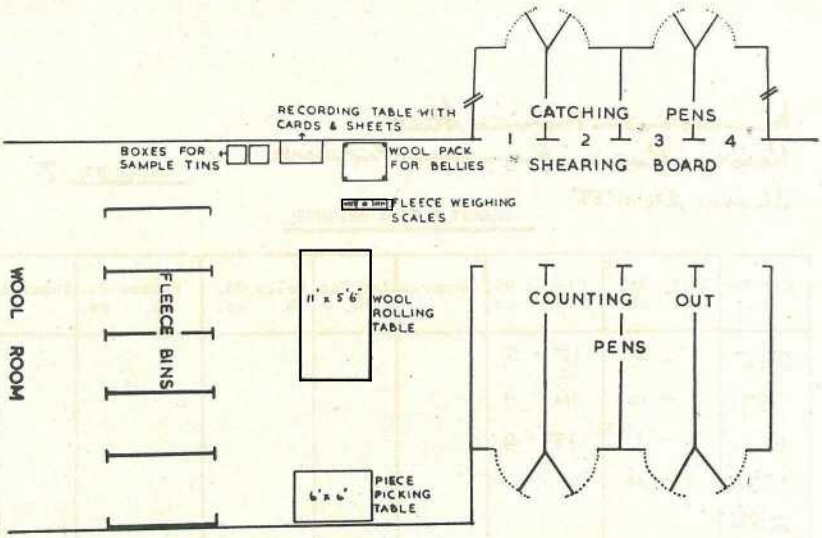


Fig. 1.

Showing a Placing of the Scales and Tables That has Proved Convenient. Positions can be varied to suit the particular layout of your shed.

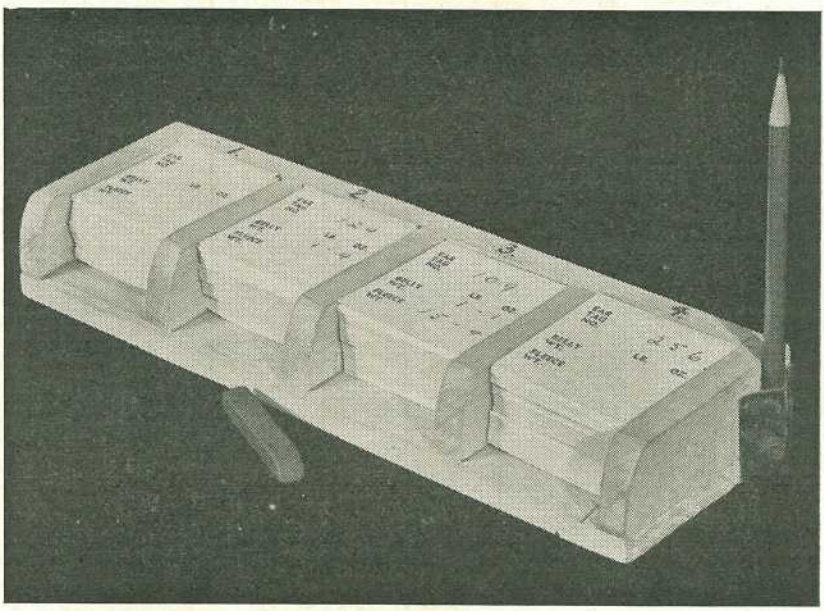


Fig. 2.

A Wooden Tray Used for Holding Fleece Weight Cards. Note the numbers of the shearers' stands on the back of the tray and the way information is recorded on the cards.

Mundoonen Merino Stud
Reserve Rams - from Emu Paddock
Shorn 24·11·55

SHEET NO. 3

GREASY FLEECE WEIGHTS

Ear Tag No.	Belly Wt. lb.	Belly Wt. oz.	Fleece Wt. lb.	Fleece Wt. oz.	Remarks	Ear Tag No.	Belly Wt. lb.	Belly Wt. oz.	Fleece Wt. lb.	Fleece Wt. oz.	Remarks
215	1	-	15	2							
87		14	14	4							
109	1	1	15	4							
124	1	4									
256											

Fig. 3.

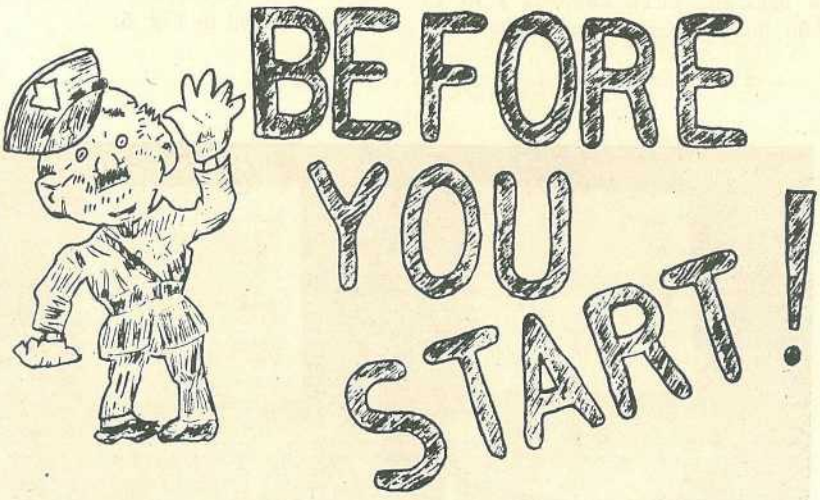
A Record Sheet Used in the Shed. Compare the figures on it with those on the cards in Figure 2.

If your reserves are drawn from different flocks that have run in separate paddocks, write the details on your greasy fleece weight sheets—for example, sheep numbers 1 to 75 from flock in Gidyea paddock, 76 to 274 from the flock that ran in Emu paddock.

Before you start be certain to read the instructions inside the box. They are reproduced in Fig. 5.

Fig. 4.

Showing the Completed Cards and the Sample Tins Filled with Wool Ready for Closing.



Please ensure that you -

1. Take a mid-side sample of approximately 4 ounces.
2. Place a card with each wool sample. Write on the card:-

   Ear Tag No. .....

   Fleece Wt. ....lb.....oz.

