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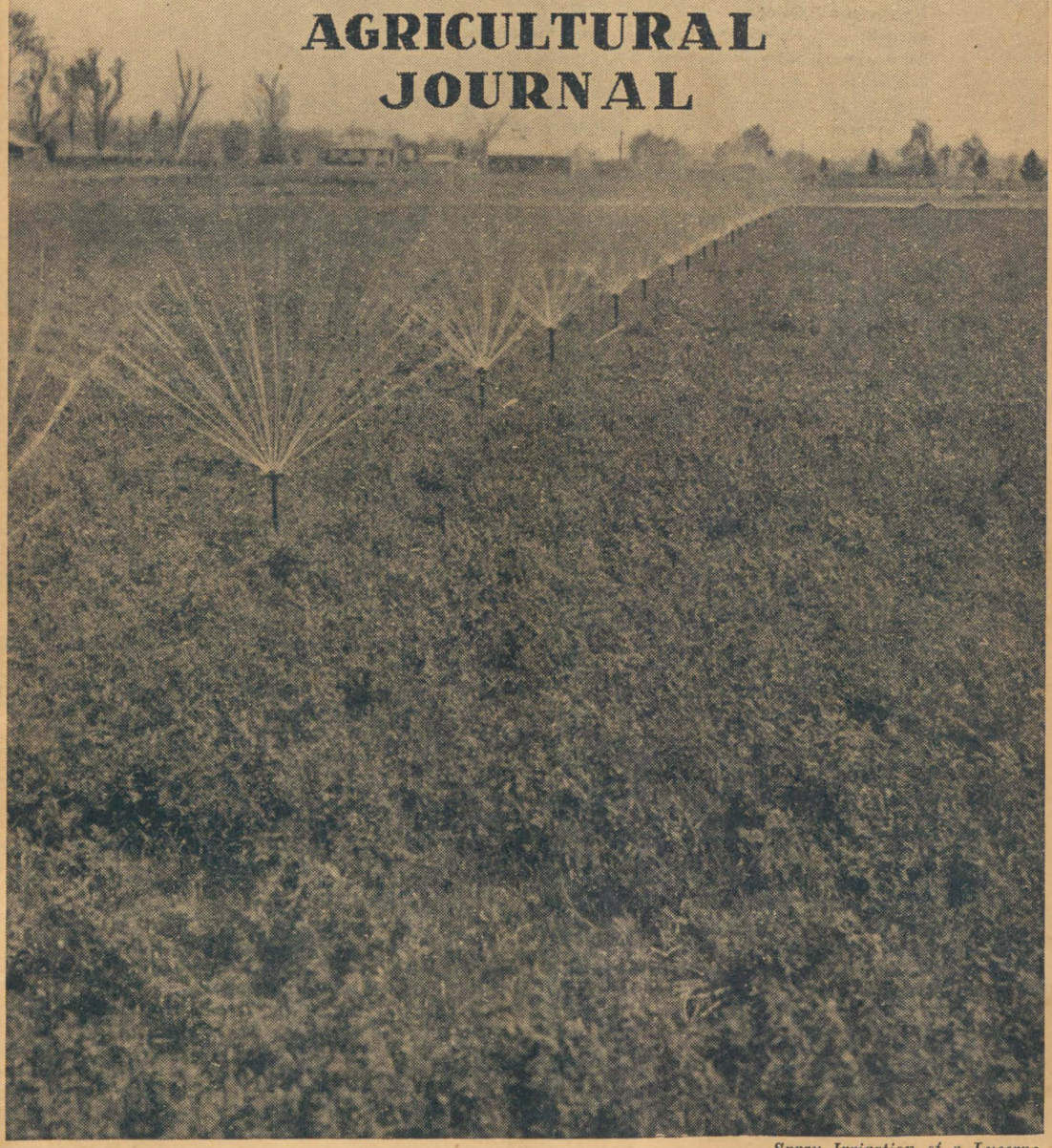
DEPARTMENT OF AGRICULTURE

QUEENSLAND AGRICULTURAL JOURNAL



Spray Irrigation of a Lucerne Crop in the Gatton District.

LEADING FEATURES

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Queensland AGRICULTURAL JOURNAL

Contents

Soil Conservation on the Steeper Cultivated Slopes of the South-Eastern Darling Downs.

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

A large area of agricultural land exists on the south-eastern Darling Downs where continuous cultivation has been, and is still being carried out, on slopes of 8-10% (that is, 8-10 ft. rise or fall in 100 horizontal feet), and in some cases even greater slopes.

Such slopes are steeper than is normally regarded as safe for cultivation. Serious erosion has occurred on most of these areas. At present the slopes are eroded to varying degrees, progressing from minor sheet erosion to severe gully erosion, and many acres have been rendered useless for cultivation.

The bulk of the area is located in the valleys of the upper tributaries of the main drainage systems (for example, the Goomburra, Upper Pilton, Maryvale, Swanfels and Killarney areas), and the cultivation referred to is carried out on the hills forming the valley walls.

The soil is self mulching residual clay of basaltic origin with colour varying from reddish-brown to very dark brown. It is moderately deep, the surface horizon averaging about 12 in., but considerably deeper in places (as shown in Plate 1), and has a high inherent fertility.

These slopes are not suitable for continuous cultivation because of the risk of serious erosion. It is emphasised that even the construction of soil conservation earthworks will not entirely avert erosion on this land so as to permit its use for permanent cropping. However, by using these structures and following a rotational programme, of which the greater part is a pasture ley, some cropping is permissible.

The initial step in arresting the erosion of these slopes is the construction of a carefully planned layout of earthworks. These are designed to retain the greatest practicable amount of rain falling on the area and to provide for the safe disposal, of surplus runoff water, at non-erosive velocities, to main drainage lines.

LAND USE.

Following completion of earthworks, attention should be given to the future agronomic use of the area. It is advisable, immediately—in accordance with suitable planting times—to sow the area to an improved pasture mixture. Difficulty in selection of a suitable pasture mixture will probably arise and further investigation will be necessary before firm recommendations can be made.

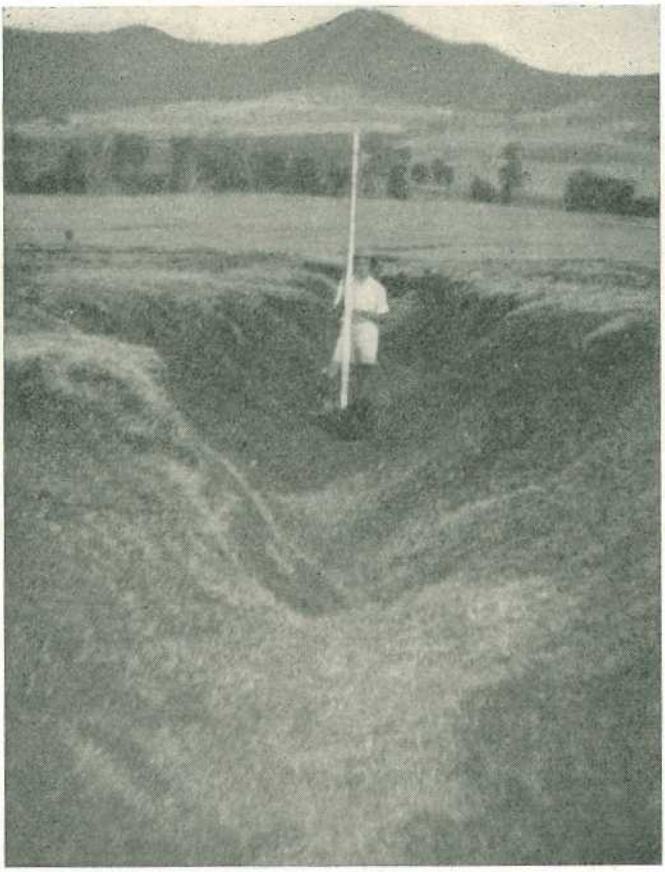


Plate 1.

Typical Gully Erosion on a 9% Slope in the Goomburra Valley. Erosion rendered this 50-acre paddock useless for cultivation.

For summer sowing, the suggested mixture is Rhodes grass at 8 lb. per acre, and lucerne at 2 lb. per acre, with an initial application of 1 cwt. of superphosphate per acre. Green panic is showing promise in some districts and may be used in place of Rhodes grass where it is considered suitable.

If the area must produce winter feed the choice of a mixture is more difficult. Species under trial at present include phalaris, cocksfoot, perennial ryegrass, H.1 ryegrass, subterranean clover (Mt. Barker and Tallarook strains), red clover, white clover and lucerne. On observations to date the grass appearing most suitable to the frequent dry spells encountered is phalaris. The ryegrasses died out badly in the 1953-54 season, under extremely adverse moisture conditions. The legumes showing the most promise are red clover and lucerne.

Of the above species, a suggested mixture is:—

Phalaris	4 lb. per acre.
Red clover	3 lb. per acre.
Lucerne	2 lb. per acre.

(Plus 1 cwt. of superphosphate per acre).

If the area is not considered suitable for improved pasture establishment on the above lines, it should be sown to lucerne for grazing.

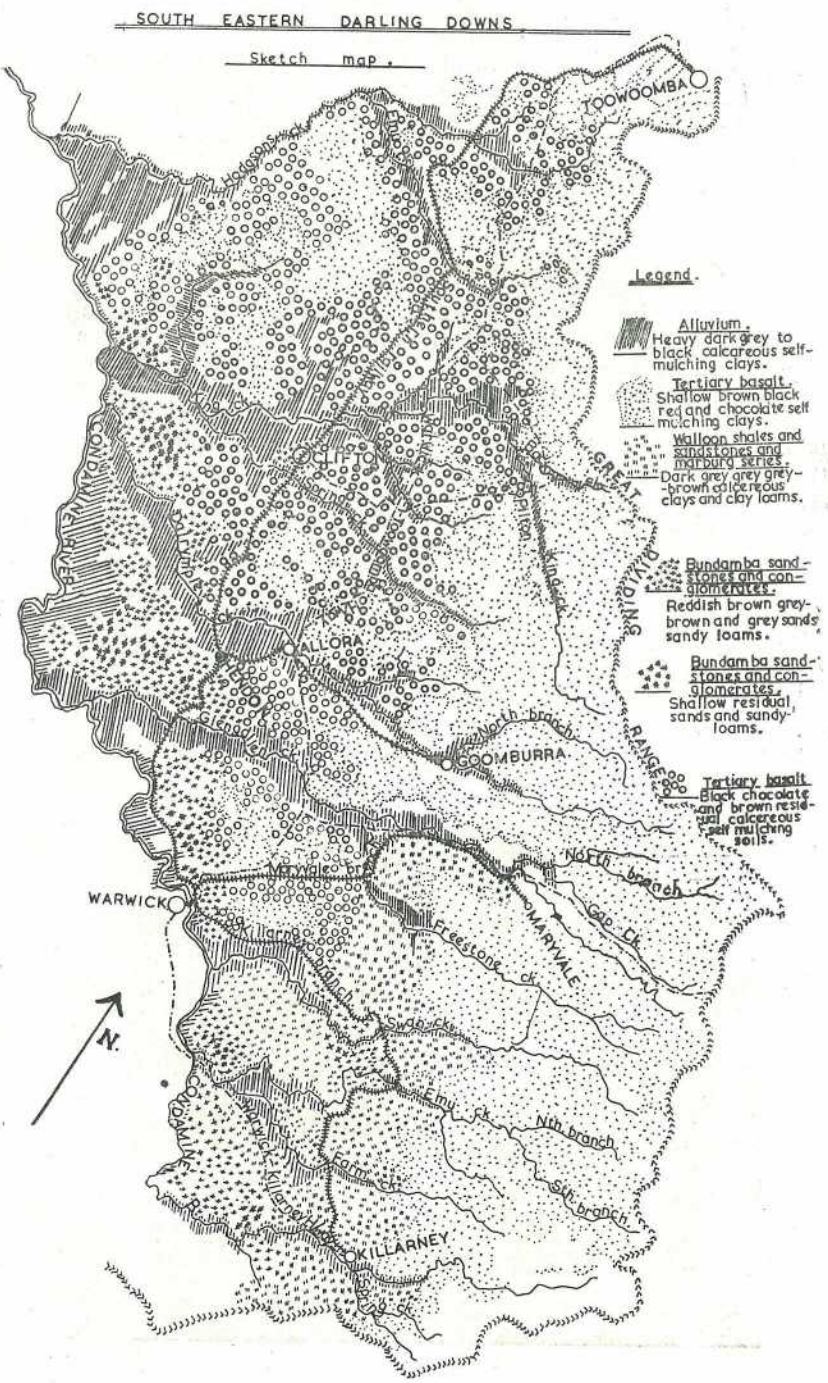


Plate 2.

Sketch Map Showing the Area Under Discussion.

The length of the pasture ley will depend on the condition of the pasture and the farm economy. A period of three to five years is suggested, followed by a period of cultivation. However, as careful land use is an essential, the cropping phase should be restricted to two or three years, depending on soil and weather conditions.

During the cultivation period the land should preferably be used for the growing of annual grazing crops, winter or summer as desired. If the farm economy necessitates the growing of a cash crop, then such crop will also have to be fitted into this cultivation phase. Following this phase, the area is then returned to pasture for another three to five years.

EARTHWORKS.

Design of soil conservation earthworks should receive careful attention. It is stressed that earthworks will vary from property to property and it is intended here to outline the basic principles.

Primary consideration in preparation of a plan must be given to areas suitable for the disposal of runoff water. If stable well-grassed drainage lines or adjacent permanent pastures are available, these may be used to transport runoff safely to the main drainage line. If no stable disposal lines are available, artificial waterways have to be constructed.

The construction of a waterway involves the preparation of a strip of ground from top to bottom of the slope, and sowing this strip down to a permanent vegetative cover which will be resistant to erosion. This waterway is enclosed within retaining banks, and is constructed so as to be level in cross-section but slightly dished in the middle (see Plate 4).

The width of the waterway between retaining banks is determined by soil type, slope of the waterway, and the acreage of land to be drained into the waterway. A guide to width on the slopes under discussion is 1 foot of waterway width to three-quarters of an acre of arable land. It is desirable

Plate 3.

Sown Pasture. Shown 10 Months After Planting. Establishment was during 1953 winter, one of the driest on record for the area (Goomburra Valley). Mixture sown:—4 lb. phalaris, 2 lb. red clover and 2 lb. white clover per acre.

to limit to 30 acres the area of arable land drained into one waterway. If runoff from grassland or timbered land is to be diverted into the waterway, allowance of one foot of waterway width per 1½ acres should be made.

If the calculated maximum width of the waterway exceeds 40 feet, two waterways of equal width should be constructed alongside each other to provide the extra width. This is desirable, as a more efficient water spread is obtained on two small waterways than on one large waterway. By this means the velocity of waterflow is also reduced, and the erosion hazard consequently lessened. The retaining banks of the waterway should be 18-24 in. high, with a 6-8 ft. base. The waterway cross-section between banks should be dished 3-4 in. at the centre. The sketch in Plate 4 illustrates the desirable cross-section.

depending on follow-up rain for germination. Weed growth that may result from this method should be controlled by mowing.

The best times to sow seed mixtures are in spring, from late September to the end of October, and in summer, from late January to the end of February, immediately following the preparation of the waterway.

For spring sowing the following mixture is recommended:—

Rhodes grass ..	10-12 lb. per acre.
Lucerne	2 lb. per acre.
Sudan grass ..	3 lb. per acre.

For summer sowing the recommended mixture is:—

Rhodes grass ..	10-12 lb. per acre.
Phalaris	3 lb. per acre.
Lucerne	2 lb. per acre.
Oats	10 lb. per acre.

Sudan grass and oats are included in the above mixtures to provide pro-

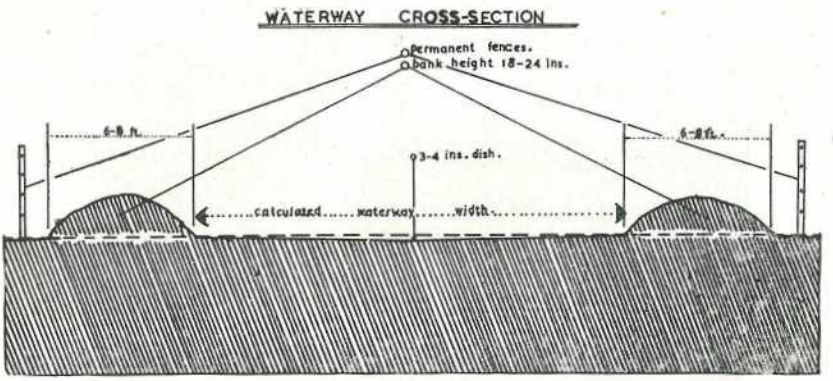


Plate 4.

Sketch Showing Desirable Waterway Cross-section.

Following construction of the waterway, the establishment of an effective vegetative cover on it is the next step. The surface should be prepared to give a shallow seedbed of rough clod tilth. If subsoil moisture is low, planting should be delayed until it is replenished. The seed should be planted at a depth of 1-1½ in. Best results have been obtained by dry-planting on good subsoil moisture and tection from storm rains before the other species can supply an efficient cover, and also to protect the Rhodes grass against frost damage during the first winter.

The seed may be mixed with superphosphate, which is applied at the rate of 1 cwt. per acre. The mixture is applied through the fertilizer box of the combine at the appropriate setting. Following sowing of the seed,

strips of kikuyu are sodded across the waterway between the retaining banks. These strips should not be more than half a chain apart and might preferably be closer.

Valuable grazing may be supplied by the waterway when vegetation is thoroughly established, but the grazing must be planned. At no time should the waterway be overgrazed or in any way allowed to create an erosion hazard. The Rhodes grass crowns must be protected against frost damage, and grazing of the waterway should therefore cease in time to allow the Rhodes grass to make adequate top growth before winter.

PONDAGE AND DIVERSION STRUCTURES.