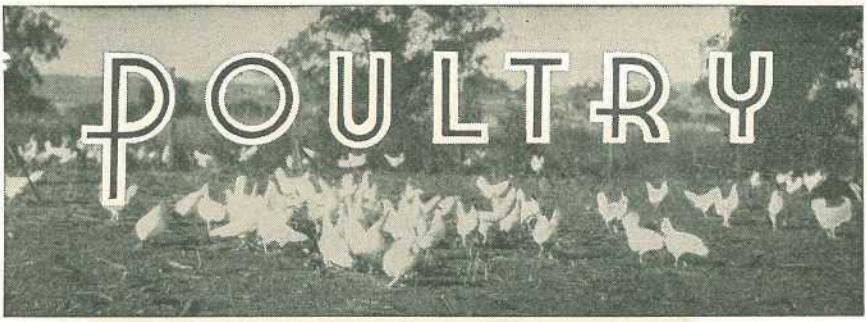
   Belly Wt. ....lb.....oz.

3. Record fleece weights on sheets provided.
4. Fill in Advice Note supplied.
5. Despatch samples and details to -

   The Director of Sheep Husbandry,
   Department of Agriculture and Stock,
   Roma Street.

Fig. 5.

Showing the Notice Inside Each Box. Be certain to read it before you start.



Caponising Poultry.

By P. D. RANBY (Veterinary Services Branch) and B. W. MOFFATT (Poultry Branch).

The table quality of a cockerel may be improved by reducing its masculinity—converting it into a capon.

The simple method of chemical caponisation is described in this article, and in addition details of surgical caponisation are given for those who prefer this method.

Just as the removal of the testicles in beef cattle and sheep improves the quality of the carcase, so the removal of the testes in young cockerels will produce a superior table bird—the capon. The art of caponising poultry has been practised for centuries, for historians tell us that roasted capons figured largely on the tables of the Elizabethan aristocracy.

The capon is readily identified by the absence of male secondary sex characteristics, the small comb and wattles giving a hen-like appearance, although the male type of feathers on the hackle, saddle and tail are still retained (Plate 3). Often in the past, the capon was dressed and sold with the head on so that the buyer could identify the capon readily from other classes of poultry.

Not only is the appearance altered by the operation, but the tendencies to crow and fight are lessened. Reduction of crowing is a consideration in closely settled areas.

CAPON PRODUCTION.

Capons can be produced either surgically or chemically.

Those produced chemically are referred to as "chemical" capons and occasionally trade circles describe them as "caponettes". The effect of chemical caponising is temporary, but does offer the table poultry producer a ready means of improving the quality of the carcase.

Caponising by surgical methods is permanent, but for a producer to realise the full value of the surgical method, the capons must be retained until they are at least nine months old. At the present time, poultry meat processors do not pay differential prices in favour of capon meat, so there is no economic advantage to be gained by resorting to surgery.

Improves Quality and Appearance.

As the blood stream in capons carries more fatty globules than in cockerels, there is an increased deposition of fat in the muscle tissues, under the skin and in the abdomen. It is the increased fat content of the muscle which produces the better quality meat.

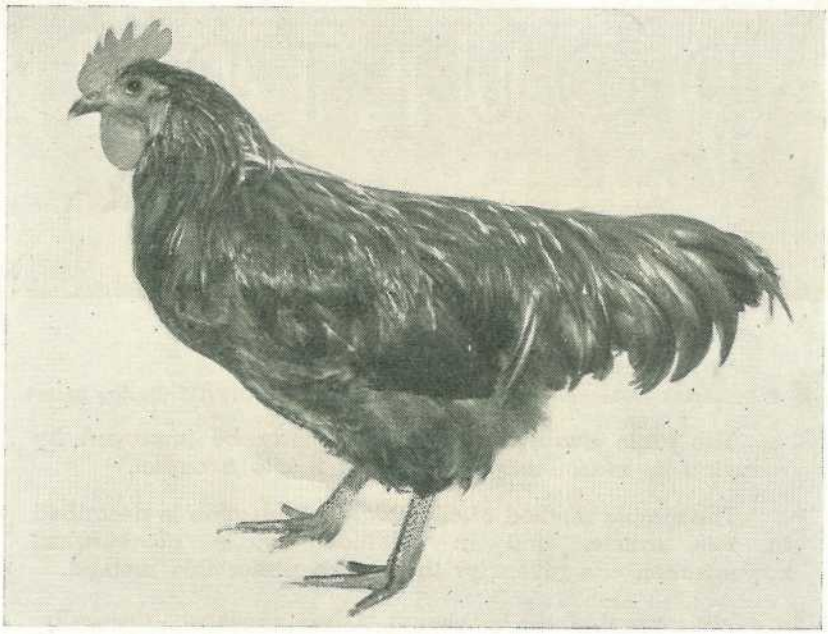


Plate 1.
Cockerel 4½ Months Old.

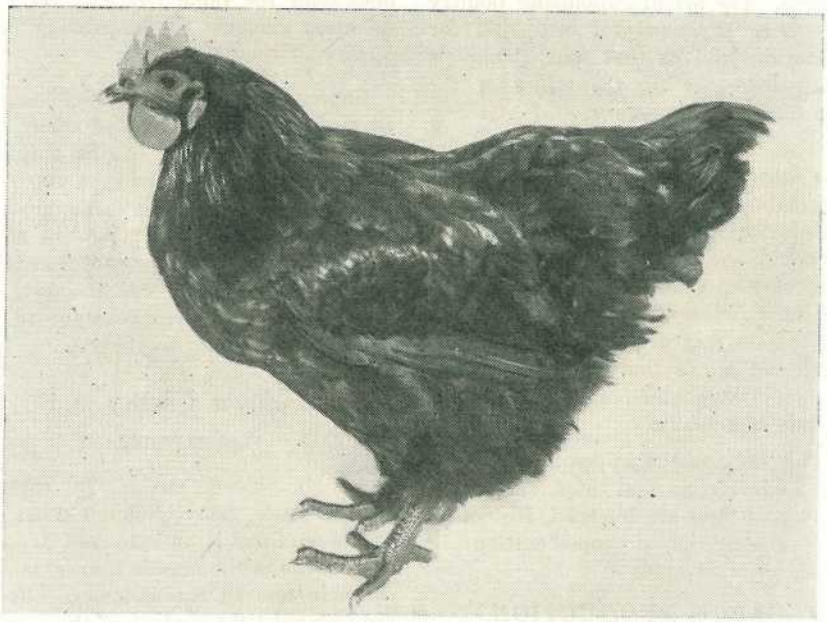


Plate 2.
Pullet 4½ Months Old.

Plate 3.

Capon Produced by Surgical Treatment. Weight nearly 10 lb. at 20 months. Note feminine appearance of head but retention of the hackle (male tail feathers).

[*Photo. by courtesy of Queensland Agricultural High School and College.*

Capons dress very attractively and should appeal to the discerning buyer, for there is a greater proportion of succulent white breast meat to darker leg meat than in cockerels. Plate 9 shows the dressed appearances of capons and cockerels of the same age and breed.

WHAT IS CHEMICAL CAPONISING?

Chemical caponisation is a recent development and depends on the use of a female hormone (an oestrogen). Its effect is to temporarily suppress production of the male hormone and so cause effeminisation. This method of caponisation is the one usually practised now. It is simpler than the surgical method, and in any event there is now a much smaller demand for the large carcase that can be produced by the surgical capon.

How Is It Done?

The most desirable method of chemical caponisation is the implantation of a pellet under the skin. It should be implanted high up in the neck at the back of the head in order that any residue will be removed when the head is discarded. The pellet may be implanted by means of a special pellet gun (Plate 4) or by cutting an opening about a quarter of an inch wide in the skin and making a pocket with a blunt instrument. In either case, the pellet should be inserted for a distance of three-quarters of an inch. Unlike mammals, birds show practically no signs of pain to such operations.

Before use, the instruments should be sterilized in boiling water.

The female hormones most commonly used in implants are stilboestrol and hexoestrol. Tablets or pellets used for chemical caponising contain 15 milligrams of hormone.

Generally, the implant is made when the bird is 10-12 weeks of age. If the birds are to be kept beyond the age of 18 weeks, a further pellet should be implanted when they are 16 weeks old. Older male birds should be given two pellets instead of one to tenderise them.

It must be remembered that the effect of the hormone will start to wear off after about 8 weeks, and a gradual return of the secondary male characteristics is noted.

A small percentage of cockerels appear to react poorly or not at all to the hormone. These should be treated again.

Male turkeys react similarly to cockerels and chemical caponisation of them is practised to some extent in the U.S.A. Drakes, however, do not seem to be affected by implants of female hormones.

SURGICAL CAPONISING.

This operation requires a certain amount of skill, which is gained only by practice. A beginner is advised to experiment on a dead cockerel in order to become familiar with the positions of the internal organs (Plate 6) before attempting the operation on live cockerels. With a little practice, the operation will become easier.

The Best Age.

Cockerels 8-10 weeks of age are the best subjects, but younger ones may be done. Older cockerels are unsuitable owing to difficulty in removing the testes due to their increased size and fragility. Only cockerels in good condition should be done.

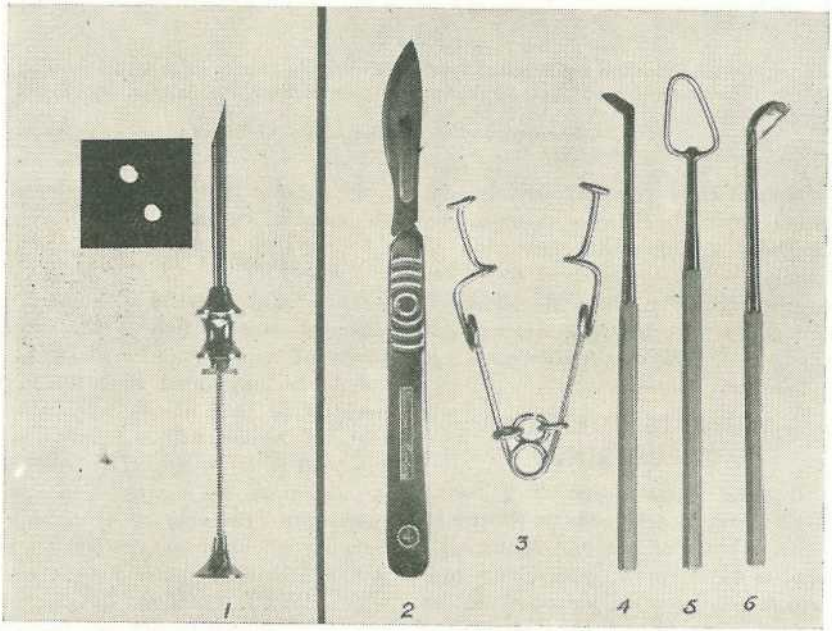


Plate 4.

Caponising Instruments. (1) Pellet gun and hormone pellets for chemical caponisation. (2) Scapel. (3) Spreaders or retractors. (4) Hooked probe. (5) Repeller. (6) Split spoon to remove testis.

Plate 5.

Cockerel Marked to Show the Position of the last Four Ribs. The incision for surgical caponisation is made between the last two ribs.

Preparing Cockerels for Operation.

Prior to operation, cockerels must be starved for 18-24 hours in order that the intestines will be empty and the testes accessible. The birds will not be harmed in any way by the absence of feed for this period, but drinking water must be freely available.

It is most difficult to successfully caponize cockerels when the intestines are full, and the operation should not be attempted then.

Preferably, the cockerels should be kept in wire coops during the fasting period so that they will not eat anything at all. In addition, the birds are caught more easily in coops.

What Equipment is Needed.

The complete set of instruments required (Plate 4) is as follows:—

(1) Sharp knife or scalpel to make the initial incision.

(2) Spreaders or retractors, which are inserted in the wound to keep it open during the operation.

(3) A hooked probe to penetrate the air-sac membrane.

(4) An instrument to hold the intestines aside whilst the testes are removed (repeller).

(5) A split spoon or an extractor to remove the testes.