Following establishment and stabilization of the water disposal system, consideration should be given to the interception of any runoff water entering the cultivation area from higher slopes. It is essential that provision be made to intercept this runoff before any action is taken with respect to structures on the cultivation land.

For upper catchment interception, either pondage or diversion structures are utilized. Generally speaking, the topography does not permit the effici-

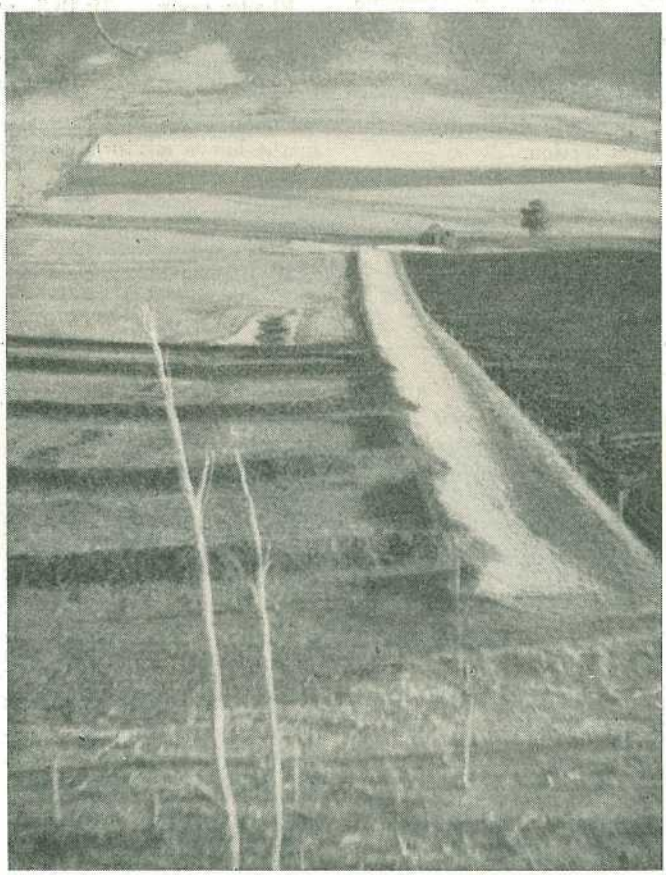


Plate 5.

A Stabilized Waterway. This is a stabilized waterway where vegetation is well established, and shows a series of contour banks draining to this waterway. The remaining area to be drained to the waterway has yet to be contour-banked. The gully previously left out of cultivation is filled as bank construction proceeds. Waterway is fenced for the exclusion of stock—a most important requirement during the establishment of vegetation.

Plate 6.

Close-up of Waterway Shown in Plate 5. This illustrates the vegetative cover of Rhodes grass, kikuyu and lucerne. This photo was taken 14 months after construction, and no grazing had been allowed to this stage. Top growth was mowed twice and the material retained as surface mulch.

ent use of pasture furrows, which otherwise would be an alternative to pondage banks.

The pondage banks are intended to retain most of the runoff from the upper slopes. When the channel above the bank is filled the bank functions as a water diversion structure by virtue of the provision of an overflow weir.

The size of the bank will vary directly in relation to the area draining to the bank. If conditions permit, the bank is constructed sufficiently large to ensure that overflow occurs only during periods of exceptionally heavy rain such as can be expected on an average of once in 5 or 10 years. However, frequently this is not practicable where the catchment area is such that a considerable area of rough country extends above the first suitable site for the construction of a pondage bank.

As a general guide the pondage bank should be 4 ft. high and 12-15 ft. wide at the base, with the outlet weir or weirs (if both ends of the bank serve as outlets) two feet lower than the lowest point in the crest of the bank. The bank length should not exceed

600 ft. if weired at one end, or 1,200 ft. if weired at both ends. Where possible, these distances should be considerably reduced.

Rather than construct one long pondage bank, it is desirable to have a series of short banks with one spilling to the other. In this way any risk of intake to the bank being greater than the overflow is minimised.

If construction of a pondage bank is not practicable a diversion bank may be used. The diversion bank is usually constructed to a height of 18-24 in. with a gradient of 4-6 in. per 100 ft. If a large catchment area is involved the channel cross-section is increased by providing a wider channel and higher bank. The gradient may be increased in special cases but immediate precautions must then be taken to stabilize the channel by the establishment of a grass cover. In the areas under discussion the main drainage lines are not widely spaced and large catchment areas are not involved.

CONTOUR BANKS.

Once stable water disposal systems have been established and provision has been made for the interception of the runoff from areas above the cultivation, contour banks can be constructed on the cultivation area.

The type of bank most suitable for the slopes under discussion has a narrow base and steep sides. It should not be cultivated. The bank size is dependent on the size of the area to be drained by the bank and increases as the length of bank increases. Obviously, the size at the outlet end must be adequate to cope with the increasing volume of water to be controlled at that end.

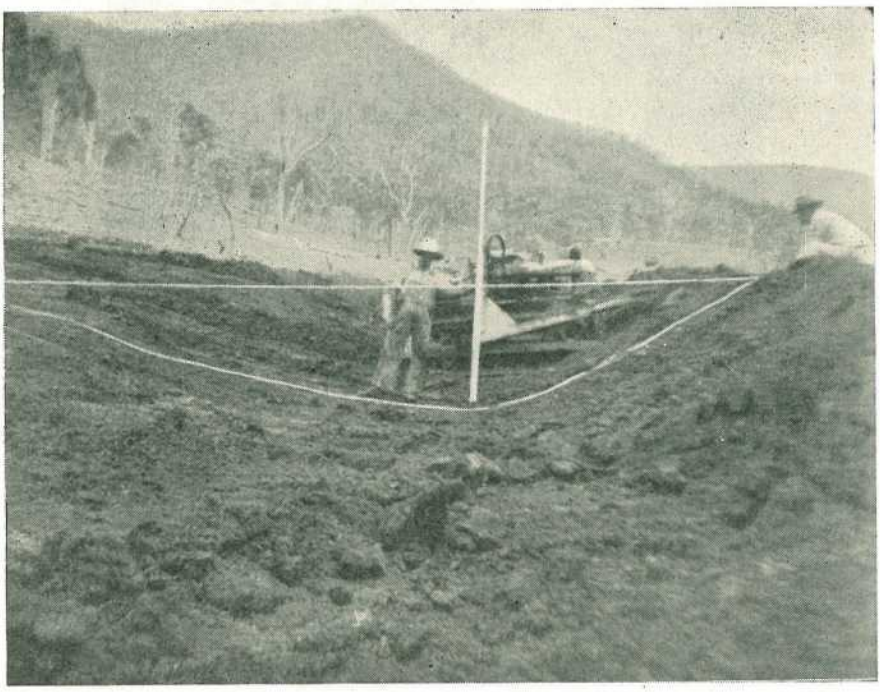


Plate 7.

A Typical Pondage Bank During Construction on a 9% Slope. The bank crest is 4 ft. above the channel bottom and weirs are constructed to allow pondage of 2 ft. of water before flow commences from the bank. The dozer used for construction is shown in the middle distance.

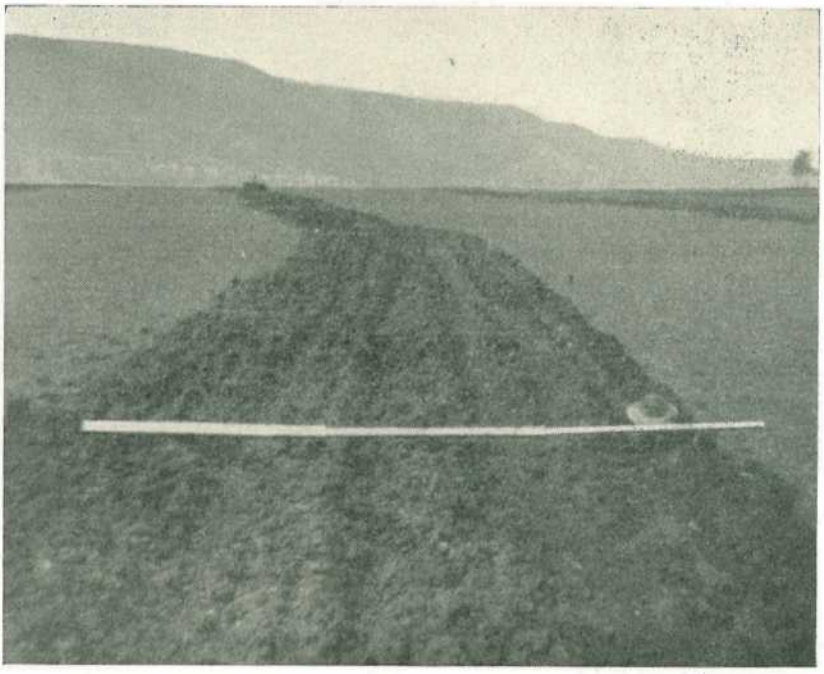


Plate 8.

Initial Ploughing of Surveyed Contour Bank Line for Dozer Construction.

As a general guide the base of the bank is 6-8 ft. wide and the bank crest two feet above the water channel. Bank length (related to water flow in one direction) should not exceed 1,000 ft., and is desirable to design for shorter lengths if possible. Bank length can be increased by designing so as to permit water to flow from the middle of a bank to both ends. By this means the safe length of the bank may be doubled.

The spacing between banks is most important and the following table indicates the spacings which are proving satisfactory.

Slope of Land.	Horizontal Interval.
%	ft.
8	85
9	80
10	75

Attempts to increase these distances are highly undesirable, as they may result in interbank soil movement with resultant silting of the bank channel and eventual failure of the structures.

Gradients of the bank channel must be given careful attention, and accurate levels should be taken when surveying the bank lines prior to construction. Gradients used should be a fall of .3% at the end of the bank most distant from the waterway for approximately one quarter of the bank length, increasing to .4% for the middle half of the bank length, and .5% for the final quarter near the waterway.

Use of lower gradients is not advised, as channel capacity is necessarily low on these steep slopes. It is therefore preferable to discharge runoff more rapidly than is the case with gentler slopes. However, if gradients are increased beyond those recommended scouring of the bank channel may occur.

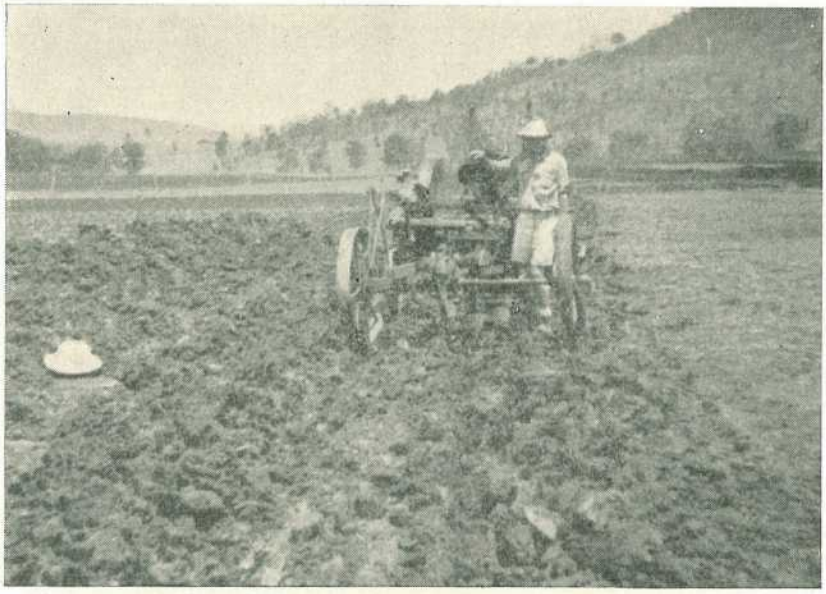


Plate 9.

Second Ploughing After Completion of First Dozing Phase. The bank constructed from first ploughing is shown to the left of the area being currently ploughed.

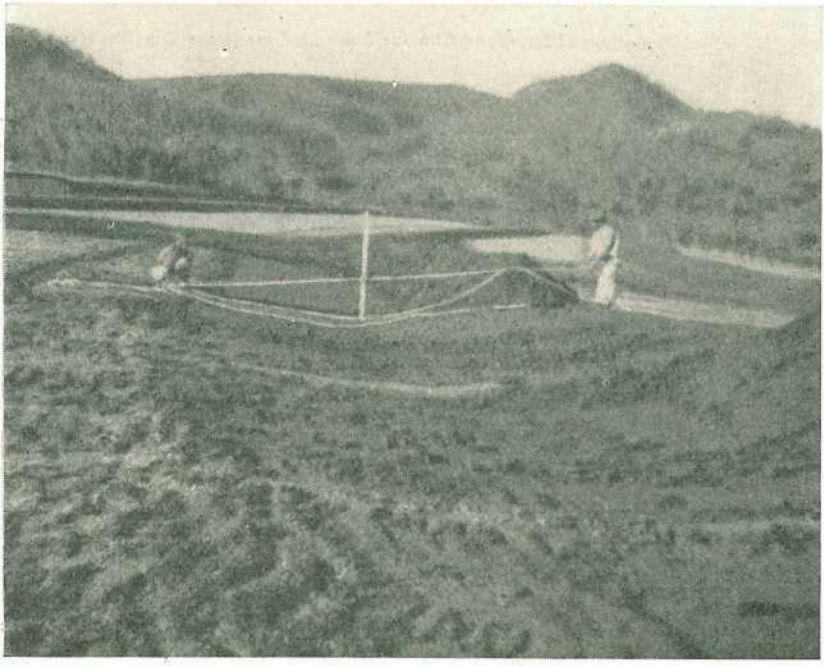


Plate 10.

A Completed Bank Section After Second Ploughing Has Been Dozed to Form the Completed Bank. A crossing ramp for machinery is located at the division of the waterflow.

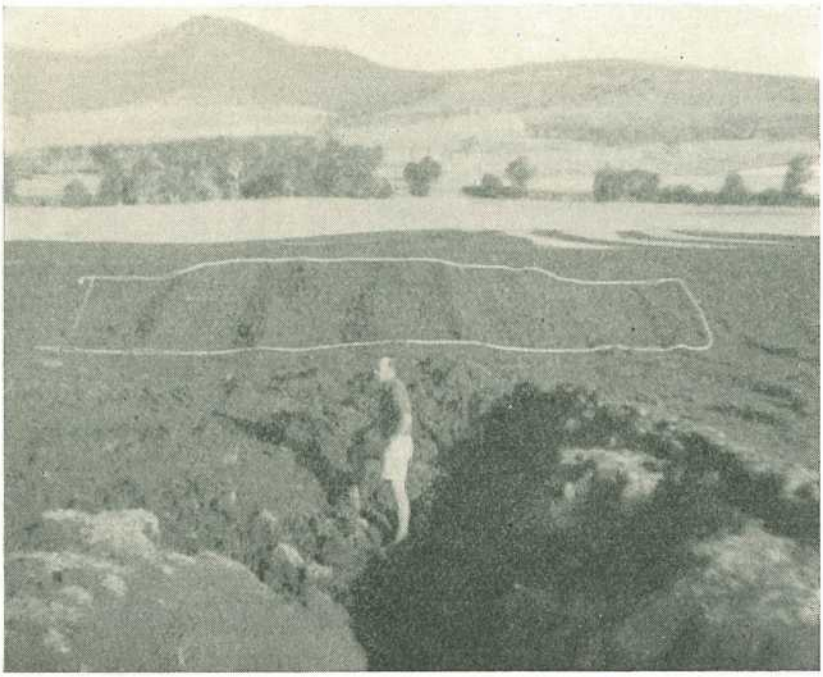


Plate 11.

Gully Filling. This is the gully shown in Plate 1. The entire gully is to be eventually filled. The upper tape line illustrates the extra height of the bank where it crosses the gully; this is to allow for settlement.

A small bulldozer unit is most suitable for the construction of this type of bank, but where such a unit is not available a grader will do the job quite well. During construction care should be taken that a gently sloping entry to the water channel is left when the bank is completed. If the entry is too abrupt, rilling and consequent silting of the channel will result.

When constructed the banks should be sown to a Rhodes grass lucerne mixture. The seed is sown by broadcasting and should be applied at a rate of approximately 12-14 lb. Rhodes grass and 4 lb. lucerne per acre (approximately 5,000 ft. of bank length represents one acre). Before planting, it is advisable to let the bank become thoroughly wet. This is important, since seedlings germinating on a wet surface will die if the sub-surface is dry and good follow-up rain does not occur after planting. October or early November is suggested as the most favourable planting time, but if conditions are not suitable, planting should be delayed to late January or early February.

Subsequent cultivation should be done between the banks with the bank water channel included in the cultivation. The method of working between banks should be varied to avoid repetition with respect to the location of finish-out furrows.

It is desirable that after bank construction cattle be excluded from the area until the newly constructed banks have consolidated, and preferably until vegetation is established on the banks. Under grazing the development of cattle pads may necessitate occasional bank repairs.

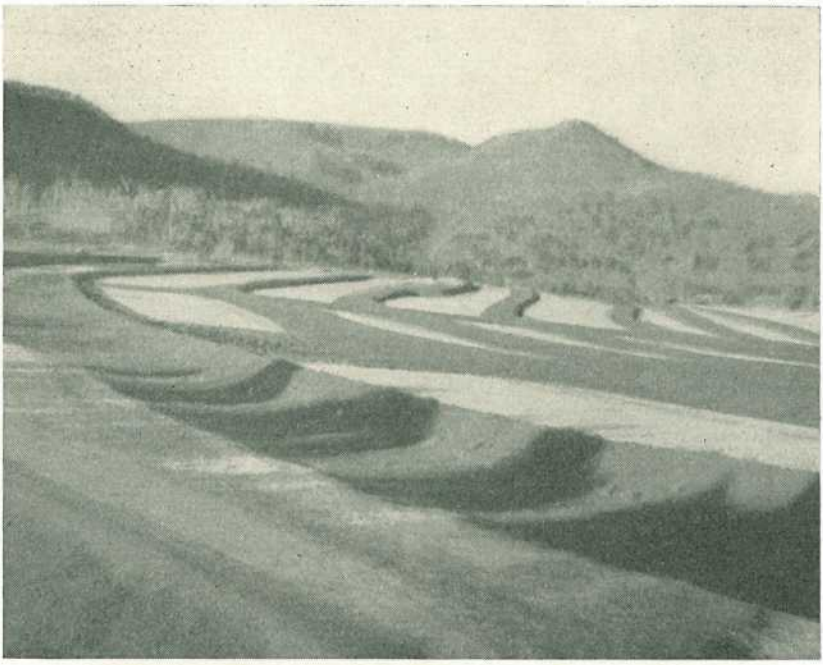


Plate 12.

The Completed Earthworks on a 9% Slope. Banks are now ready for sowing to Rhodes grass and lucerne.

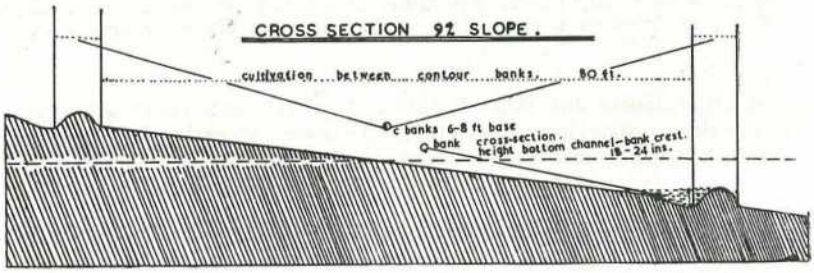


Plate 13.

Sketch Showing a Cross-section of a 9% Slope with Contour Banks Constructed.

Water Conservation on the Atherton Tableland.

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

A general conception of the Atherton Tableland is that it is an area of heavy rainfall and running streams. This, however, is not true of the whole area. Further, the average rainfall distribution throughout the year leaves the late winter and spring months with inadequate supplies of rain, at a time when vegetable crops are largely grown. During the last seven years a progressive farmer has developed a system of dam storage and land irrigation enabling the cultivation of up to 300 acres of vegetables, worked on a share farming system with nine sharefarmers (Plates 1 and 2). Departmental officers who have examined the layout consider that an account of the methods used will be of general interest to others, although the owner has plans for still further improvements. The following information has therefore been compiled with the concurrence of the owner, Mr. A. E. Jonsson of Kaban, who is to be congratulated on his achievements to date.

The Kaban-Tumoulin Area.

Large sections of arable land on the margins of the rain forest country receive a much lighter rainfall than other parts of the Tableland. This is the position in the areas north of Ravenshoe, the Kaban-Tumoulin section, where the average annual rainfall is about 40 inches, most of it falling in the summer months. Thousands of acres of forest country (Plate 3), consisting mostly of comparatively fertile red clay loam soils, are awaiting development. The average elevation of this area is 3,000 feet, and the land is comparatively flat or gently sloping with few large creek beds. Crop growing is dependent on rainfall unless some method can be developed for conserving runoff from the summer rains.

Mr. Jonsson's property is situated near Kaban railway station and it consists of about 5,000 acres, mostly of good red clay loam. It does not

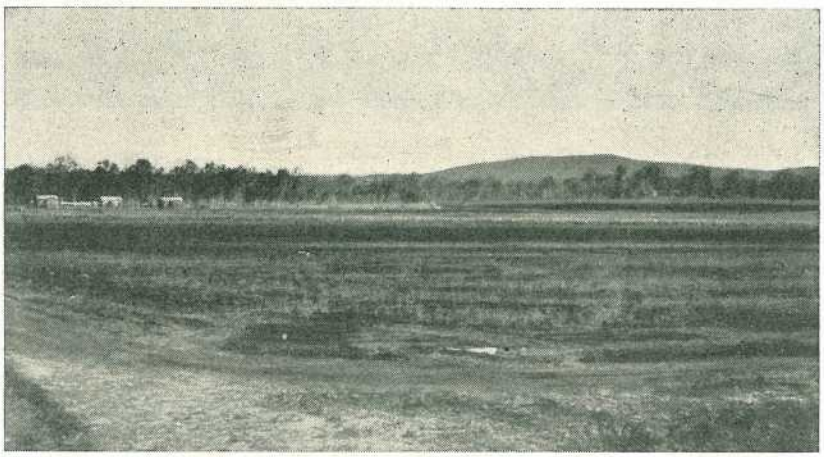


Plate 1.

View of Cultivation and Crops From One of the Tanks.

Plate 2.

Young Cabbage Crop. Wall of dam visible through trees in background.

receive the misty winter rains that are common on the wetter portions of the Tableland.

The Irrigation Layout.

Mr. Jonsson constructed his first dam in 1947. The capacity initially was about 10 million gallons, but this has been increased over the years and now a body of water can extend over 30 acres with an estimated capacity of about 25 million gallons

Plate 3.

Showing Gum and Bloodwood Trees of the Kaban Area.

(Plate 4). Four other dams have been constructed, so the total storage now is as follows:—

Original dam, capacity 25 million gallons.
1 dam, capacity 14 million gallons.
2 dams (each 5 million gallons), capacity 10 million gallons.
1 dam, capacity 3 million gallons.

These give a total of 52 million gallons storage, or roughly 200 acre feet. These figures do not allow for seepage or evaporation, and the intake varies with the season.

The water is pumped from the dams, either direct to the spray lines or to three concrete tanks, one of 50,000 gallons and two of 40,000 gallons each (Plate 5). The tanks are not sufficiently elevated to give pressure in the sprays, so the water from the tanks is pumped to the various fields.

There are nine distinct irrigation plants, with 3 in. pumps driven by 10 h.p. diesel engines. Both main and spray lines are 4 in. diameter, the latter being fitted with sprays of the rose-head low-pressure type. In some parts of the farm, the main line is underground to facilitate tilling operations.

Development of the Venture.

At the present time the community on the farm consists of about 90 persons, men, women and children, housed in some 17 houses, some of which are supplied with water and electricity (Plate 6). Two more homes are at present under construction. A community playing area includes a tennis court and playground equipment.

For the farms the owner provides the land, machinery, seed, fertilizer and water, while the nine share-men are responsible for the labour.

Areas under crop or proposed this season are as follows:—

	Acres.
Potatoes	130
Cabbage and lettuce	40
Cauliflower and tomatoes	30
Beans	20
Carrots	10
Sweet potatoes	20
Rhubarb	3
	253

Based on last year's figures, gross returns for this season are expected to be about £60,000.

The system of farming is for each share-man to concentrate on one particular line of vegetable—for example, one man grows only potatoes, another beans, and so on. Most of the produce is marketed in the coastal towns

Plate 4.
Portion of the Main Dam Area.

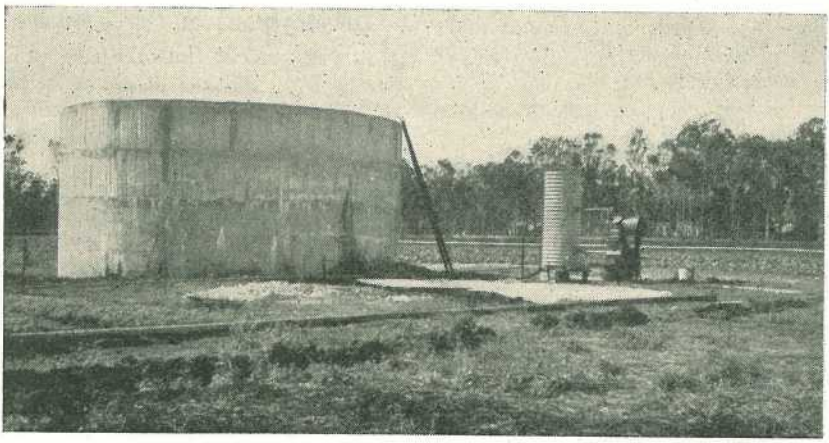


Plate 5.

Concrete Tank, 40,000 Gallons, with Pump and Engines; Crops in Background.

of Townsville, Cairns, Innisfail and Ingham. A 12-ton semi-trailer truck has recently been purchased to handle the longer runs; two 5-ton trucks are used for the shorter trips.

By picking and loading the truck by day and travelling at night, the vegetables are available for sale as far away as Townsville with only one day's delay.

Projected Developments.

Mr. Jonsson has under consideration an additional scheme whereby water can be obtained from Mill Creek, and a further earth dam and reticulation scheme have been proposed. If necessary, water could then be piped into the existing dams on the property so that the supply would be assured.

Plans have been prepared for this work by a firm of consulting engineers and an estimate for it is of the order of £38,000. Whilst this is a large sum, Mr. Jonsson feels if such an additional scheme were completed, it would remove the element of risk associated with the present scheme in which, successful as it has been up to date, the water supply nevertheless depends solely on the runoff from the limited catchment areas above the dams.

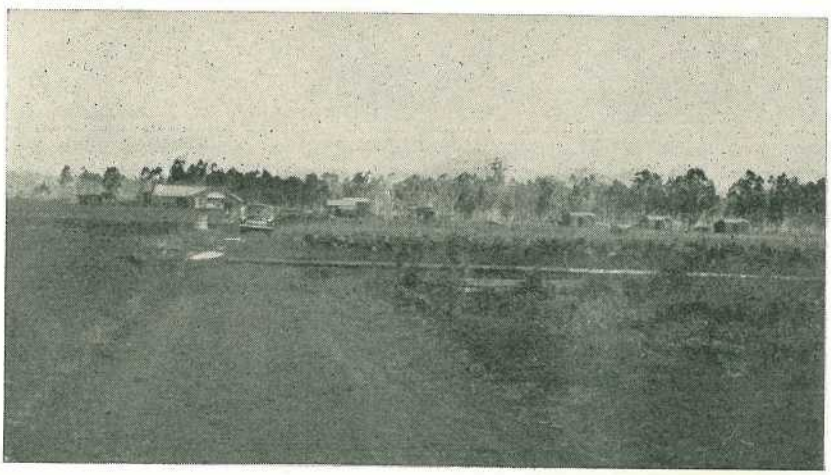


Plate 6.

General View of Portion of Housing Area.

Sowing Summer Pastures on the Darling Downs.

By R. G. WILSON, Adviser in Agriculture.

Landholders when planting summer pastures should pay attention to three important factors. These are good seedbed preparation, balanced seed mixtures of good seed, and correct times and methods of sowing.

SEEDBED PREPARATION.

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

Good seedbed preparation makes it possible to reduce planting rates. This is important when seed is costly and in short supply.

The ashes of scrub burns and rough, stony seedbeds will give satisfactory germination, but these types of seedbeds will require heavier planting rates.

EROSION AND THE SEEDBED.

As the most suitable planting times for summer pastures coincide with periods when heavy rains are experienced, precautions against erosion should be taken.

Soil erosion hazards on land with a slope of 3% or more may necessitate the retention of a cloddy surface tilth. Tine tillers and chisel ploughs are proving effective in producing this type of seedbed.

On very steep land, it may be necessary to give additional protection to the seedbed by using contour strip planting or contour banks.

Where cloddy seedbeds are used, it would be necessary to sow dry when rain is expected. 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.

SEED MIXTURES.

Pasture seeds are costly and only seed with a good germination should be sown. The germination capacity of seed of many grasses improves with storage and therefore newly harvested seed, particularly of green panic and buffel grass, should be held for 12 months before planting.

Green panic seed which had shown only 3% germination at harvest gave a germination of 15% after 9 months' storage, while buffel grass improved from 3% germination to 79% in 10 months.

It is possible to obtain green panic seed with a germination of 40% and this can be sown at 2 lb. per acre, compared with a planting rate of 4 lb. per acre for seed with 20% germination.

The following mixtures are being used on the Downs for late summer plantings. All rates are per acre.

If desired prairie grass may be added to all mixtures at the rate of 4-5 lb. per acre.

TIMES AND METHODS OF SOWING.

Pasture seeds are small and costly, and success or failure can hinge on the time and depth of sowing.

Plate 1.
A Pasture of Green Panic and Lucerne at Maclagan.

Mixture A.

Green panic (20% germination)	4 lb.
Lucerne	½-1 lb.
Barrel medic	1 lb.

Phasey bean can be substituted for barrel medic in an early summer sowing or added to the late summer mixture at 1/5 lb. per acre.

Mixture B.

Green panic (20% germination)	3 lb.
Queensland Buffel grass	1-2 lb.
Rhodes grass	2 lb.
Lucerne	1 lb.
Barrel medic	1 lb.

Mixture C.

Rhodes grass	3 lb.
Lucerne	1-2 lb.
Barrel medic	1 lb.

Mixture D.

Queensland Buffel grass	2-3 lb.
Lucerne	½-1 lb.
Barrel medic	½ lb.

Mature seed can be sown following good late winter rains, or in January to early February when soil temperatures are high and good summer rains can be expected.

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.

In the past, establishment has been most successful on the fertile soils of the softwood scrubs, brigalow-belah scrubs and creek flats. The chocolate and brown basaltic soils which are common on the Eastern Downs have also given good results; these soils give excellent spring growth where soil nitrates and moisture are in good supply.

Most summer pasture seeds exhibit a "shyness" to depth of planting, and the best results are obtained when the seed can be sown in a moist shallow seedbed just prior to or during the wet season.

Pasture seeds should be sown at a depth of ½ to 1 inch. Machine sowings give a more accurate control of depth of planting than broadcasting, and also require less seed.

Mixture A is sown through the combine in 14-in. drills. The fine side is used and the combine is set for 18-30 lb. of wheat. If desired, the grass and legumes can be kept separate and sown in alternate 14-in. drills, or at wider spacings. In late summer, this mixture has also been sown successfully mixed with 15 lb. of wheat per acre in 7-in. drills. The combine setting should be for about 18 lb. of wheat per acre.

Mixture B can be mixed with an equal weight of dry, sieved sawdust and sown through the fertilizer box of the combine in 7-in. drills. If a fertilizer box is not available, the green panic, Rhodes grass, and legumes should be mixed with an equal weight of dry sieved sawdust (cypress pine if possible) and sown through the grain hoppers. The coarse setting is used, adjusted for approximately 27-30 lb. of oats per acre. Because of the tendency of this type of mixture to pack, the grain box should not be filled. If packing of the mixture does occur, with a resultant stop in seed flow, the packed material should be broken up by stirring with a piece of 8 or 10 gauge wire.

The buffel grass seed should be mixed with three times its own weight of damp sawdust, and broadcast from the tractor or combine.

Plate 2.

Green Panic and Lucerne Sown in Drills in the Chinchilla District.

Mixture C is skim-sown in 7-in. drills, mixed with twice its weight of sawdust. This mixture may be sown through the fertilizer box, or through the grain box set for about 50-60 lb. of oats per acre. Packing should be broken up by stirring with a piece of wire.

Mixture D may be sown as described for Mixture B.

A man should be in attendance on the combine during all sowings.

MANAGEMENT OF SOWN PASTURES.

Perennial grasses must be spelled periodically during periods of active growth to permit them to replenish

their food reserves, which are stored in the roots. This type of management involves some system of controlled grazing, a practice which has many advantages.

Healthy, actively growing, leafy pastures will provide more proteins, more minerals and more readily digested fodder than old pastures. If scouring occurs or butterfat tests fall when dairy stock are grazed on lush pastures, a lack of fibre or roughage in the diet is usually indicated. This condition can be corrected by feeding hay or by using native pasture in rotation with the sown pastures.

Internal parasites are also more easily controlled where rotational grazing is practised.

The correct use of the mower is important in pasture management, especially in the year of establishment. Mowing not only controls weeds but encourages greater density by stooling.

Correct management of a sown pasture is essential for persistence and high yields, and since pastures are costly to establish it pays to manage them carefully.

JOHNSON AND COLUMBUS GRASS SEED.

Sale of seed of two potentially dangerous grasses has now been prohibited, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) announced recently. The plants are Johnson grass (Sorghum halepense) and Columbus grass (Sorghum almum).

The presence of seeds of either of these grasses as impurities in other seeds intended for sowing is also prohibited.

Both plants are a potential danger to stock because they are capable of developing lethal quantities of Prussic acid. In this respect they present a considerably greater risk than well-bred varieties of sorghum and Sudan grass.

Johnson grass, also, is one of the most serious weed pests in cultivations. Its long, underground rootstocks make it extremely difficult to eradicate. Columbus grass has less extreme rootstock development than Johnson grass, but all plantings examined so far contain some plants which cannot be distinguished from Johnson grass.

In addition, it is almost impossible to distinguish Columbus grass seed from Johnson grass seed. Therefore, any sample of Columbus grass seed could carry a high percentage of Johnson grass seed without detection.

Mr. Collins added that the provisions of the Agricultural Standards Acts empower inspectors to seize any of these seeds, or seeds intended for sowing which contain Johnson grass or Columbus grass seeds as impurities.

COUNTRY BREAKFAST SESSIONS.

The Rural Broadcasts Section of the A.B.C. is now providing regular breakfast sessions of interest to rural people from 4QY, 4AT, 4QB, 4GM and 4QS, Monday to Friday from 7 to 7.15.

Harry Greaves, stationed at Cairns, handles the northern programme, and Trevor Stockley conducts the southern programme from Toowoomba.

Dwarf and Semi-Dwarf Varieties of Banana.

By F. W. BERRILL, Assistant Horticulturist.

Until comparatively recently, the most important banana variety in south-eastern Queensland was the Dwarf Cavendish but during the last decade its taller mutants, the Mons Mari and so-called William's Hybrid, appear to be gaining in popularity in many districts. This is probably due to the fact that the latter are usually more tolerant of "border-line" conditions in regard to both soil and climate.

It is difficult to distinguish between these two semi-dwarf types in the field, mainly because the two names have been used for the same plant or collection of plants. With the subsequent interchange of propagating material between plantations, confusion in the naming of the various types was unavoidable.