In addition, an operating table is required—a 44-gallon drum is suitable. To restrain the birds on the table, weighted cords are placed over the legs and wings and hung over opposite sides of the table. The weights should be just heavy enough to hold the cockerel firmly on the table.

The instruments should be kept in a container containing a weak solution of Dettol (a suitable solution is translucent rather than opaque).

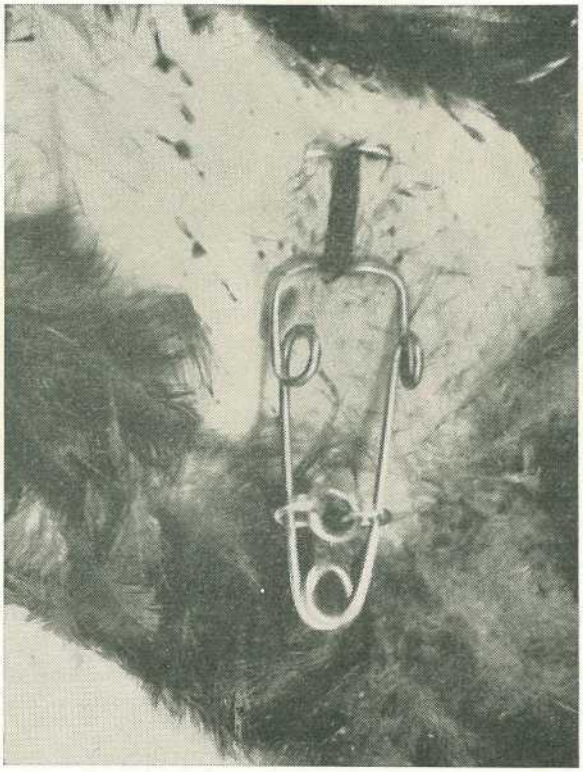


Plate 6.

Spreaders in Position Between the Last Two Ribs.

How Is It Done?

Surgical caponising must be carried out in good light so that the position of the organs may be properly seen. For this reason, it is best carried out on farms in the open on a bright sunny day when the sun is overhead.

The removal of the two testes can be done from the one side, but a beginner is well advised to remove one testis from each side until a reasonable degree of skill is obtained.

The index finger of the left hand is used to push the skin of the flank towards the hip. The space between the last and second last ribs is felt. The leg should be drawn back to facilitate this. The feathers over the site of the operation are plucked out, the skin cleaned with a swab saturated with methylated spirits, and the surrounding feathers wetted to prevent them getting in the way.

With the skin still pulled towards the hip, a cut is commenced between the last two ribs about half to three-quarters of an inch from the backbone (Plate 5). This incision should follow the curve of the ribs and be just long enough to fit the spreaders in (about three-quarters of an inch long). Lack of resistance to the blade will be experienced when the abdominal wall is opened and the cavity of the air-sac exposed.

The spreaders are then inserted in the opening to hold the ribs apart and allow the operator to see the cavity of the air-sac (see Plate 6). A thin transparent membrane will then be visible. This is the inner wall of the

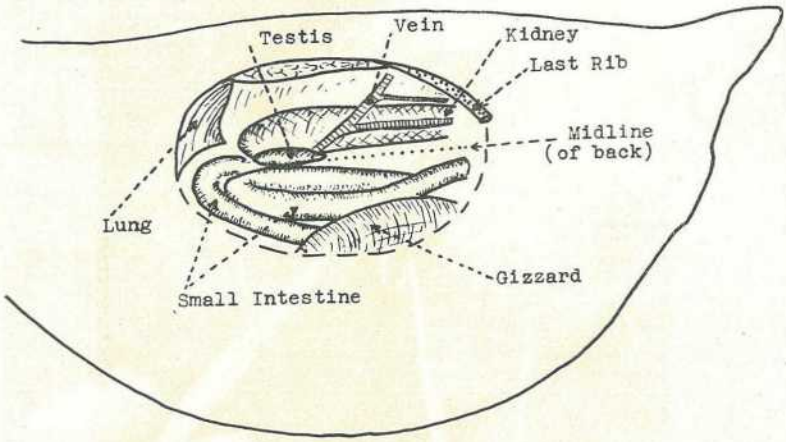


Plate 7.

Diagram of the Position of the Internal Organs in the Region of the Testis.

air-sac. This membrane is then penetrated by the hooked probe, allowing access to the abdominal organs. The arrangement of these organs in the region of surgical approach is seen in Plate 7. The testis will appear as a small, white, bean-shaped organ about the size of a wheat grain in a 6-weeks-old cockerel chick but up to half-an-inch long in a 10-weeks-old bird. It is white in colour in most cases, but sometimes in Australorps it is wholly or partly pigmented by a black pigment called melanin. The testis lies on the front part of the kidney, which is chocolate coloured. Some large veins will be seen to lie near the testis. These must be very carefully watched by the inexperienced operator.

The second testis will be located in the corresponding position on the opposite side, not far from the midline of the back. It is separated by a transparent sheet which suspends the intestines and contains blood vessels running from the intestines. To reach the second testis, this membrane must be punctured with the hooked probe in an area with no blood vessels. If both testes are removed from the one opening, the lower one should be removed first so that any bleeding from the upper one will not obscure it. If any difficulty is encountered in removing the lower testis the upper one should then be removed and a new opening made in the opposite side to give an easier approach.

If desired the operator may remove each testis from an opening in each side as a routine.

The removal of the testis is now performed with the aid of a split spoon or an extractor. Great care should be exercised to see that each testis is removed completely. If the testis breaks when being drawn out and even a small portion is left behind, the operation will be unsuccessful in that the bird will retain its cockerel characteristics. Such cases are referred to as "slips".

The split spoon should be manipulated around the lower testis until the cord attached to the testis fits into the slit in the spoon. One must then be sure that the large vein near the testis

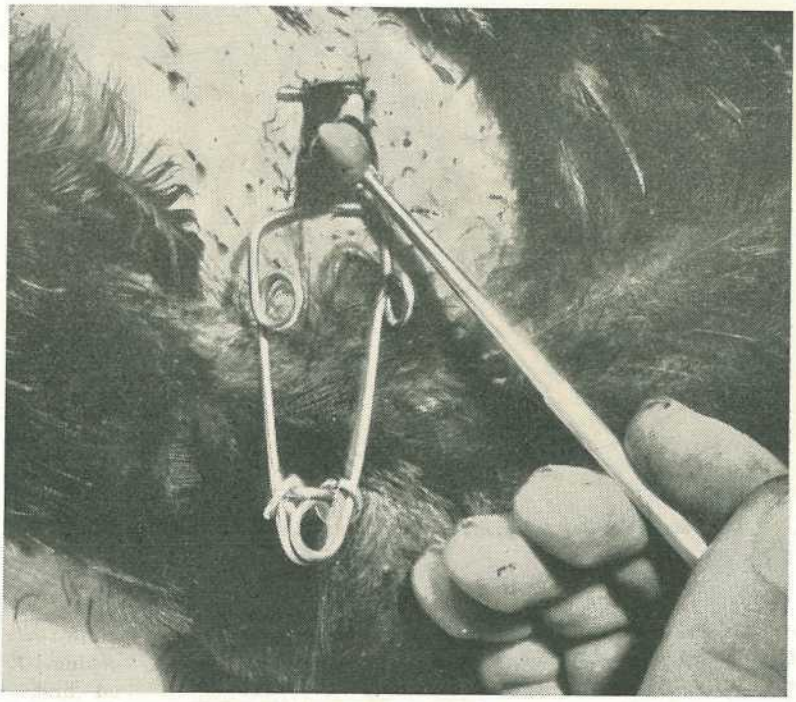


Plate 8.

Testis Being Removed by the Split Spoon.

is not entangled in the spoon, otherwise rupture of the vessel with resulting haemorrhage and death will occur. The spoon is then twisted around, taking care not to injure the kidney. The testis is then torn from its attachments and withdrawn from the abdomen (Plate 8). The second testis is removed similarly.

With both organs removed, the spreaders are withdrawn gently from the wound and the operation is complete. No stitches are required. It will be noticed that if the skin was pushed towards the hip sufficiently prior to the initial incision, it will return to its former position after the spreaders are removed and the skin opening will not coincide with the opening in the muscle layer between the ribs. Thus the skin will cover the opening into the abdomen. If not, the interior of the abdomen will be exposed to dirt and dust, with risk of infection. If the cavity of the abdomen is exposed, it may be advisable to put in one skin stitch, using cotton.

After caponising, each bird is released into a pen containing food and water. It will eat and drink shortly afterwards, but should not be disturbed for one week until the wounds have healed.

As the skin wound will heal before the wound in the muscle between the ribs, air will become imprisoned under the skin in some of the birds, causing a pronounced swelling like a balloon. These are referred to as "wind-puffs".

The "wind-puff" is treated by making a small elliptical skin opening with a pair of sharp scissors on the

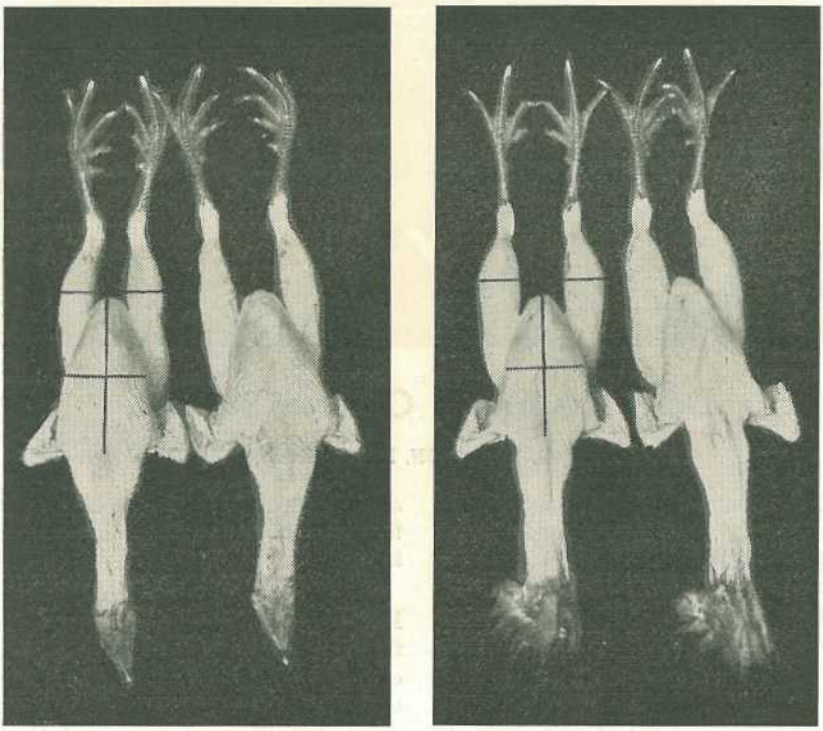


Plate 9.

Dressed Australorp Capons (left) and Cockerels (right). Note the larger breast of the capons and the thicker thigh of the cockerels.

most distended part. This allows the air to escape until the wound between the ribs is fully healed.

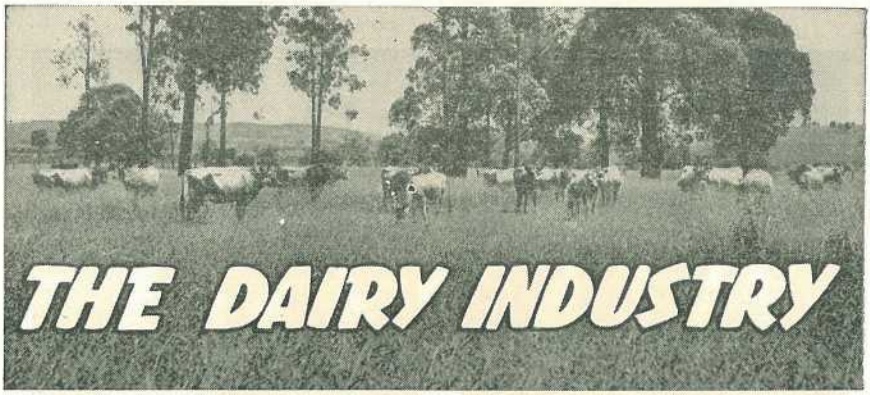
After a little practice, the operation of caponising will take only a few minutes. Losses should be negligible. The main cause of death is due to rupture of the large vein near the testis. A small proportion of "slips" will occur and these should later be removed because they will bully the more docile capons.