THE CAVENDISH.

The variety which we generally recognise as Cavendish or Dwarf Cavendish to-day is characterised by a sturdy, heavily pigmented pseudostem averaging 5-6 feet in height, with short, thick leaf stalks and relatively broad leaves. The bunch usually averages 8-12 hands, is compact and has an appreciable taper from end to end.

Details of the occurrence and distribution of this variety are not known with any degree of certainty prior to the year 1826, when a few plants were collected in Southern China and transported to Mauritius.

Suckers from these stools were shipped to England in 1829 and grown at Chatsworth in hothouses belonging to the Duke of Devonshire. In 1837, the plant was named *Musa cavendishii*, after the family name of its owner. In the following year, suckers were taken to the South Sea Islands by the missionary John Williams, and it is generally believed that the Cavendish bananas grown here to-day are descendants of those original plants.

The Cavendish, like other edible cultivated bananas, does not produce seed and is propagated entirely by either bits or suckers. It might be expected that with this method of multiplication, the progeny would always be identical with the parent. However, the process of cell division which precedes the formation of a sucker is a very complex one. Sooner or later, therefore, a breakdown occurs and a sucker is produced which is not identical with its parent.

A variation of this nature is referred to as a mutation, and the sucker is known as a "sport" or mutant. It will possess some new characters, but whether they are widely different from those of the mother plant, or so similar as to be almost indistinguishable, will depend entirely on the nature of the

original mutation. Most plants are capable of mutating in this way but the banana probably does it rather more frequently than many others.

Mutation in the Cavendish.

When a mutant arises which has outstandingly different characters from the parent stool, it is at once recognisable and in all probability will be given a distinctive name. Thus, if a Cavendish stool, with an average height of 5 feet, produces a sucker which attains a height of say 11-12 feet, it is evident at once that this is a "sport" and, as such, deserves careful observation to ascertain whether it is superior or inferior to its parent. The Mons Mari arose in this way. If, however, the change is not so obvious, it may easily pass unnoticed.

The identification of "sports" is complicated by the fact that environmental conditions often affect the appearance of a variety. The superior stools which are often found adjacent to creeks and packing sheds are examples of this but smaller differences due to soil variations are liable to occur in any plantation.

The fact that one plant differs from another in some detail such as height, size of leaf, pigmentation of pseudostem, shape of "bell", and so on, may not be of any practical importance. Such mutants, however, may also possess associated characters such as greater bunch weight and fruit size, tolerance of cold conditions or resistance to disease or wind damage, which are important from the commercial point of view.

At present only mutants with very obvious differences are recognised, but as experimental work proceeds, less conspicuous forms may be separated out and tested. One such instance of a minor variation is the Cavendish type plant which produces fruit covered with a fine down; it appears to be inferior to the normal Cavendish insofar as fruit quality is concerned.

The so-called Cavendish banana actually comprises a range of mutants rather than one distinct type.

Plate 1.

Cavendish Bananas at Maroochy Experiment Station. Note the stout pseudostem and the tapering bunch.

MONS MARI.

Mons Mari was the first Cavendish mutant recognised in Queensland. It arose on Buderim Mountain over 40 years ago, but the same plant type has since originated from Cavendish stools in other localities. Mutation of Mons Mari back to the Dwarf Cavendish has also occurred in commercial plantations. Similar mutations have been observed overseas, where the plant we regard as Mons Mari is generally referred to as Giant Cavendish.

Plate 2.

Mons Mari Bananas at Currumbin. Note the relatively tall stem and the well thrown cylindrical bunch.

The Mons Mari is considerably taller than Cavendish and is therefore fairly readily distinguished in the field. Its pseudostem may reach a height of 11-12 feet and is somewhat thinner and more heavily pigmented than that of the Cavendish. The leaf blade and its stalk are longer, sometimes exceeding 6 feet, and the leaves are rather widely spaced along the pseudostem. The bunch is long and may carry up to 15 hands which are fairly widely spaced. The degree of taper in the bunch is less than in Cavendish and the fruit grading is therefore more even. The plant will usually tolerate somewhat poorer soils than Cavendish and possesses the additional advantage that it is not nearly so liable to "choke throat", although this may occur under extremely unfavourable conditions.

Perhaps the greatest defect of the Mons Mari is its height, for the rather slender pseudostem is usually incapable of supporting the comparatively large bunch unless the latter is efficiently propped. Even then, if heavy winds are experienced the bunch may be lost as a result of the buckling of the pseudostem between the ground and the point of support.

WILLIAM'S HYBRID.

As mentioned above, a distinction between the William's Hybrid mutant and Mons Mari is very difficult to establish. As a general rule growers tend to differentiate the two by means of characters such as height of pseudostem, angle of leaf stalk, shape of the bunch stalk, whether or not the bracts and male flowers remain adhering to the stalk as in Cavendish, and curvature of the fruit. Such characters are often very variable and identification based strictly upon them could be misleading. Hence a grower may, in good faith, sell planting material from stools which he believes to be William's Hybrid but which are not actually distinct from Mons Mari. As a result, a large number of plantations of one mutant may be known under the name of the other, and plantations exist which are a mixture of the two.

In the plantings which have been checked to date, the normal range of variability within the Mons Mari is similar to that in the William's Hybrid and no evidence has been obtained to support the view that they are distinct mutants. Actually most Mons Mari plantations are made up of a mixture of at least two distinct mutants and a similar state of affairs exists in the so-called William's Hybrid plantations.

LACATAN.

The Lacatan is the tallest member of the Cavendish group known at present and like the Mons Mari

Plate 3.

The Lakatan: The tallest of the mutants from Cavendish.

probably arose as a mutant from the Dwarf Cavendish. This is borne out by the fact that single plants have been observed on a few occasions in plantations of Dwarf Cavendish.

The pseudostem of Lacatan is usually appreciably taller than that of Mons Mari and the plant is more liable to wind damage and more difficult to prop. The leaves are considerably longer, somewhat narrower, and are fairly widely spaced along the pseudostem. It has not as yet been observed to exhibit "choke-throat". The general appearance of the plant is very similar to that of Mons Mari but the bunch is usually smaller, while the individual fingers are often larger. Like other members of the Cavendish group, it is highly resistant to Panama disease. Fruit quality is slightly inferior to that of the shorter Cavendish mutants.

During the war years, plantings of Lacatan in the West Indies expanded considerably and shipments of the fruit are being placed on the British markets. This fruit has largely replaced the Gros Michel variety, plantations of the latter having been reduced considerably by the ravages of Panama disease. At the present time, however, it is apparently considered in the West Indies that the shorter Cavendish mutants, such as our Mons Mari, are preferable from a commercial point of view since there is a tendency for Lacatan to be displaced in their favour.

Complete information as to the performance of Lacatan under southern Queensland conditions is not available yet but there does not appear to be any justification for its adoption as a commercial variety so long as the Mons Mari is available.

APPROVED STRAWBERRY RUNNERS.

Strawberry crops grown by 11 southern Queensland farmers have complied with the standards prescribed under the Strawberry Runner Approval Scheme, 1954-55. Runners from these crops may be sold during the 1955 season as "Planting Material Approved by the Department of Agriculture and Stock".

The growers, all of whom produce the Phenomenal variety, are: G. A. Armstrong, Old Bowling Green Road, Palmwoods; H. G. Holden, Old Woombye Road, Palmwoods; A. M. and T. B. Ishoy, Mt. Ninderry, via Yandina; D. E. Lacey, Palmwoods; W. G. Muller, Woombye; W. J. C. and E. Stone, Yandina; E. Brockhurst, Radford Road, Manly; A. Fels, Underwood Road, Eight Mile Plains; A. F. Jones, Beenleigh Road, Sunnybank; E. H. Lambley, Badgen Road, Birkdale; and A. J. Wicks, Kensington, Logan Road, Upper Mount Gravatt.

Varietal Trends in the Tomato Crop at Bowen.

By E. F. TREE, Adviser in Horticulture.

The Bowen district has supplied tomatoes to the Sydney market ever since regular transport was first organised, and consignments by sea reached an impressive figure before southern centres were linked with the North by rail. At that time, however, communications were far from satisfactory. Fast fruit trains have put the industry on a better basis and tomatoes now arrive on the Sydney market six to eight days after loading at Bowen.

The crop is grown during the dry winter and early spring months. Irrigation is essential and presents no difficulties, for adequate supplies of water are available in the sands underlying the clay-loam soils near the Don River. The climate is mild with an almost complete absence of frost. Harvesting extends from May to mid-October, when production in most other districts is light owing to low temperatures or dry conditions. The annual crop is in the vicinity of 500,000 half-bushel cases.

Production methods are rather different from those practised elsewhere in the State and the main commercial variety is more or less peculiar to the district.

Plate 1.

Bowen Globe Tomatoes. Note the wide ground cover.

Bowen Globe.

The best known variety in the Bowen district is the Bowen Globe, the origin of which is rather obscure. It appears that, at one time, Livingstone Globe and Buckeye State were both well established varieties in the area and that the modern Bowen Globe has been derived by selection from natural crosses between these two varieties.

The selection from these hybrid types was continued for a number of generations on individual farms by several growers, each of whom had his own standards for plant type, fruit shape and various other characters. Modern strains of the Bowen Globe differ a great deal from each other and an improvement in district yields could be achieved if only the better strains were used by growers in the area.

The Bowen Globe is typically grown as a ground crop and has a large, sprawling bush which, under favourable conditions, will cover 100 square feet. The fruit shape is irregular; the colour is pale green in the immature fruit and pink in the ripe fruit.

A somewhat similar variety known locally as Lady Cunningham has some adherents in the district. It has been derived by Mr. Wallace, apparently from a cross between Bowen Globe and Marglobe. The bush has an open habit of growth but is more compact than that of Bowen Globe and the ripe fruit is reddish-pink rather than pink in colour. The developing fruit appears to be less susceptible to sunburn than that of Bowen Globe.

Q 3.

Growers have, from time to time, tried varieties grown commercially in other parts of Australia. Although some of these possessed attractive characters, none of them has replaced Bowen Globe, which still remains the dominant variety in spite of its admitted defects. The first sign of any change in grower preference followed varietal trials begun in 1947, when certified "Q" varieties produced at Stanthorpe were introduced into the district.

Of the four certified varieties, Q3 has perhaps the most significance for the future of the tomato industry in the Bowen district. When grown on a heavy clay loam in the Dry Tropics it develops a dense bush which gives a good ground cover if the plants are spaced 4–5 ft. apart in the row. The dense foliage is a disadvantage in early plantings made during the latter part of the wet season, when fungicides have to be used for disease control. Later in the season, however, when fungous diseases are less troublesome, the shade over the main leaders and the base of the plant is an advantage. The fruit has excellent colour in both the green-mature and fully ripe stages and its appearance on the Sydney market after the train journey from Bowen is much superior to that of the Bowen Globe.

Q3 has proved useful in May and June plantings for crops which are to be harvested from September onwards. At that time of the year temperatures are rising and fruit wastage is considerable in varieties such as the Bowen Globe which have an open habit of growth.

Other Varieties.

Shortly after the introduction of new varieties to Bowen, a natural cross between a selection from which Q3 was derived and Bowen Globe was noted by an up-river grower, Mr. Pott. It was a large, vigorous plant of the Bowen Globe type but carried fruit with the typical characters of Q3. Such a cross was of considerable interest, for some of the progeny could conceivably combine the vigour, disease resistance and yield potential of the Bowen Globe with the fruit quality of Q3. Selections have been made within the progeny for about five years and some of the better strains are now reasonably uniform. They are being tested in quantitative trials.

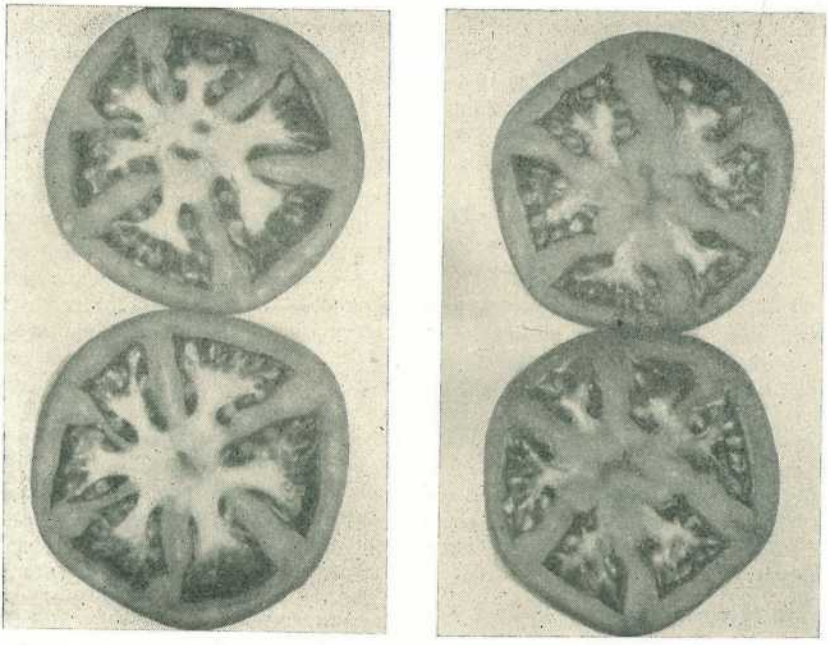


Plate 2.

Internal Fruit Quality of Important Bowen Varieties. Left, Bowen Globe —note thin septa, whitish core and cavities under the skin, all of which are undesirable characters. Right, Bowen Globe X Q3 Selection.

In 1951, a commercial variety known as Cavalier was introduced to Bowen. It had a rather open habit of growth and its field performance was far from good. However, grower selections within the variety produced one or two strains with some characteristics of interest to the district, and these are now being grown on an ever increasing scale. They are quite unlike the standard Cavalier—the bush is compact and dark-foliaged but the fruit type, although it tends to become flattened at the blossom end under stress conditions, has excellent internal quality and carries well.

The Future.

The Bowen Globe has certain characteristics which are peculiarly suited to local conditions. It has been developed by farmers who, each year, select "seed plants" which appear to suit the requirements of their own soil, climate and marketing conditions. Its greatest merits are a long cropping period and the ability to tolerate a fair amount of Fusarium infection. The fact that no introduced variety has so far superseded Bowen Globe leaves no doubt that, in the past, yield and plant vigour have been more important criteria of a variety for the district than fruit quality.

Marketing conditions have now become more competitive and fruit quality may assume greater importance in the future than has been the case in the past. In order to compete with southern producers, Bowen growers must put up an attractive pack. Varieties with the fruit characters of Q3, selections from Cavalier and selections from the natural cross between Bowen Globe and Q3, may give the industry a greater measure of stability than it has had in the past.

Brucellosis-Tested Swine Herds.

A herd listed by the Department as "brucellosis tested" is one in which all such animals as may be determined by the Director of the Department's Division of Animal Industry have been subjected to two successive tests for brucellosis, at intervals determined by him, without any positive reactors being found. A semi-annual or annual re-test of the herd, as determined by the Director, is required.

TESTED HERDS (As at 31st December, 1954).

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
G. Handley, "Handleigh" Stud, Murphy's Creek
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
E. Pukallus, "Plainby" Stud, Crow's Nest
G. C. Traves, "Wynwood" Stud, Oakey
E. Tumbridge, "Bidwell" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
M. K. Collins, "Kennington Stud, Underwood Road, Eight Mile Plains
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Cryna" Stud, Beaudesert
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, "Alstonvilla," Wolvi, *via* Gympie
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
J. H. N. Stoodley, "Stoodville," Ormiston
H.M. State Farm, Numinbah
V. G. M. and A. G. Brown, "Burdell," Goovigen
R. H. Coller, Tallegalla, M.S. 292, Marburg
R. E. Paulsen, "Crest" Stud, Binjour Plateau, M.S. 670, Gayndah
M. G. and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfeld" Stud, Taylor
Dr. B. J. Butcher and A. J. Parnwell, "Hartley Grange" Stud, 684 Logan road, Greenslopes
C. E. Edwards, "Spring Valley" Stud, Kingaroy
G. J. McLennan, "Murcott" Stud, Willowvale
H. M. Wyatte, "Deepwater" Stud, Rocky Creek, Yarraman
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
R. J. Webber, "Webberberry" Stud, 35 Caxton st., Petrie Terrace
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
The Marsden Home for Boys, Kallangur
M. F. Callaghan, Lower Mount Walker, *via* Rosewood
J. B. Lotz, M.S. 794, Kalbar
E. J. Clarke, "Kaloon," Templin, *via* Boonah
K. B. Jones, "Cefn" Stud, Clifton

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
K. B. Jones, "Cefn" Stud, Pilton
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale *via* Rosewood
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
K. A. Hancock, "Laurestonvale" Stud, Murgon
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
M. D. Power, "Ballinasloe" Stud, Swan Creek, *via* Warwick
H. L. Larsen, "Oakway," Kingaroy
C. Wharton, "Central Burnett" Stud, Gayndah
Mrs. I. G. Utting, "White Lodge," Mountain road, Cooroy
N. E. Meyers, Halpine Plantation, Kallangur
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. I. Skyring, "Bellwood" Stud, *via* Pomona
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Miss G. R. Charity, Coondoo, Kin Kin.
W. J. Blakeney, "Talgai" Stud, Clifton
O. B. Vidler, Manneum, Kingaroy
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur.

Tamworth.