USEFUL LEAFLETS.

With the chicken hatching season approaching, poultry raisers, particularly those with little experience, will appreciate two advisory leaflets issued by the Department of Agriculture and Stock. These are:

Successful Hatching.
Rearing Chickens.

Both are available free on application.



Dairying in the Central Burnett.

By R. T. WESTON, Dairy Adviser.

The Central Burnett district lies between latitudes 25° 15′ and 25° 45′ and longitudes 151° 30′ and 152° 20′. The climate is sub-tropical, but the prevailing easterly winds tend to restrict the temperature range, making heavy frosts in winter rather exceptional and high summer temperatures infrequent. Winter frosts tend to increase in both frequency and severity with altitude and distance from the sea. Summer temperatures are rather higher in the western part of the district and relative humidity is lower.

The annual rainfall ranges from 25 to 30 in., the higher totals occurring mainly in the eastern parts of the district. The main rainy season occurs in summer, particularly during late January and February. It is the rule for spring weather to be dry and this is liable to have a deleterious effect on pasture and agricultural crops generally. While the total annual rainfall is sufficient to support most crops, its monthly distribution is very erratic and periods of temporary drought are frequent.

Eucalypt forest is the main vegetation type of the district. On the ridges of the Coast Range and its offshoots a fairly dense forest formation occurs, containing straight tall trees of excellent milling quality. Prominent species are spotted gum, red bloodwood, flooded gum, tallow-wood and southern kauri pine.

On the western side of the Coast Range the vegetation is mostly open forest carrying a comparatively dense cover of native grasses such as Queensland blue grass, Burnett blue grass, bunch spear grass and three-awned spear grass. The trees here are mainly those which withstand drought well, such as grey ironbark, narrow-leaved ironbark, grey box, silver-leaved ironbark, poplar box, Moreton Bay ash and numerous wattles. On poorly drained flats with heavy soils, brigalow is a common tree.

Along the Burnett River and creeks a typical river-bank flora is developed which includes blue gum, Moreton Bay ash, Portuguese elm, tea-trees and several native figs.

A wide range of soil types is found throughout the district, and in the development of the country land usage has followed the distribution of the various types of soil. The poorer, shallower soils capable of carrying only a fair grass cover are devoted to grazing on a wide scale. Better soils with a clay loam texture are used for the production of agricultural crops, while horticultural crops are confined

to specially selected soils which lend themselves to intensive systems of management.

The district is fairly well watered by creeks, but an appreciable amount of water is obtained from underground streams by means of bores and wells. The natural drainage system is divided by the Coast Range east of Biggenden. Creeks having their source on the eastern side of the range drain into the Mary River, and those on the western side flow into the Burnett River. The latter waterway provides good watering facilities for a large area of the north-western and western parts of the district. Unfortunately, during drought periods many of the smaller streams develop a high mineral content which is objectionable to stock.

Underground water supplies are generally plentiful and are available at depths ranging from 10 ft. to 50 ft. The windmill is a familiar sight throughout the district. Well water in certain areas, particularly at Coalstoun Lakes, contains excessive amounts of salts and is unsatisfactory for dairy and household purposes without treatment. However, it is quite suitable for stock and irrigation.

The construction of earth dams in suitable localities provides another means of water storage and this method is assisted by the undulating nature of the country.

PASTURES.

The native pastures are composed of a wide range of species, including Queensland blue grass, Burnett blue grass, bunch spear grass and three-awned spear grass. There are also a number of native legumes growing in the native pastures, as well as the introduced phasey bean. All are summer-growing types and die in the winter, but the dry residues are readily eaten by stock.

The carrying capacity varies considerably in accordance with the proportion of better grasses and may range from 1 beast to 5 acres to 1 to 12 acres. Frequent burning appears to have destroyed many of the finer native grasses.

Grass growth after the winter usually commences with storms in the spring and early summer, but in common with most pasture land in Queensland, this early growth may be severely checked by hot weather if storms are too infrequent to maintain reasonably good soil moisture conditions until the wet season commences.

The most important introduced pasture grass is Rhodes grass, which has proved its adaptability to local soils and climatic conditions. Many thousands of acres of softwood scrubs have been felled, burnt and sown to this grass. A reasonable carrying capacity is 1 beast to 3-5 acres.

Paspalum is widely distributed along the forest creek flats. More recently, green panic, blue panic and buffel grasses have been successfully introduced. Other useful grasses to be found in the district are kikuyu, liverseed grass, molasses grass, para grass, elephant grass and phalaris.

Various legumes have been tried as pasture components, the most promising being lucerne, which shows much promise in admixture with green panic.

WEED PROBLEMS.

Peppercress is of particular importance to the dairying industry in the Burnett, as it is responsible for the heavy tainting of milk and cream at certain times of the year, particularly the spring. Its obnoxious flavour is the cause of the heavy degrading of butter manufactured in the district. None of the many methods of cream treatment studied gives promise of providing a general solution of the weed taint problem. Simple changes in farm practice, such as taking the cows off the weeds some hours before milking, are of little effect. The solution appears to lie in eliminating the annual weeds by the development and use of

better pastures and of crops which will effectively compete with and prevent the weeds from attaining any significant proportion of the herbage.

THE DAIRYING INDUSTRY.

Since the advent of closer settlement, dairying has played a major part in the progress of the Central Burnett. The large grazing holdings were gradually broken up as more settlers came to the district and started dairying.

Some of the first settlers to begin dairying in the Biggenden area came from the Maryborough district in 1890 and occupied forest land at Lakeside, five miles east of the present town of Biggenden.

In 1903 the second cream separator to be introduced to Queensland was purchased for use in the district. This had a capacity of 110 gallons per hour. Prior to 1911, when a butter factory was opened at Biggenden, all cream produced in the district was sent for manufacture to Maryborough and Tiaro. The Biggenden factory was remodelled in 1929. Building operations on a butter factory at Gayndah were commenced in 1910 and the factory was opened in the following year. A remodelled factory was opened in 1928.