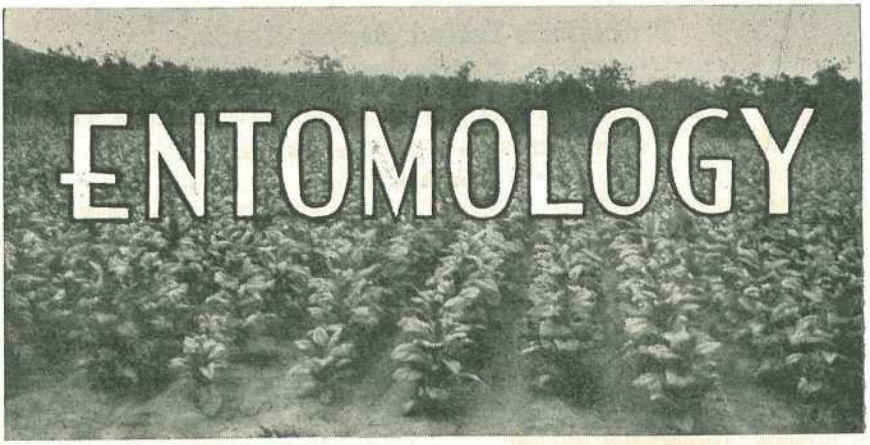
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
A. J. Surman, "Namrus" Stud, Noble road, Goodna
Department of Agriculture and Stock, Regional Experiment Station, Kairi
E. C. Phillips, "Sunny View," M.S. 90, Kingaroy
F. N. Hales, Kerry Road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. A. Herbst, "Hillbanside" Stud, Bahr Scrub *via* Beenleigh
H.M. State Farm, Numinbah
D. B. Alexander, "Debreczen" Stud, Kinleymore *via* Murgon
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. H. Sattler, Landsborough
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
D. and P. V. Campbell, "Lawn Hill" Stud, Lamington
H. J. Armstrong, Alhambra," Crownthorpe, Murgon
Q.A.H.S. and College, Lawes
R. H. Coller, Tallegalla, M.S. 292, Marburg

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
D. Kay and P. Hunting, "Kazan" Stud, Goodna
J. M. and B. N. Gleeson, "Iona Vale" Stud, Kuraby
C. R. Smith, "Belton Park" Stud, Nara
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trout road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
A. Curd, "Kilrock" Stud, Box 35, Jandowae
W. R. Dean, "Trelawn," Tandur, *via* Gympie
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
J. E. Heath, "Springlea" Stud, Murgon
Mrs. R. A. Melville, "Wattledale Stud," Beenleigh road, Sunnybank
A. J. Stewart "Springbrook," Pie Creek Rd., Gympie
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur.

British Large Black.

H. W. Naumann, "Parkdale" Stud, Kalbar



White Wax Scale on Citrus.

By T. MANEFIELD, Asst. Entomologist, Entomology Section.

In recent years white wax scale (*Ceroplastes destructor* Newst.) has become the major scale insect pest of citrus in coastal districts of southern Queensland, and has caused some concern in inland areas during years of excessive rainfall. It also occurs on a wide variety of other introduced and native shrubs and trees.

An unsightly black desposit on the foliage, twigs and fruit is constantly associated with the insect. This deposit, known as "sooty mould", is composed of the massed threads of a number of fungi which are not parasitic on the plant but grow in the sugary secretion or honey-dew produced by the scale insect. The presence of the mould on fruit is one of the main reasons why control of this pest is necessary.

Habits and Life History.

Each stage of the insect secretes a protective white waxy material, which in the adult stage froms a globular covering up to a quarter of an inch in length, the covering becoming slightly grey with age.

The newly hatched larvae are free-moving but soon settle on young twigs and leaves, those on the leaves falling off after a short time. They secrete a wax covering fringed with rectangular projections. Further wax produced over the body becomes conical, then globular, later extending outwards over the fringe when the adult shape is assumed. With heavy infestations and fusion of the wax, the outlines of individual scales are lost, the twigs becoming covered with an irregular coat of wax (Plate 1).

At maturity the insect body is full of eggs. These are laid into the space beneath the insect, the body wall and wax providing a protective covering until hatching. Life history studies have shown that there is a prolonged major hatch commencing in September and carrying through until early January, with a peak between late November and early December. Minor hatchings, however, have been recorded at other times of the year except late summer.

Control.

The best method for preventing the development of sooty mould is to eradicate the white wax scale.

Timing of spray application and complete coverage are two essentials for the successful control of this insect. For timing, the grower should become familiar with the appearance of the egg-laying adults (Plate 2). Before the eggs are hatched the under surface has a pink sandy appearance, the sandy particles being the eggs. After hatching, the body wall darkens to brown, and the cavity left is partly filled with empty shells which

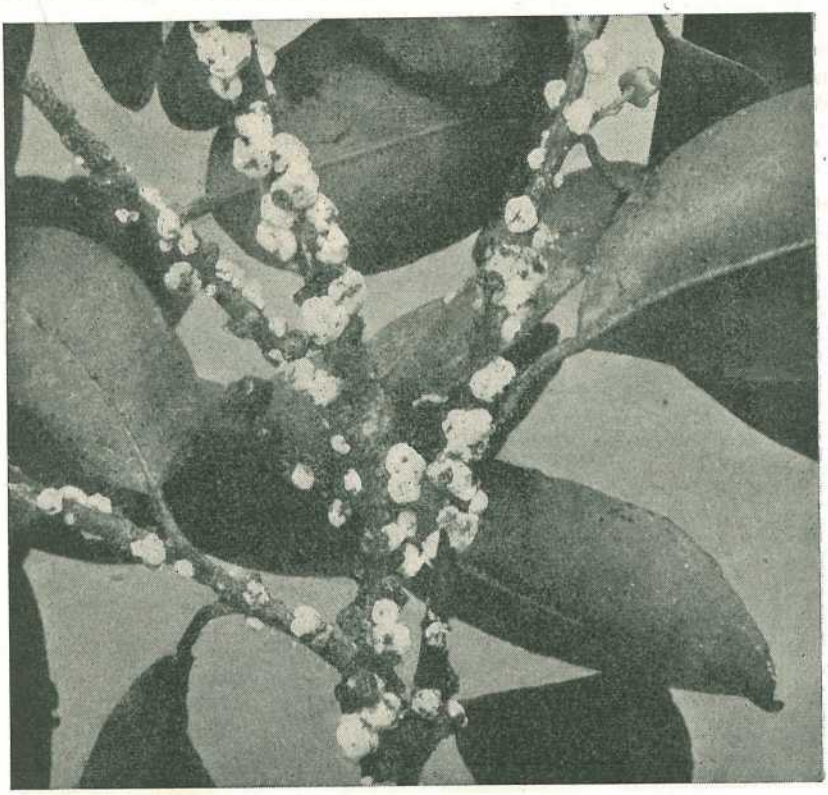


Plate 1.

White Wax Scale and Sooty Mould on Citrus. The sooty mould consists of massed threads of fungi which live on the honey-dew secreted by the scale insects.

resemble white webbing. Spraying should take place when most of the adults are in the latter condition, generally in *early December*.

In *coastal districts* trees should be sprayed with the following mixture—

20 lb. washing soda (or 7½ lb. soda ash)

1½ pints detergent* (34-40% active ingredients)

100 gallons water.

In *inland areas* control is rarely necessary, as the normal high summer temperature and low humidity cause the wax to melt, thus effecting a natural control. If control measures are necessary, however, an oil-soap-soda mixture may be used as a dual-purpose treatment, replacing the oil spray for red scale (*Aonidiella aurantii* Mask.) control in *early December*. The mixture is as follows:—

12-14 lb. washing soda (or 5 lb. soda ash)

8 lb. soap

2 gallons white oil

100 gallons water.

Where double spraying is used for red scale control, the oil strength in this mixture should be reduced to 1 in 60, and the follow-up oil spray, also at 1 in 60, applied normally a fortnight later.

This mixture with the 1 in 60 oil strength can be used also in *coastal districts* when both white wax and hard scales are present in numbers sufficient to warrant the application of control measures.

* The detergent used in successful Departmental experiments against white wax scale contained 34 per cent. sodium secondary alkyl sulphate.

For the home gardener, mechanical treatment such as brushing gives a quick and efficient control of this pest on small trees.

Cleaning the Fruit.

Should it be necessary to remove sooty mould from fruit, this may be done efficiently in the packing shed by the use of one of the modern detergents. The fruit should be dipped in a 1 in 2,000 solution, brushed, and then allowed to dry well before being packed.

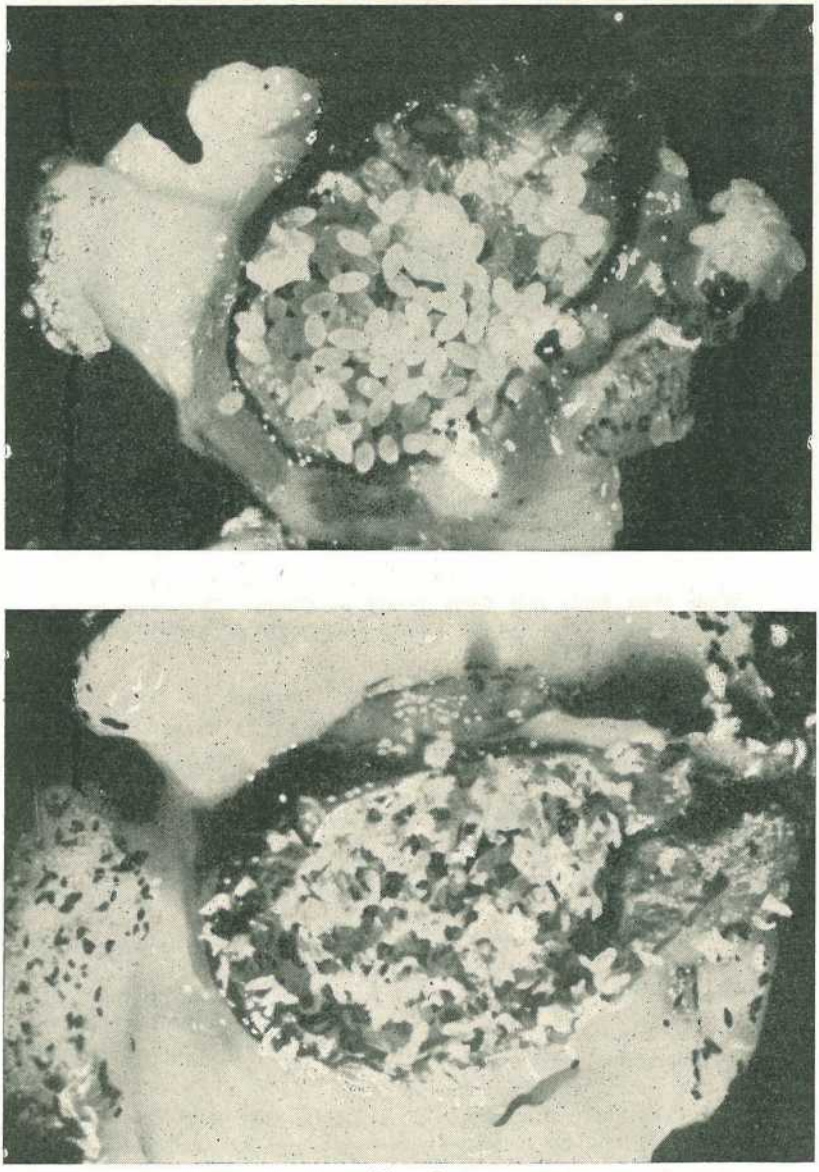
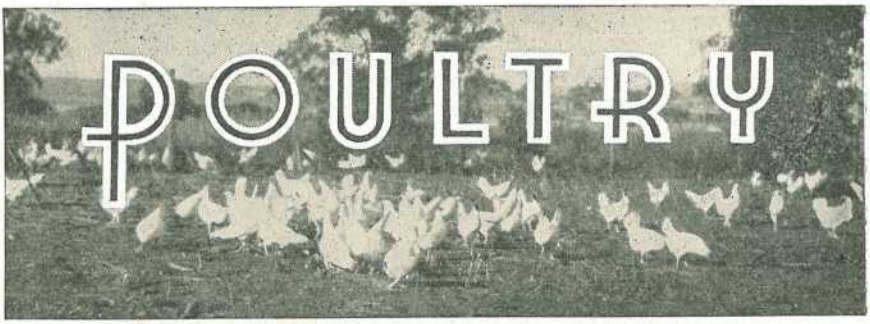


Plate 2.

Guide to Spraying Time. The top picture shows the underside (magnified) of an adult scale insect with unhatched eggs. After the eggs hatch, the empty shells form a webbing as shown in the lower picture (also magnified). The tree should be sprayed when most of the scales are showing the webbing of empty shells, usually in December.



The Egg and You.*

By P. RUMBALL, Officer-in-Charge, Poultry Branch.

Science in its service to mankind has made somewhat a slave of the poor old hen. She is not given an eight-hour day nor a five-day week and it's a safe bet that science won't be satisfied until we have a hen that gives us an egg a day.

Naturally she is not doing this of her own free will. We have had to help by giving her somewhat better housing than she would have in her natural state and a ready supply of food containing all the essentials for sustained production.

What does she give us in return? Most would say an egg. I think, however, that her effort is worthy of a little more detail than that. She has converted bulky raw materials to fats and proteins of a high biological value together with a wide range of vitamins and minerals and packed them in a container well suited for distribution to members of any household.

She failed to do one thing of importance, however, and that was to brand her eggs "perishable". This could be responsible for the failure of some of those people through whose hands eggs pass to appreciate the perishable nature of eggs, which results in the loss of quality and the all-too-frequent complaints.

Egg quality does not rest entirely with the farmer. His is an important job. His work can be perfect but it can be destroyed by both the storekeeper and the consumer.

Although the quality of eggs may vary from bird to bird, most hens receiving an adequate ration will produce an egg of that quality readily acceptable to the consumer, and it only rests with all those persons handling eggs to treat them in a manner that will preserve the required quality.

Producers realize that the consumer is the final judge of quality. He judges an egg when it is broken out in a pan or a dish. He expects the yolk and the thick white of the egg to stand up well, and the thin white to spread over a very limited area. The producer also realizes that the consumer likes to see some colour in the yolk.

There are many conditions that bring about loss of these desired qualities. Continued high temperature is one. It is common on the farm, in the store and in the home, and can be classed as enemy number one.

Heat Affects Quality.

Continued high temperature causes the white of the egg to break down and become watery. The white of an egg has a greater moisture content than the yolk, and when a breakdown occurs, moisture passes from the white to the yolk, enlarging the yolk and weakening the membrane enclosing it.

* An A.B.C. "Country Hour" talk.

When the egg is broken out the yolk has a flattened appearance and the white spreads over a large area.

Farmers, generally, appreciate the adverse effect of heat upon egg quality, and do all in their power to prevent the loss of quality due to that cause. Eggs are gathered at frequent intervals, up to three times a day, to prevent their being re-heated by visits of other birds to the nests, which are placed in the coolest parts of the shed. Wire baskets which permit of a free circulation of air, and rapid cooling, are used to gather the eggs.

Eggs are stored in a cool place on the farm and consigned to market two or three times a week. Unfortunately, there are some farmers who are rather indifferent in this direction, and by their actions are doing the industry a disservice.

Dry Air Harmful.

There is probably one point not appreciated by many farmers and that is the loss of the moisture content of the egg. As the egg ages the air cell increases in size, due to the evaporation of moisture through the pores of the shell of the egg. Too frequently eggs are exposed to a current of dry air with the object of cooling them off.

This loss of moisture can be reduced by keeping the room in which eggs are stored at a relative humidity of 70%. Humidity in the room in which they are stored can be maintained by having wet sand upon the floor, or when eggs are placed in a current of air to hasten the loss of animal heat by seeing that the air is kept moist by passing it through a piece of wet hessian.

Clean Eggs.

The appearance and attractiveness of an article goes a long way in assisting sales. Producers are aware of this and make a point of thoroughly cleaning the eggs before packing. Unfortunately, many don't appreciate the dangers that lurk in a soiled cloth or a dirty egg-washing machine, nor how easy it is for bacteria which cause "rots" to gain entrance through the shell to the egg content.

A fresh-laid egg that is perfectly clean is normally free of any infective agent. It has an outside coating on the shell, commonly referred to as the "bloom," and so long as the egg is kept dry this coating is sufficient protection against harmful organisms gaining entrance. Washing removes this protective coating.

Egg cleaning is time-consuming. It is a job that has to be done daily. How can we reduce this labour and expose a smaller percentage of eggs to the risk of infection?

There are many types of nests and many types of houses in which poultry are kept. Probably the type of poultry shed is as varied as the dwellings of the farmers engaged in poultry raising. The farmer's wife prevents the soiling of her floors with dirty feet by the use of boot scrapers and mats placed at the entrance to the house. The farmer must protect his nest boxes and the eggs that may be in them from being soiled by the feet of the fowl. It is not suggested that he put down scrapers and mats for them, but he can achieve the same results by having an area in front of his nests covered by clean dry litter through which the fowls have to pass to gain access to the nests.

Marketing.

From the farmer the egg passes through his marketing organisation, the Egg Board. Here every individual egg is passed over an intense light in order to classify it with respect to internal quality. All this care is exercised to assure that the consumer is enabled to purchase quality eggs.

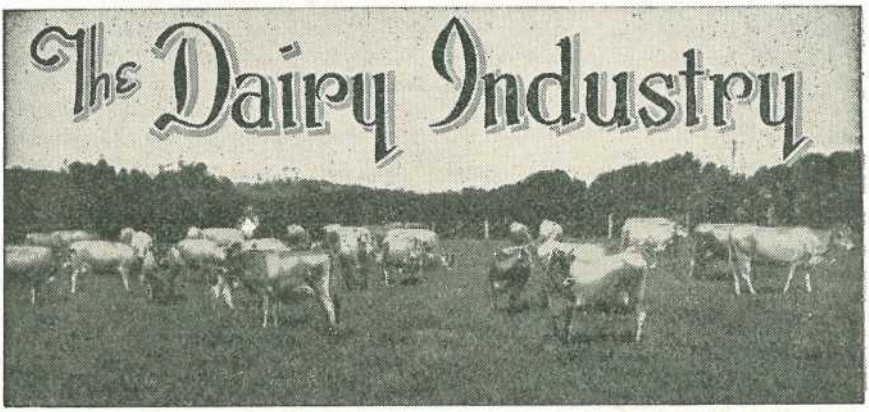
There are limits today as to action that the retailers can take to prevent loss of quality. The first thing that he must understand is that the egg is perishable, and that heat, dry winds and age cause loss in quality. If these facts are appreciated by him, he

would purchase his eggs at least twice weekly. He would not put them for display purposes in a window where they are exposed to the sun during the major portion of the daylight hours.

There is another point also. Eggs pick up taints very readily, and consequently should not be kept in close proximity to any strong-smelling goods.

Consumer complaints with respect to egg quality are not uncommon. Do they ever realize the perishable nature of the egg? I am afraid that many think that because it is encased in a shell and because with age it doesn't smell like a sausage would if kept under the same conditions, it is sufficient for it to rest in a dish in the kitchen. The egg should receive the same consideration as meats and butter; their place is in the refrigerator.

Because only one or two of a dozen eggs may become inedible through lack of care, the householder often is not greatly concerned. But he should bear in mind that eggs cost about 2s. 10d. per pound, and although this is not as much as paid for some meats and other perishable foodstuffs, it is sufficient to justify the egg receiving the same attention as those foodstuffs that are obviously perishable.



The Official Australian Pure Bred Dairy Cattle Production Recording Scheme.

By Officers of the Division of Dairying.

The revision of the rules governing the official schemes for the production recording of registered pure bred dairy cattle conducted by State Departments of Agriculture has been considered by a meeting of interstate dairy officers and action is being taken in the various States to implement the recommendations of the Conference with a view to achieving uniform rules.

Action has now been taken to amend the rules governing the scheme in Queensland and the new rules will become effective from 1st July, 1955.

The main alterations to the rules deal with:—

(*a*) Recording of all cows.

(*b*) Extension of the lactation period from 273 to 300 days.

(*c*) A revised set of age-production standards.

(*d*) The deletion of the supervised strip-out and the institution of a system of check-testing.

It is not proposed to force the owner to record all cows as soon as the new rules become effective, but to increase the numbers progressively until in three years all registered pure bred cows must be entered by stud breeders who record their herds. During the period July 1, 1955, to June 30, 1956, all registered pure bred cows under the age of four years at the time of calving will be recorded. The following year all cows under the age of five years must be submitted, and thereafter all cows.

The revised rules are set out hereunder.

General.

1. This scheme shall be known as the Official Australian Pure Bred Dairy Cattle Production Recording Scheme.

Official Year.

2. The official year shall commence on the first day of July and end on the thirtieth day of June.

Application for Recording.

3. The owner of any herd of registered pure bred dairy cattle wishing to have his herd recorded shall apply for entry of his herd and shall pay the prescribed fees.

Herds Eligible for Recording.

4. (*a*) Where a herd is composed entirely of registered pure bred animals, there shall be at least five "A" class cows (vide rule 5 (*b*)) before the herd will be accepted for recording.

(*b*) Where a herd is composed of registered pure bred and grade animals, the owner shall be required to enter the whole herd for recording. The registered pure bred animals shall be recorded under the Official Scheme and the remaining animals under the Group Herd Recording Scheme. The recording of all cows in the herd shall be carried out by the Recording Officer at each visit. The herd shall consist of at least ten cows.

Cows Eligible for Recording.

5. (*a*) Only those cows will be accepted for test which are registered or are eligible for registration in a recognised Herd Book or Pure Stock Register.

(*b*) During the period from the 1st July, 1955, to the 30th June, 1956, all cows in the herd under the age of 4 years at the time of calving shall be recorded. The owner may record any cows over the age of 4 years at the time of calving.

During the period from 1st July, 1956, to 30th June, 1957, all cows in the herd under the age of 5 years at the time of calving shall be recorded. The owner may record any cows over the age of 5 years at the time of calving.

After the 30th June, 1957, all cows in the herd shall be recorded annually. Such cows will be classified on the receipt of entry forms or at the commencement of the first test as follows:—

(*a*) "A" class cows,

(*b*) "B" class cows.

The following cows may, with the approval of the Director of Dairying, be classified as "B" class—all other cows shall be classified as "A" class cows.

(i.) Cows which have aborted.

(ii.) Sick cows; such cows automatically become "A" class if they produce 150 lb. butterfat in the first six months of their lactation period.

(iii.) Strippers. A stripper is defined:—

(*a*) In herds entering test for the first time, a cow which has calved more than 120 days prior to the first test;

(*b*) In herds continuing in test, a cow which has already completed a full lactation period in the preceding year and has not again freshened.

(iv.) Nominated cows. A nominated cow is one which has calved normally but which, on entry to test, is nominated for culling. If such cows are not disposed of at the time of their sixth test, or six months after the date of calving, they will automatically become "A" class.

(v.) Heifers which calve under the age of one year and 6 months.

(vi.) Cows over ten years of age which have been recorded for at least four lactation periods.

(vii.) Application for cows to be entered as "B" class cows must be accompanied by full particulars of these cows and the reasons for the application.

The records of yields of "B" class cows will not be published or used in calculating averages either for the herd or for the scheme as a whole.

Herd Inventory.

6. The owner shall supply to the Director of Dairying when first entering cows for recording, and on the 1st July in each subsequent year, an inventory of all pure bred animals on his farm.

The Director of Dairying may allow an owner whose cows were recorded the preceding year to submit a supplementary list showing additions to and withdrawals from the herd during the preceding recording year instead of a full inventory of the cows in the herd.

Herd Ownership.

7. When a breeder owns more than one herd on separate farms each herd shall be considered and recorded as a separate herd. Any cow commencing her record on one farm shall be credited to the herd on that property though she may complete her record on another property of the same owner.

Identification of Cows.

8. The recorder shall record the identification number and markings of each animal on an approved form prepared for the purpose by the Department of Agriculture and Stock. He shall satisfy himself as to the identity of each animal. If the cow is not marked according to the records of the particular breed society, or the markings are indistinct, the recorder shall report the fact to the Director of Dairying, who will report to the society, and the matter will then become an issue between the society and the owner. Pending finality the cow will be recorded but no figures of production will be published.

Fees.

9. (*a*) Each herd owner shall pay to the Department of Agriculture and Stock on entry of his herd and annually thereafter a herd entry fee of £2, together with a fee of 12s. 6d. per cow renewable at each lactation for all "A" class cows.

The owner shall be exempted from paying fees for all "B" class cows.

(*b*) On the withdrawal of the herd, the recording of all cows shall cease.

Period of Official Test.

10. The official lactation period shall be 300 days. This may be extended to 360 days on application by the owner. Such application must be submitted to the Director of Dairying not later than one month prior to the expiration of the 300 days period.

The official lactation period shall commence five clear days after calving. The first five days' yield after calving shall not be included in the recording period.

Computing Official Records.

11. The yield for the official lactation period shall be calculated as follows:—

(*a*) The lactation period shall consist, in the case of the 300 days record, of ten sub-periods each of thirty days; in the case of the 360 day record, it shall consist of twelve sub-periods each of thirty days. In the case of cows not completing in full the required number of sub-periods, the lactation shall be concluded with the sub-period of the last recording.

(*b*) The cows shall be recorded once in each sub-period at approximately equal intervals of time.

(*c*) The official yield shall be the sum of the yields of each sub-period.

(*d*) The yield for each sub-period shall be calculated as follows:—

The milk yield shall be the amount (lb.) of milk yielded over the 24 hours test multiplied by thirty.

The butterfat yield shall be the amount of butterfat (lb.) calculated from the weight (lb.) and butterfat percentage of the same 24 hours milk yield multiplied by thirty.

12. The recordings shall be carried out as far as possible at intervals of thirty days (vide rule 11 (*b*)). In the event of it not being possible so to do, the recordings may be carried out not more than 35 days nor less than 25 days after the preceding recording, and if this is not practicable, the calculations for the sub-period under record shall be averaged as in the case of an abnormal recording (vide rule 13).

Averaging Abnormal Records.

13. In the case of a cow appearing to be sick or recording abnormally, i.e., more than 25 per cent. above or below the average of the proximate and succeeding recordings, such recordings may not be registered, but an average may be made from the proximate and succeeding recordings. The same course shall also be followed in the case of a cow whose sample is, or has become, unavailable for correct testing. Any such sickness shall be reported to the Department by the official recorder. Where the first test is abnormal, or the sample is or has become unavailable, the yield for the first sub-period shall be taken as the same as the yield recorded for the second sub-period.

Cows First Recorded more than 44 days after Calving.

14. When the first recording of a cow is made between 45 and 120 days after calving, such cow shall be credited with milk and butterfat production as shown hereunder.

No. of days elapsing between calving and first test.	Period of production credited on first test.	No. of records required for 300 days lactation period.	Method of arriving at the tenth sub-period.
45–74	60	9	Treat 9th recording as 10th sub-period
75–120	90	8	Treat 8th recording as 10th sub-period

A similar method shall be used to calculate the production record of a cow completing a 360 day lactation period.

Who Shall be Official Recorders.

15. The official recorder shall be an officer of, or approved by, the Department of Agriculture and Stock.

Testing of Milk Samples.

16. Testing for butterfat of samples of milk taken during recording may be carried out by the recorder on the farm or taken under adequate protection to be tested at an approved centre.

Official Supervision.

17. (*a*) The owner must state at the time of entry, or when requested by the recorder, the hours at which he intends to commence milkings. These times are then to be regarded as the scheduled milking hours, and must not be varied without first giving the Director of Dairying seven days preliminary notice.

(*b*) A check test may be made at any time on any herd or any cow. No prior notice of such check test shall be given to the owner. The Director of Dairying may withhold any test figures.

(*c*) The results of any check test or tests may, at the discretion of the Director of Dairying, be made available to the herd owner.

(*d*) The check test results shall not be used for the purpose of calculating sub-period production except when, in special circumstances, it is considered advisable by the Director of Dairying to substitute the check test results for the ordinary sub-period test results. When the check test results are so substituted, the whole of the results of the check test or tests shall be used and no cow shall be credited with production based on the ordinary sub-period test results.

Daily Weighing and Recording.

18. (*a*) In recording each cow the recorder shall weigh, on officially approved scales, the milk yield at each of the consecutive milkings and record same. After thoroughly mixing such milk the recorder shall take a sample. The milk from each milking may be tested for butterfat as separate units, or a composite sample may be taken of the milkings. No milk weight shall be credited to any cow unless the aggregate of all milkings in the 24 hours totals 4 lb. or over.

(*b*) No cow shall be stripped more than once after each milking during the recording. Where milking machines are used, stripping (if practised) shall be carried out immediately after the machines are removed. Where cows are milked by hand the milking and stripping shall constitute one operation.

(*c*) Where cows are being milked by machines a vacuum bucket shall be used during the period of the recorder's visit.

Number of Milkings Per Day.

19. No cow shall be milked more than twice per day unless she is yielding more than 60 lb. milk or 2½ lb. butterfat per day. In such circumstances, milking three times per day may be permitted only until such time as the yield falls to 50 lb. milk or 2 lb. butterfat per day, when twice per day milking must be practised.

Accommodation of Recorders.

20. Every facility is to be afforded by the herd owner to recorders carrying out their duties in connection with the scheme and accommodation shall be provided overnight if necessary.

Particulars of Date of Calving, Etc.

21. (*a*) Owners must supply on the request of the Director of Dairying particulars as to the date of calving and services, manner of feeding and details as to the class, quantity of food, etc., and any other details regarding the rations fed during the period of the test, and when requested by the Director of Dairying shall allow samples of the different foods used to be taken for analysis.

(*b*) All particulars required by the Director of Dairying shall be made by statutory declaration when deemed necessary.

Issue of Records.

22. (*a*) All calculations shall be made, recorded and published in terms of pounds of milk and butterfat.

(*b*) Records of all "A" class cows submitted to the official recording and completing lactations shall be published, including those that fail to reach the official standard, and cows milked three times per day shall be indicated.

23. The standards for 300 days period upon which certificates shall be issued are as follows:—

Junior 2 year old	..	260 lb. butterfat
Senior 2 year old	..	280 lb. butterfat
Junior 3 year old	..	300 lb. butterfat
Senior 3 year old	..	320 lb. butterfat
Junior 4 year old	..	330 lb. butterfat
Senior 4 year old	..	340 lb. butterfat
Mature cows	..	350 lb. butterfat

"Junior" applies to any animal whose date of freshening falls within the first six months of the age indicated and "Senior" within the second six months.

Cows Which Abort.

24. Any cow which aborts her calf during a lactation period shall be deemed to have completed her current lactation. She shall, however, continue to be recorded as a "B" class cow as provided for in rule 5 (*b*) (i).

Feeding Milk or Cream to Cows.

25. The feeding of whole milk or cream to cows undergoing recording is prohibited as being a wasteful practice. Any records obtained from cows so fed will be disallowed.

Disqualification.

26. Should the owner of any herd entered for recording not conform to these rules, or by any act or improper practice pervert the record of the herd or any cow thereof, such herd shall be subject to disqualification for such period as the Minister may determine.

27. No person who has at any time been a member of the scheme shall have any claim for damages of any nature whatsoever against Her Majesty the Queen, the Government or any officer or employee of the Government for anything done or omitted to be done in connection with the scheme and the recording of any cow.

Interpretation.

28. In all matters relating to recording, the ruling of the Director of Dairying shall be final.

Report on Group Herd Recording for the Year Ended September 30, 1954.

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

During the Group Herd Recording year which ended on September 30, 1954, seasonal conditions for dairying were variable. A dry period from April until October, 1953 affected the production of cows which dried off after October. January and February were very wet and severe floodings occurred in several parts of the State. From March until July, 1954, very little rain fell in the dairying areas.

During the herd recording year there were 55 groups in operation, of which four commenced during the period. Lactations were completed during the year by 41,378 cows in 1,202 herds.

The total number of completed lactations and average production for each year since 1948-49 are given in Table 1.

TABLE 1.

NUMBER OF COMPLETED LACTATIONS AND AVERAGE PRODUCTION PER COW.

Year.	No. of Herds.	No. of Lactations.	Average Production per Cow.		
			Milk. (Lb.)	Test. (%)	Butterfat. (Lb.)
1948–49	507	17,216	3,289	4·3	144
1949–50	715	22,392	3,523	4·3	152
1950–51	814	26,798	3,312	4·4	146
1951–52*	818	23,123	2,657	4·2	112
1952–53	1,073	34,304	3,467	4·3	150
1953–54	1,202	41,378	3,143	4·3	134

* Drought year.

The drop in the average production from 150 lb. butterfat in 1952-53 to 134 lb. in 1953-54 can be attributed to adverse seasonal conditions, and stresses the need for the storage of adequate supplies of fodder.

The growth of herd recording in Queensland since 1948, together with the average production per cow each year, are depicted in graph form in Fig. 1.

Table 2 gives, according to age group, the number of cows which completed lactation periods of 300 days or less and their average production of milk and butterfat. All completed lactations up to 300 days are included. The lactation period of 300 days was introduced on October 1, 1953, to bring the scheme in this State into line with those of other Australian States. Prior to that time the period was 270 days. The extension of the lactation period gives greater prominence to those cows which milk for the longer period.

The comparatively low average production of 134 lb. butterfat is equivalent to approximately 166 lb. commercial butter, the monetary return for which would be £33 per cow.

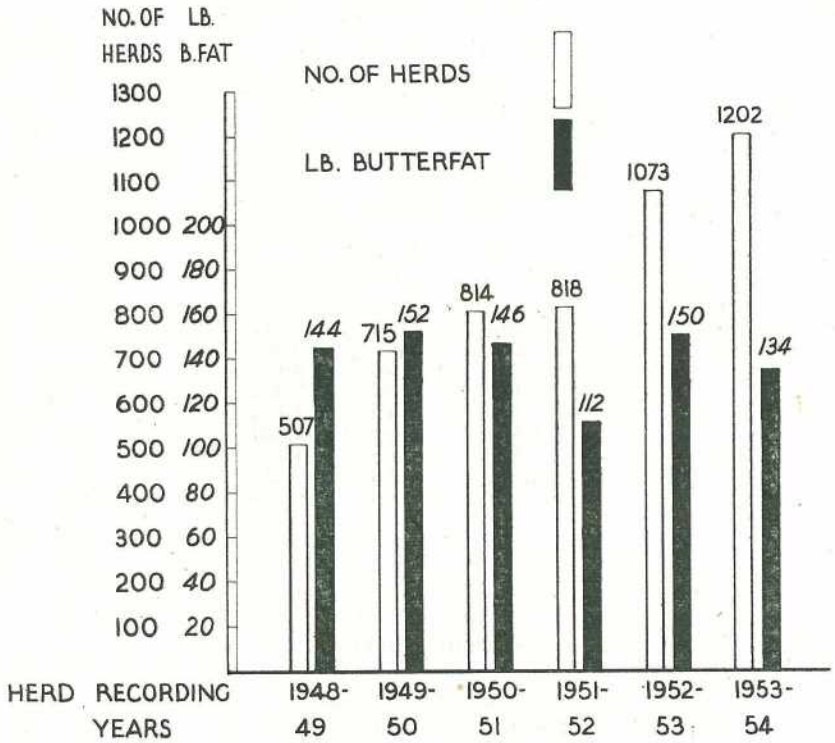


Fig. 1.

Graph Showing Growth of Group Herd Recording Since 1948-49, Also Average Butterfat Production.

As the population of Australia is rapidly increasing, there is sure to be a bigger local consumption of dairy produce. This calls for increased production, as besides supplying the local demand, it is necessary to Australia's national economy to build up overseas credits by a virile export trade. Overseas competition is now forcing down the price of dairy produce and it is becoming more and more necessary to reduce production costs. One method of reducing costs is to increase the production per cow. All cows cost the same for maintenance, and the greater the yield the cheaper the production up to a reasonable stage.

TABLE 2.

Average Production of Cows, According to Age, which Completed Lactation Periods of 300 Days or Less.