Two small cheese factories at Dundarrah and Coalstoun Lakes were opened in 1914 and 1925 respectively. Prior to this, similar factories had operated at Emu Creek and Byrnestown. The Coalstoun Lake factory is still operating.

TYPES OF DAIRYING.

The great majority of dairymen send cream to either of the two butter factories operating in the area. The skim-milk is utilized for the feeding of pigs and calves. Approximately 400 farms come within this category. The remainder, representing 20 farms, supply whole-milk to the cheese factories, whey being returned to the farms for the feeding of pigs and calves. Only a few farmers engage in the market milk trade and they supply consumers in the two principal towns.

Where the size of the farm permits, many farmers run stock for beef production in association with dairying. A common practice is to mate a beef type bull such as a Hereford or Aberdeen Angus with a poorer type of dairy cow. The resultant calf is then reared to the age of 2-3 years and sold as fat stock.

SIZE OF FARM.

In the early days of the dairying industry in this district, the average farm, particularly in the scrub lands, occupied an area of about 160 acres. Later it was found that this area was too small for economic working and by amalgamation of the blocks the average scrub farm dairy now occupies approximately 500 acres. In the poorer types of forest land, the area greatly increased and many farms in this category are over 1,000 acres in size.

The carrying capacity varies with the degree of development of the farm. Many of the scrub lands are being overrun with lantana, which reduces the area available for grazing. One beast to 5 acres on the more fertile land, and one beast to 10-12 acres on the poorer types of soil is the usual range.

FARM PRODUCTION.

There is a wide variation in the amount of dairy produce consigned from individual farms. This is influenced by various factors, more especially soil fertility, husbandry methods, quality of stock, and the ability of the farmer. Production figures for four individual farms are as follows:—

No. 1 Farm, Biggenden area:

All native grasses. Fodder crops grown—lucerne, grain sorghum, oats and pumpkins. Limited feeding of concentrates.

Area—531 acres.

Total number of dairy cows—82.

Production—10,311 lb. commercial butter.

No. 2 Farm, Coalstoun Lakes area:

Half of farm improved pastures, mainly Rhodes grass, balance native grasses. Fodder crops grown—grain sorghum, maize and oats. Limited concentrate feeding.

Area—800 acres.

Total number of dairy cows—76.

Production—10,287 lb. commercial butter.

No. 3 Farm, Gayndah Area:

Mostly native pastures, but small proportion of Rhodes grass. Fodder crops grown—grain sorghum, wheat and oats. Limited concentrate feeding.

Area—571 acres.

Total number of dairy cows—86.

Production—12,239 lb. of commercial butter.

No. 4 Farm, Gayndah Area:

Native pastures and Rhodes grass. No fodder crops grown and no supplementary feeding.

Area—1,120 acres.

Total number of dairy cows—92.

Production—9,454 lb. of commercial butter.

These four farms can be regarded as examples of typical dairy farms in the district. While there are many herds with greater production per cow and per acre, there likewise are many which fall below the average. The average annual production per cow is about 110 lb. commercial butter, and per acre 10 lb.

BUTTER PRODUCTION.

Production is closely related to the seasonal rainfall, and therefore the usual peak period for output is during December-April.

Average annual production of dairy factories in the district is:—

Biggenden—656 tons butter.

Gayndah—603 tons butter.

Coalstoun Lakes—89 tons cheese.

BREEDS OF CATTLE.

The dairy breeds most favoured are the Jersey, A.I.S. and Guernsey. As the district is almost wholly devoted to cream production, this fact has a big influence on the choice of breed. An occasional Ayrshire is to be seen, but there are no herds of this breed. One Friesian herd is established, and a few animals of this breed are found in herds, mainly in the cheese producing areas.

The Guernsey breed is gradually increasing in popularity, mainly due to the activities of several stud breeders and the breed's general apparent suitability to district conditions.

The approximate numbers of the main breeds are:—

Jersey	14,000
A.I.S.	11,000
Guernsey	5,000

BREEDING.

Stud breeding in the district is fairly well established, with 15 breeders operating, several, however, on a restricted scale. There are 7 A.I.S., 21 Jersey, 5 Guernsey and 1 Friesian studs. There is a fair demand for sires from local dairymen, and in addition many bulls are sent to various parts of the State. Several studs contain stock introduced from Victoria and New South Wales and there are now some very good stud cattle in the district.

Four breeders are continuously submitting cows under the Pure Bred Recording Scheme, and the percentage of animals reaching the required standard for entry into the advanced register is very high. Several cows have topped their age groups for the State for the individual breeds.

The usual policy is to practice line breeding with an occasional outcross.

The commercial herds generally are being graded-up by use of purebred bulls. Less cross-breeding is in evidence now than has been the case in the past. The Guernsey x A.I.S. cross has been popular, the first cross having been generally above the average as a producer. Some Guernsey x Jersey crossing has been carried out with a fair amount of success. Many of the sires of the commercial herds have been obtained from local breeders, although a number have been purchased from other parts of the State.

HUSBANDRY METHODS.

(1) Herd Management.

Although many farmers do not regulate the freshening of their cows, the general tendency is to have them calving during the months of August to January. About three-quarters of the total number of cows calving each year do so during this period and are thus able to take advantage of the lush pasture usually evident during the summer months.

The average yield per cow per annum as calculated from herd recording is very low, being only 110 lb. of butterfat. Lack of suitable fodder during times of pasture scarcity is one of the chief factors influencing this low figure. However, there are undoubtedly many cows being milked throughout the district which are not worthy of a place on any well-managed dairy farm.

Farmers who are submitting their herds to continuous recording under the Department's Group Herd Recording Scheme are obtaining valuable information, which if used to the best advantage must raise the general productivity of their herds and so set an example to the remainder of the district.

Husbandry methods adopted for controlling diseases and parasitic pests include the use of Strain 19 vaccine for the control of brucellosis, DDT, BHC and arsenic for ticks and buffalo fly, and the routine drenching of calves with phenothiazine for worm control.