Age Group.	No. of Cows.	Average Production per Cow.		
		Milk. (Lb.)	Test. (%)	Butterfat. (Lb.)
2-year-old	5,908	2,778	4·3	121
3-year-old	4,799	2,985	4·3	128
4-year-old	3,944	3,174	4·3	138
Mature	17,379	3,340	4·2	142
Unknown Ages	9,348	3,076	4·2	130
Total	41,378	3,143	4·3	134

The number of cows which milked for various ranges of lactation, together with their average productions, are given in Table 3.

TABLE 3.

NUMBER AND PERCENTAGE OF COWS WHICH MILKED FOR VARIOUS PERIODS.

Length of Lactation (Days).	No. of Cows.	Percentage of Cows.	Average Production.		
			Milk. (Lb.)	Test. (%)	Butterfat. (Lb.)
300	5,461	13·2	4,576	4·4	199
270	6,257	15·1	4,097	4·3	177
240	8,137	19·7	3,625	4·3	155
210	6,881	16·6	3,166	4·2	134
180	5,134	12·4	2,622	4·2	110
150	3,559	8·6	2,122	4·2	89
120	2,512	6·1	1,633	4·2	68
90	1,659	4·0	1,174	4·1	49
60	1,139	2·8	743	4·2	31
30	639	1·5	369	4·3	16

It will be noted that only 13·2% of the cows milked for 10 months, whilst 23·0% milked for less than 6 months.

The 11,718 cows which milked for 270 or 300 days produced an average of 187 lb. butterfat, while cows with a lactation period of less than 270 days averaged 113 lb. Cows with a short lactation thus produced 74 lb. less butterfat than those which milked for at least 270 days. At present prices this is worth approximately £18. This means that 71·7% of cows recorded in Queensland are losing this amount through short lactation periods.

The seriousness of the average short lactation period of cows in this State is one of the most important things revealed by herd recording.

Many of the short lactation periods are caused by the low plane of nutrition to which cows are subjected. Most cows in the State only receive sufficient nutriment to enable them to produce to their capacity for two or three months during the year.

Conservation of fodder, improved pastures and pasture management can help to overcome this shortage and allow the animals to produce to their inherent capacity.

The old adage that "80% of a cow's breeding goes down her throat" is very apt, even though not entirely correct, as obviously no cow will milk at all if she is not fed. It has been found that breeding does play a part in the use made of feed by individual animals, as cows milked under the same conditions vary considerably in their production. By using herd recording information it is possible

to breed from the strains, or cow families, which produce best under local conditions. All dairymen should remember that it is futile to breed cows with a high production potential unless the standard of nutrition is sufficient to allow them to exploit their inherited production capacity.

The average length of completed lactations was 211 days (7 months). This means that on the average each cow loses 3 months' production per year. A cow should milk for 10 months and then have a dry period of 8 weeks prior to re-calving.

The average length of lactation for each year since 1948 is given in Table 4.

TABLE 4.

AVERAGE LENGTH OF COMPLETED LACTATIONS.

Year.	Days.
1948–49	220
1949–50	223
1950–51	203
1951–52	209
1952–53	210
1953–54	211

The average length of lactation in each district for the year 1953-54 is given in Table 5.

TABLE 5.

AVERAGE LENGTH OF LACTATION FOR EACH AGE GROUP, ACCORDING TO DISTRICT.

District.	Length of Lactation. (Days).
Atherton Tableland	235
Central Coast	200
Upper and Central Burnett	189
South Burnett	208
South-eastern Queensland	216
Eastern Downs	211
Western Downs	200
All Queensland	211

It will be noted that the average length of lactation was longest on the Atherton Tableland, with 235 days compared with 231 days last year, the next highest being in South-eastern Queensland, where the average length was 216 days.

Table 6 shows the average production per cow in each of the herd recording groups. The groups are placed according to district.

TABLE 6.

AVERAGE LENGTH OF LACTATION, AVERAGE PRODUCTION PER COW, NUMBER OF HERDS AND NUMBER OF COWS WHICH COMPLETED LACTATIONS FOR THE VARIOUS GROUPS, 1953–54.

District/Group.	Herds.	Cows.	Length of Lactation.	Av. Milk. (Lb.)	Av. Test. (%)	Av. Butter-fat. 1953-54. (Lb.)	Av. Butter-fat. 1952-53. (Lb.)	Av. Butter-fat. 1951-52. (Lb.)
Atherton Tableland—								
Malanda No. 1	25	836	233	4,129	4·0	164	192	162
Malanda No. 2	20	658	238	3,755	3·9	148	159	145
Malanda No. 3	23	710	224	3,602	4·5	156	160	128
Millaa Millaa	25	761	245	3,492	4·4	155	161	153
Mackay—								
Mackay	18	766	201	2,142	4·7	101	124	95
Rockhampton—								
Raglan-Marmor.. ..	21	784	215	2,824	4·2	119	99	..
The Caves	20	622	226	2,731	4·5	123	..	..
Dawson-Callide—								
Biloela	17	436	203	2,732	4·5	123	..	..
Wowan	19	674	156	2,355	4·2	99	..	..
Port Curtis—								
Wallaville	17	519	197	2,579	4·5	115	129	103
Upper Burnett—								
Monto No. 1	23	963	205	3,334	4·0	133	155	127
Monto No. 2	18	521	160	2,364	4·4	104	..	..
Central Burnett—								
Biggenden	22	665	207	3,070	4·3	133	157	114
Mundubbera	23	658	172	2,627	4·2	110	137	91
South Burnett—								
Goomeri	21	773	198	3,180	3·8	121	131	85
Kilkivan	20	731	188	3,168	3·9	125	126	73
Kingaroy No. 1 ..	26	847	229	3,729	4·2	157	142	79
Kingaroy No. 2 ..	25	697	212	3,912	4·0	156	163	118
Nanango..	27	765	224	3,447	4·1	141	147	96
Proston	24	995	203	2,881	4·4	126	104	..
Tansey	24	1,121	203	3,276	4·2	137	147	105
South-eastern Queensland—								
Beaudesert	23	921	222	3,433	3·8	132	160	131
Boonah	22	648	220	3,309	4·2	140	167	124
Cedar Pocket	23	613	218	2,909	5·0	144	191	135
Coomera	20	1,024	214	2,614	4·0	105	127	98
Cooroy No. 1	21	755	212	2,714	4·5	122	132	99
Cooroy No. 2	21	1,026	213	2,954	4·6	135	143	98
Esk No. 1	21	906	218	3,277	4·4	144	151	117
Esk No. 2	23	527	205	3,002	4·3	130	147	..
Gympie No. 1	18	898	219	3,019	4·6	139	148	88
Ipswich	23	575	230	3,481	4·3	150	196	..
Kenilworth	24	542	227	3,389	4·6	156	174	108
Kilcoy	22	963	198	2,787	4·5	124	141	92
Laidley	17	229	150	2,068	4·4	91	..	..
Landsborough-Caboolture	27	942	218	2,751	4·4	121	129	..
Maleny No. 1	24	660	222	3,297	4·8	156	183	138
Maleny No. 2	25	1,057	234	3,246	4·6	151	165	128
Mapleton-Kureelpa ..	20	738	238	3,328	4·5	149	163	119
Maryborough	21	586	186	2,519	4·5	114	105	64
Merrimac-Mudgeeraba ..	19	1,057	202	2,782	4·0	112	130	90
Miva-Theebine	20	1,140	227	2,932	4·9	145	147	90

TABLE 6—*continued.*

AVERAGE LENGTH OF LACTATION, AVERAGE PRODUCTION PER COW, NUMBER OF HERDS AND NUMBER OF COWS WHICH COMPLETED LACTATIONS FOR THE VARIOUS GROUPS, 1953–54—*continued.*

District/Group.	Herds.	Cows.	Length of Lactation.	Av. Milk. (Lb.)	Av. Test. (%)	Av. Butterfat. 1953-54. (Lb.)	Av. Butterfat. 1952-53. (Lb.)	Av. Butterfat. 1951-52. (Lb.)
Mount Tamborine ..	23	642	203	2,508	4·5	114	126	111
Pomona No. 1	28	736	228	2,725	4·4	120	127	93
Pomona No. 2	25	899	204	2,591	4·5	117	118	..
Eastern Downs—								
Crow's Nest	23	557	189	2,826	4·2	118	156	89
Goombungee	19	692	206	3,288	4·1	133	179	91
Oakey	22	853	215	3,711	4·0	150	183	152
Pittsworth	20	603	223	4,732	4·1	195	192	157
Toowoomba	25	597	237	4,406	4·1	179	172	106
Warwick	24	598	192	3,142	4·1	130	190	154
Western Downs—								
Chinchilla No. 1 ..	24	1,014	195	3,258	3·8	125	117	68
Chinchilla No. 2 ..	18	540	184	3,457	4·0	140	..	..
Dalby	22	560	196	3,090	4·1	127	152	..
Jandowae	20	1,058	209	3,615	4·2	153	186	101
Miles	16	695	207	3,649	4·1	148	137	107

The average production per cow according to the main dairying districts is given in Table 7. The highest average production of 156 lb. butterfat was on the Atherton Tableland.

TABLE 7.

AVERAGE PRODUCTION PER COW ACCORDING TO DISTRICT.

District.	No. of Herds.	No. of Cows.	Average Production.		
			Milk. (Lb.)	Test. (%)	Butterfat. (Lb.)
Atherton Tableland ..	93	2,965	3,756	4·2	156
Central Coast	112	3,801	2,544	4·4	112
Upper and Central Burnett	86	2,807	2,926	4·2	122
South Burnett	167	5,929	3,345	4·1	137
South-eastern Queensland	511	18,109	2,957	4·4	131
Eastern Downs	133	3,900	3,687	4·1	151
Western Downs	100	3,867	3,429	4·1	139

The number of cows in the various production ranges is as shown in Table 8.

It will be seen that 12,334 (29·8%) of the cows produced under 100 lb. butterfat, compared with 7,589 (22·1%) in the previous year. This large number and percentage emphasises once again the necessity to maintain adequate supplies of fodder to meet all requirements.

TABLE 8.

NUMBER OF COWS IN VARIOUS PRODUCTION RANGES OF BUTTERFAT.

Ranges of Butterfat (Lb.).	No. of Cows.	Percentage.
Under 100	12,334	29·81
100–149	13,428	32·45
150–199	9,776	23·62
200–249	4,055	9·80
250–299	1,279	3·09
300–349	369	0·89
350–399	111	0·27
400–449	18	0·04
450–499	5	0·01
Over 500	3	0·007

Only 26 cows (0.06%) produced over 400 lb. butterfat, compared with 40 (0·12%) last year.

Table 9 shows the number and percentage of herds in various ranges according to the average production.

TABLE 9.

NUMBER AND PERCENTAGE OF HERDS IN VARIOUS PRODUCTION RANGES.

Butterfat Production Range (Lb.).	No. of Herds.	Percentage of Total Herds.
Under 100	289	24·0
100–149	547	45·5
150–199	282	23·5
200–249	68	5·7
Over 250	16	1·3

Nearly a quarter of the herds averaged under 100 lb. butterfat, compared with 17·6% last year, whilst those averaging 200 lb. or more decreased from 10·1% to 7·0%.

Highest Producing Herds.

The highest producing herds according to the number of cows which completed lactations are as given in Table 10. Herds in which less than 10 cows completed lactations are not included.

The results obtained by these dairymen are an example of what can be attained by sound farming and husbandry methods. Those men had to start with ordinary herds and by applying themselves assiduously and intelligently their efforts have been amply rewarded.

The herd which had the highest average production was that of Mr. G. I. Holmes, Yarranlea, whose herd is in the Pittsworth Herd Recording Group.

TABLE 10.

Highest Producing Herds.

Highest Herd.	Group.	Breed.	No. of Cows.	Average Production.			Av. Lactation. (Days.)
				Milk. (Lb.)	Test. (%)	Butterfat. (Lb.)	
10 to 20 Cows.							
P. W. N. Sippel ..	Esk No. 2 ..	Jersey ..	15	5,725	4·9	281	242
Hastie and Sons..	Malanda No. 3..	Jersey ..	15	5,369	4·7	252	256
K.M. and R. Laws	Malanda No. 1..	A.I.S. ..	20	6,168	3·9	242	248
21 to 50 Cows.							
G. I. Holmes ..	Pittsworth ..	A.I.S. ..	37	7,149	4·1	295	268
R. W. Burrows ..	Kingaroy No. 1	Jersey ..	32	6,108	4·7	287	294
F. Porter ..	Maleny No. 2 ..	Jersey ..	48	4,694	5·9	273	249
51 to 100 Cows.							
A. Bridges ..	Kenilworth ..	Jersey ..	58	4,914	5·2	255	279
R. S. Griffiths ..	Malanda No. 2..	A.I.S. ..	53	6,104	4·0	245	259
W. and E. Adlem	Kingaroy No. 2	A.I.S. ..	52	5,888	4·0	236	234
101 Cows and Over.							
Est. T. T. Curtis	Jandowae ..	Jersey ..	117	4,450	5·5	244	252
Est. W. T. Savage	Toowoomba ..	A.I.S. ..	109	4,509	3·9	176	268
Haselwood Bros.	Jandowae ..	A.I.S. ..	155	4,336	3·9	170	237

This herd of 37 A.I.S. cows averaged 7,149 lb. milk and 295 lb. butterfat and has been recorded for a few years. Purebred sires with production backing have been purchased from the "Yarranvale" A.I.S. Stud. Mr. Holmes' herd is grazed on cultivated crops. He is a firm believer in fodder conservation and carries ample stocks of hay and grain.

Mr. P. W. N. Sippel, Esk No. 2 Herd Recording Group, had a herd of 15 cows which averaged 5,725 lb. milk and 281 lb. butterfat. Last year the herd averaged 291 lb. butterfat from 11 cows. Mr. Sippel has a registered purebred herd of Jerseys and maintains a high standard of nutrition throughout the year. He always keeps an ample reserve of lucerne hay for supplementary feeding, and during the past year he has established an appreciable area of improved pasture.

Mr. A. Bridges, Kenilworth Herd Recording Group, has a purebred Jersey herd. He has culled on production and used production-backed bulls. He practises rotational grazing and supplementary feeding. The improvement since he commenced recording in 1950 is illustrated by the following:—

Year.	Completed Lactations.	Average Production.			
		Milk. (Lb.)	Test. (%)	Butterfat. (Lb.)	Days.
1950–51	38	3,404	5·2	176	197
1951–52	52	3,267	4·7	153	233
1952–53	59	5,030	5·0	252	262
1953–54	58	4,915	5·2	255	279

Est. T. T. Curtis, Jandowae Herd Recording Group, Western Darling Downs, has a Jersey herd of which some are registered in the Herd Book, but the majority are not. He uses herd recording results for selecting breeding stock and for culling purposes, and has been line breeding for a number of years using butterfat test as a means of selection. Prior to joining the Jandowae Herd Recording Group, he tested the herd himself.

Feeding is based on the grazing of cultivated crops. This herd was first recorded in 1952 and the average production since then has been as follows:—

Year.	Completed Lactations.	Average Production.			Days.
		Milk. (Lb.)	Test. (%)	Butterfat. (Lb.)	
1951–52	19	3,190	5·8	185	235
1952–53	108	4,169	5·6	233	242
1953–54	117	4,450	5·5	244	252

Herd recording has been accepted as an integral part of the dairying industry in this State. More and more farmers are realising its value in planning their future programmes. Since July, 1954, 10 new Herd Recording Groups have been commenced and applications have been received for several others.

If the information obtained from herd recording is utilised to its fullest extent, greatly improved production can be expected in the future.

FEEDING EWES ON SILAGE.

A lambing trial in the Muttaburra district this season has indicated that Queensland's lambing losses may be reduced by feeding silage to lambing ewes.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.), who stated this recently, explained that feeding silage to ewes may permit feeding for production rather than just for maintenance during a drought. The real commercial value of feeding sheep may lie in feeding the ewe flock to increase the number of lambs reared each season.

In last season's trial, a group of ewes fed entirely on silage was lambed. The ewes were fed silage for about a month before and during lambing. They ate 4 lb. of silage per head per day, making the feed costs less than ½d. per day each. The silage was made on the property.

The ewes lambed successfully and lambing losses were under 5 per cent. This result is much better than those obtained in lambing trials conducted by the Sheep and Wool Branch of the Department under field conditions where losses have ranged between 11 per cent. and 50 per cent.

Lambing ewes on silage permits mating in autumn which is the time of the year when the fertility of rams and ewes is highest. If a successful lambing is made on silage during spring, when the weather is usually dry, the young lambs can obtain the benefit of the good feed produced by the later, summer rains.

Now that it has been shown that ewes can lamb successfully on silage, it is intended to investigate the organisation required to lamb between 2,000 and 4,000 ewes on a ration of silage under intensive conditions.

Fluorosis of Merino Sheep in Queensland.

Part 3. The Management of Flocks to Overcome Fluorosis.

By J. M. HARVEY (Senior Biochemist) and G. R. MOULE (Director of Sheep Husbandry).

The information presented in the previous sections of this series of articles makes it clear that there is no easy way of overcoming fluorosis. It is too expensive to try to take the excess fluoride out of affected water; you cannot overcome its effects by feeding a supplement.

However, skilful management and making sure that all sheep have access to fluoride-free water when their permanent teeth are developing will assist in preventing the effects of fluorosis.

The systems of management that can be adopted are described in this article. They are based on experiments carried out at the Animal Health Station (now Animal Research Institute), Yeerongpilly, and on field studies on properties where fluorosis occurs.

Let us consider the experimental work first.

DESIGN OF THE EXPERIMENT.

Merino lambs that were three months old when the experiment started were used. They were bred on a property in south-western Queensland where the water is free from fluorine. The lambs' mothers had not watered at bore drains containing fluorided water at any time during their lives. A uniform line of 80 lambs was selected. They were divided into four groups each containing 20 lambs so that each group was quite similar for age, weight and sex. The groups were treated as follows:—

Group 1.—The lambs in this group were given drinking water containing 10 parts per million (p.p.m.) of fluoride during the whole of the experiment.