Losses from blackleg are minimised by widespread vaccination, and tuberculosis is controlled by regular testing of herds which have shown evidence of the disease. Cases of footrot and milk fever occur occasionally and are treated by the latest methods.

Several farmers practice dehorning, but it is not universally adopted throughout the district.

Cows do not generally receive any special treatment prior to calving, although occasionally individual animals are given a small concentrate ration for two or three weeks before freshening, especially when this occurs during the winter months.

The majority of farmers keep only sufficient calves for normal herd replacements. The remainder are either sold to meatworks at 2-3 weeks of age, or where the area permits kept for sale later as stores or fat cattle.

(2) Feeding of Stock.

As in most dairying districts, pasture is the basis of all stock feeding. Owing to the rather erratic rainfall, pastures are often inadequate to enable the dairy cow to maintain a reasonable level of production. Supplementary feeding is carried out on the majority of dairy farms by the growing of various fodder crops. Hand feeding is not universally practised except on selected farms and where stud breeding is carried out. The usual method is to graze fodder crops by giving cows access for varying periods, depending on the type of fodder and stage of growth.

Poona pea is widely grown throughout the district for this purpose, and provides a valuable addition to the pasture during the summer months. Sudan grass is also popular during this period of the year. As a winter fodder crop, oats finds almost universal favour and is largely responsible for the maintenance of winter production.

Grain sorghum, which is grown on many dairy farms, is widely used as a concentrate during times of pasture scarcity. It is often mixed with other concentrates imported into the district, such as meatmeal, linseed meal, cottonseed meal and peanut meal.

Molasses, being easily obtained from adjacent sugar mills, is widely used for the feeding of dairy cows, pigs and calves.

A phosphorus deficiency exists in some herds, and a shortage of copper has been found on isolated properties. Some farmers are providing a lick of salt and bonemeal to meet the major mineral deficiencies of their stock.

HERD RECORDING GROUPS.

One herd recording group operated in the district during 1955 under the Department's herd recording scheme.

MECHANISATION.

The dairying industry is well established in this district, and the majority of farms are highly mechanised. At least 95 per cent. are equipped with milking machines and tractors. In addition, a wide range of agricultural implements are utilised, ranging from single furrow ploughs to headers, combines and hay balers.

CROPS.

Soil types in the Central Burnett favour the cultivation of many crops. The main agricultural crops are grown for use by the dairying and pig industries, although in recent years increased mechanisation of farms has resulted in increased acreages being devoted to maize for sale as grain. Other crops grown commercially include grain sorghum, wheat, cotton and peanuts.

Fodder crops grown extensively include lucerne, Sudan grass, Poona pea, oats, field peas and various millets. These fodders provide valuable grazing for district dairy herds especially during periods when natural pastures are at a low nutritive level, and almost every farmer with cultivable land provides as much supplementary grazing of crops as possible.

FODDER CONSERVATION.

Fodder conservation in the district does not receive the attention it merits. Soils are productive, but the rainfall is erratic, and therefore it should be the concern of every dairy farmer to make provision in the good years for the unpredictable seasons ahead in order to keep up production. This applies particularly to this part of the Burnett, because irrigation facilities are very limited for growing fodder crops in dry times.

The two severe droughts in 1946 and 1951 were responsible for the loss of thousands of cattle. The losses were particularly heavy on farms where no provision had been made for the storage of fodder. Hundreds of tons of fodder were brought into the district to feed starving stock, and good fodder production methods could have obviated this expense. On farms where good stocks of fodder and grain were stored, stock losses were not only averted but production was well maintained considering the poor condition of the pastures. In such instances, cattle were in comparatively good condition when the drought broke and were soon able to resume normal condition.

There is increasing evidence that many farmers have learned a lesson from the recent droughts and are following the examples set by others in the matter of fodder conservation. The making of hay is by far the most

popular method of conserving fodder, and the development of such machines as the pick-up hay baler has greatly increased the efficiency of haymaking. Not more than half a dozen farms are equipped with silos, and these are mostly of the pit variety. More farmers, however, are showing an interest in silage making, and it is certain to be practised more extensively in the future.

PIG AND CALF INDUSTRY.

The pig and calf industry is generally of major interest to the dairy farmer and a good deal of care and attention is devoted by him to this sideline. Pigs grown in the Central Burnett are of high quality and compare very favourably with those produced in any other district in the State.

The fattening of pigs is the principal industry, but it must be noted that the purebred breeder plays a very important part in the industry. It is due to his efforts in laying a solid foundation that the pig farmer is enabled to build a good reputation for quality pigs, be they weaners, stores or fats. Popular breeds in this area include Tamworth, Large White, and Berkshire, while the Wessex Saddleback also commands a following.

During recent years more farmers have introduced purebred stock which have had the effect of producing greater litters and a better type of carcase acceptable to the bacon trade. On most properties, skim-milk forms the basic foodstuff, supplemented by grain sorghum (generally grown on the holding), pumpkins and small quantities of meatmeal when available. Molasses is used extensively during the winter months.

The calf trade in the district is well organised, and farmers obtain a good return for surplus calves which are not required for herd replacements. The usual practice is to market the calves at 2-3 weeks of age, by which time they have generally reached the minimum weight requirements of 40 lb. dressed.

POTENTIALITIES OF THE BURNETT.

Primary production in the Central Burnett is firmly established, and the various products exported from the district contribute in no small way to the State's wealth. More efficient methods of soil management, better cattle husbandry, and increased mechanisation are gradually increasing the production of existing properties. In addition, there is a considerable area of land which could be worked more intensively and so raise the productive capacity of the district.

As reticulation becomes more extensive, the effect of electricity on primary production will be immense, providing better amenities in the home, together with the efficient performance of the various farming operations. It can thus be seen that the Central Burnett is destined to play a major role in the future economy of this State.

NEW BUTTER LABORATORY.

A new dairy research laboratory set up by the Department of Agriculture and Stock in the Butter Marketing Board's modern building at Hamilton, Brisbane, will enable about 50,000 bacteriological and chemical tests to be performed annually.

The laboratory will concentrate on quality problems of the butter industry. Additional work on these problems is being conducted at regional dairy research laboratories at Toowoomba, Murgon and Malanda.