Group 2.—This group was given drinking water containing 10 p.p.m. for 3 months and then fluoride-free water for 3 months. The water supplies were alternated in this way for the whole of the experiment so that these sheep were on fluoride-free water for the 1st, 2nd, 3rd, 7th, 8th, 9th, 13th, 14th, 15th, 19th, 20th, 21st, 25th, 26th, 27th, 31st, 32nd and 33rd months of their lives. They drank water containing 10 p.p.m. of fluoride during the 4th, 5th, 6th, 10th, 11th, 12th, 16th, 17th, 18th, 22nd, 23rd, 24th, 28th, 29th and 30th months of their lives.

Group 3.—Group 3 was treated similarly to Group 2 except their drinking water contained 10 p.p.m. of fluoride for 6 months and it was fluoride-free for 6 months. The fluorided and fluoride-free waters were alternated as in Group 2.

Group 4.—Group 4 was also given alternate sources of fluorided and fluoride-free waters. However, their drinking water contained 10 p.p.m. of fluoride for 6 months and it was without fluoride for 3 months.

The experiment was continued for 30 months. The sheep were kept in small paddocks and besides natural grazing they were allowed to eat poor quality, grassy lucerne hay. The hay was fed in bales so that the sheep had to tug at it to pull it out.

In designing this trial several facts were taken into consideration.

(1) Any one of the systems of management given to Groups 2, 3 and 4 would be practicable on a large number of properties whose bore waters contained fluoride. Some of these have bores that are free of fluoride; others have fluoride-free surface water in creeks or rivers or they have built earth tanks.

(2) The high level of 10 p.p.m. of fluoride corresponds with badly affected water. Actually, some bores deliver water containing more than 10 p.p.m. Others deliver water containing less than 10 p.p.m. However, the level of fluoride increases as the water flows slowly down the bore drain. During hot weather the water evaporates away, thereby increasing the amount of fluorine remaining in the water at the end of the drain.

(3) By using 3-months-old lambs it was possible to give all groups drinking water containing fluoride just before and just after weaning. It also ensured that the sheep would be receiving fluoride at the time their permanent teeth are forming under the gum. This meant the experimental sheep drank the fluorided water at the most critical time of their lives. Therefore, the alternative systems of management were being tested under most difficult conditions.

(4) The way in which the sheep had to pull the lucerne hay out of the bales put considerable strain upon their teeth. This was probably not more than they would experience under field conditions and it made the feeding habits of the sheep quite like those that occur when they are out grazing.

WHAT WERE THE RESULTS?

The front teeth of all the sheep were examined each month. At the end of the experiment some of the sheep from each group were killed; they were then 33 months of age. Their bones and organs were analysed to see how much fluoride they contained. Here are the results:—

(1) The sheep in Group 1, whose drinking water contained 10 p.p.m. of fluorine for the whole of the time, suffered most. Their teeth were seriously affected and large quantities of fluoride were deposited in their bones.

(2) The sheep in Group 2 suffered the least damage and had the lowest accumulation of fluoride in their bones. This group drank water containing fluoride and water free from fluoride for alternate periods of 3 months. The teeth of only 3 sheep in this group showed signs of damage from fluorosis and the remainder showed a few mild signs of having drunk water containing fluoride.

(3) The sheep in Group 3, the one whose drinking water contained fluoride for 6 months and was free of it for 3 months, suffered almost as much as those in Group 1.

(4) The sheep in Group 4, whose drinking water contained fluorine for six months and was free of it for six months, were not as badly affected as those in Group 1, but they were more seriously affected than those in Group 2.

These findings point to the most appropriate method of managing flocks to prevent fluorosis of sheep in

Queensland. However, you will need a fluorine-free bore or an adequate supply of surface water in creeks or earth tanks to implement any system of management based on these results.

MANAGEMENT FOR PREVENTION.

The greatest care will have to be given to the young sheep from weaning onwards. Mature breeding ewes may drink water containing up to 10 p.p.m. of fluorine without doing any damage to either themselves or their lambs.

However, the lambs will have to be weaned early into a paddock whose water supply is fluoride-free. Alternatively, the ewes and their lambs may be moved into the paddock whose water is free of fluoride. It is preferable to move the sheep before the lambs commence to drink very much water.

It is best to keep the young sheep continuously in paddocks whose water supply is free of fluoride. If you cannot do this they should be moved after three months into paddocks whose water is unaffected. They can be returned to paddocks whose water supply contains fluoride after about three months, but they should not be allowed to drink water containing fluoride for more than three months.

Sheep whose mouths are almost fully developed—that is, those of 30 months of age (6-tooth) or over—will not be affected if they continuously drink water containing as much as 10 p.p.m. of fluoride.

If there is no alternative supply of fluoride-free water on the property it is wiser to keep the young sheep nearer the bore head. This is really only a temporary measure; it is not a substitute for the provision of alternative sources of fluoride-free water. However, keeping young sheep near the bore head means they do not drink water whose fluoride content has increased as the result of evaporation.

Of course in flush seasons the fluoride in bore waters is not so likely to have serious effects on the sheep. There is usually ample surface water then and the sheep get more of the fluids they require from the pasture.

It is important to remember, however, that these measures afford only partial relief. There is no alternative to providing reasonable supplies of fluoride-free water to which the young sheep have access for at least two evenly spaced periods each of three months during each year.

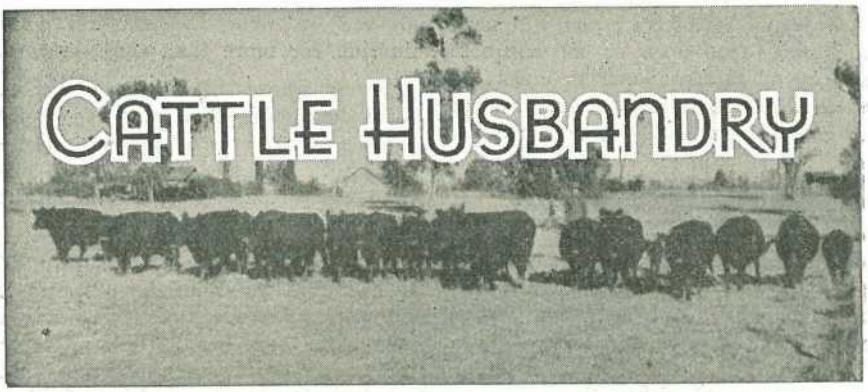
AFRICAN STAR GRASS.

Although beef cattle were not affected by African star grass in two grazing trials in Central Queensland, the grass must still be regarded as a possible source of stock poisoning.

Stating this, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) explained that chemical analyses of the grass in Queensland have shown that it can contain appreciable amounts of Prussic acid.

Grazing trials which continued for two years were arranged on a property near Rockhampton and on the Department's Regional Experiment Station at Biloela. The grass was grazed at all stages of growth by beef cattle which had been starved for a short time before each grazing period. The cattle were not affected in any way in spite of the proven poison content of the grass. The application of sulphate of ammonia to promote lush growth before grazing likewise produced no adverse reaction.

Mr. Collins emphasised that any farmers who decide to establish African star grass on their properties must realise that the possibility of stock losses from poisoning cannot be entirely disregarded.



The Beef Cattle Industry of Eastern Cape York Peninsula.

By N. C. COPEMAN (District Inspector of Stock) and W. F. MAWSON (Senior Adviser, Cattle Husbandry).

(*Continued from page 55 of the January issue.*)

BREEDS OF CATTLE.

Most of the cattle are Devon Shorthorn cross. One property runs Herefords, and Hereford bulls have been used on occasions on other properties. As a result some Devon x Shorthorn x Hereford females are available as breeders. During the past 10 years some Zebu cross bulls have been introduced. In some cases, half-bred bulls were bought and placed straight into the herd to produce quarter-bred stock. In other cases, three-quarter bulls have been bought with a view to using them on selected females and retaining the best male progeny as herd bulls.

In the Devon x Shorthorn cross the herds were originally Shorthorn. Owing to the heat, ticks and drought, stockmen found that the Shorthorn was too soft, and Devon bulls (the progeny of Devons obtained from the south) were introduced with the idea of making the stock hardier. The Devon is a slightly more active beast, not so heavy, and quite hardy.

Since the original crossing, the breeding has become rather haphazard, and now the percentage of Devon in the herds is unknown. Where it was thought that too much Devon was showing up, the Shorthorn bulls were again used. A rather distinct type of animal has evolved, which is referred to as a "Peninsula" type. Compared with the typical Shorthorn, it is leggy, (which is probably an environmental factor brought about by natural selection in dry times when much walking to water is necessary), light red in colour, long horned, short coated and rather lacking in bloom and quality. The females are small, probably because of breeding too early in life and the hard dry seasons.

Although requiring constant culling and selection, Herefords appear to have been reasonably successful and the Hereford cross cows show a little more size generally than the Devon x Shorthorn. Hybrid vigour may be a factor in this respect. More so than the others the Hereford is susceptible to eye troubles such as cancer and blight, although the Devon x Shorthorn is susceptible to the latter.

Zebu cross cattle have not yet made an impression on the main population of Peninsula cattle, but where such crossbred bulls have been used the progeny appear to compare more than favourably with the standard cattle. The Zebu cross cattle seem to

maintain condition better in bad seasons, appear to be less worried by ticks and generally do not carry such a heavy tick population, and can be turned off a year earlier than British cattle under similar conditions. They appear to be less affected by the long walk to market and do not suffer so much from eye troubles.

was a little more successful than the other two illustrates that it may be possible, by breeding and selection, to evolve a more suitable type of British breed for this area. Apparently no southern breeder has seriously attempted to produce cattle suitable for Peninsula conditions.

Plate 1.

Five-eighth Brahman Breeders with Calves on Butcher Hill Station.

Many cattlemen are impressed by the possibilities of the Zebu cross but some are afraid that they will be too difficult to handle under the prevailing conditions. There is now a swing towards these cattle, and quite recently crossbred bulls have been purchased by three men for use as herd bulls.

On various occasions Hereford bulls from three of the best southern Queensland studs have been brought into this area. It was found that they were "too soft" to handle the heat, tick and buffalo fly attack and the long travelling. That one strain

This has seriously handicapped those northern breeders who have sought to improve the quality of their cattle by the introduction of well-bred southern bulls. Having been disappointed by the performance of the southern-bred bulls under Peninsula conditions, they are now looking to the Zebu cross to produce an animal suited to the area.

NUTRITION.

As a consequence of the summer rainfall there is a period of rapid growth of grass following good storms

at the end of the year. This grass matures during autumn and sheds seed. During the dry season some green grazing becomes available as lagoons and watercourses recede and this supplements the dry grass. This is the time when cattle eat the edible shrubs and bushes.

Burning of grass after the wet season is a general practice. Where practicable, different areas are selected for burning in successive years so that any one area is not burned more than once in two years.

Owing to the retentive nature of the subsoil on the flat country, sufficient soil moisture is available to give regrowth following a burn as late as June. Other lowlying country can be burnt later than June and still produce a green shoot without rain. The burning of small areas may begin as early as April and is continued for as long as is considered safe. A measure of safety is whether the fires die out at nightfall on the day of lighting.

Cattle concentrate on the regrowth on burnt areas and this fact is made use of in the mustering of difficult country. An area of grass is burnt a mile or so distant from difficult mustering country. Cattle leave their usual haunts to graze the burnt country, and are then mustered.

With the exception of cattle which run on the marine plains there is evidence of mineral deficiency in the herds. Cases of bone-chewing and eating of dirt are common and are considered to be due to phosphate deficiency. Salt has been used to a very limited extent as a lick, but bonemeal has not been supplied.

MANAGEMENT.

The size of properties, location of the homestead, lack of permanent water, lack of fencing and heavy transport costs all have an effect in making good cattle management very difficult. Scarcely a property has a bullock paddock and very often there are not even horse paddocks adjacent to main camps.

Many of the holdings are roughly rectangular in shape, with the homestead situated at one end. Often the best grazing areas are to be found at the opposite end, probably 50-70 miles away.

All types of cattle, from week-old calves to old bullocks which have consistently dodged the muster, run together. The only restraint to their wanderings is the distance from water, a natural boundary such as a river, desert country or a range, and an occasional block fence run across to join up two ranges. Before paddocks can be used successfully it is vital that they be provided with a supply of good water.

Suitable yards at strategic situations through the properties are a further development which would lead to more efficient management. It is quite common for a property to have only one full set of yards, and that near the homestead. Other yards on properties are holding or tailing yards and consist of one or two big yards. There is usually branding and marking to do every time cattle are in the yards and the calves have to be lassoed out of the mob and either pulled up to the fence by a broncho horse or manhandled. When branded and marked the calves go back into the mob, which is churning up the dust and creating dirty conditions. Such work has a bad effect on calves, cows and fat bullocks which are in the mob.

Weaning is not done for several reasons: (1) there are no weaning paddocks; (2) calves are less susceptible to attacks by dingoes when with adult cattle; (3) since bulls are with the herd all the time, the calves are dropped over a long period each year and to wean all cattle would entail more musterings than possible under present conditions; (4) to wean a calf while its mother is still producing a little milk is to deprive it of a little very valuable food at a critical time, although it benefits at the expense of the cow.

As a general rule, the bulls are not taken out of the herd, although one grazier is doing it successfully. Most

properties have no bull paddock. It is claimed that it is difficult to persuade bulls to return singly to small groups of cows once they have been taken out. It has been the experience of some that bulls which have been paddocked together remain together when put back into the herd, with the result that isolated groups of cows are not mated. Even "tailing" the bulls for a couple of days has been insufficient to ensure that they will stay where they are wanted.

On smaller properties, thorough branding musters are made and all male calves castrated, but in far too many cases some males bred in the herd are retained as bulls. This is a deliberate policy in some cases, while in others it is the result of the cattle being missed during muster. The keeping of such bulls (commonly called "mickies") is a bad practice which can have only a detrimental effect on the herd. Such a lack of breeding policy results in the production of a less desirable type of animal. Even now, cattle can be seen which resemble the type of Longhorn from which the modern beef breeds have been developed.

Plate 2.

This Type of Brahman Cross Bull is Suitable for Use in Siring Crossbred Females for Breeding Purposes.

Intermittent speying is practised on a number of properties, but only on a small scale. It is done largely as a means of culling and not on an age basis. Most of the speyed animals are reject heifers.

Animals which are speyed as heifers develop into good cow beef at 4-5 years of age and on reasonably good country retain their condition right into the dry season. This is a class of animal which could be marketed during the "off" season and catch the Christmas market if quick transport from property to slaughter house were available.

In dry years heavy mortalities occur in first-calf heifers which are suckling a calf. Such heifers have need of a high plane of nutrition, which cannot be provided under dry-season conditions. Weaning of calves and controlled mating are necessary practices if this loss is to be avoided. The weaning of the first calf is necessary in order that the heifer may build up in condition before the second calf

is dropped. Mating should be controlled to ensure that heifers drop the first calf after the start of the wet season. To do this the heifers and/or bulls must be paddocked and the mating time adjusted to suit.

When mating is controlled to allow first-calf heifers to drop calves after the commencement of the wet season, such calves, being young, require care during the following dry season. Suitable weaner paddocks are required, together with measures for tick control.

An objection raised to the calving of heifers after the start of the wet season is that such heifers are heavy in calf during the dry season and when they become weak are likely to be knocked about by other cattle. As a result losses occur. On the whole, however, it is considered that controlled calving would prevent the heavy losses which occur at present, particularly if the standard of husbandry is lifted to include the provision of weaner paddocks.

EXTERNAL PARASITE CONTROL.

Cattle tick and buffalo fly are present throughout the whole area and constitute a problem in management which cannot be adequately dealt with under present conditions.

Cattle ticks are considered to cause the greatest economic loss to the industry and are directly or indirectly responsible for more deaths than any other combination of factors.

Most properties have no facilities for controlling ticks and buffalo fly on a large scale and most animals show the effect of the lack of control. Two or three dips which had been charged with arsenic and allowed to fall into disrepair have recently been renovated and one is to be charged with DDT. Where a dip is available on a property it is usually found at the yards near the homestead, which in many cases is a long way from the section of the property having the greatest carrying capacity.

In addition to dipping, various methods of spraying for tick control have been tried. Portable spray plants are becoming popular. These plants have the advantage of being readily portable and allow the tickicide to be taken to the cattle, which are often not in a condition to be driven to a dip when tick infestation is acute.

One property is equipped with a stationary spray outfit, complete with an 800-gallon storage tank and galvanised iron spraying chute with concrete floor and draining pen. The spraying chute is fitted with spray nozzles in two rows along the sides at the bottom and also in two rows along the sides about 3 ft. 6 in. from the floor. There are also two central nozzles in the floor. The cost of the complete unit is about £600 installed and it is claimed that full use of the tickicide is obtained, less trouble is incurred through settling out, and stock work better through it than through a dip. Further, it is claimed that weak cattle can be treated without harm, whereas such stock would be seriously inconvenienced in a dip. Horses can also be treated. An arsenical preparation is in use and no clogging of nozzles has occurred.

A further method of applying tickicides has been tried. This consists of a "fogging" machine which atomises the spray material. It has proved unsatisfactory.

CATTLE TURNOFF.

The typical property in this area turns off four-to-six-year old bullocks, some fat, but the majority in store condition. Most cattle of this age could reasonably be classed as fat when mustered at the end of the wet season, but generally they have to be "tailed" for a considerable time before leaving the property and they are often in hand for up to three months before marketing. Females comprise between 5% and 8% of the turnoff. These are not necessarily fat. One property is used purely as a breeding proposition, the steers at two and three years

of age being railed from Mareeba to southern Queensland where the same owner has another property.

From information available the property which is concentrating on store cattle is producing in the region of 600 lb. beef per square mile, in contrast to a figure of under 400 lb. beef per square mile from properties which aim to market fat cattle. The property producing stores is able also to sell a comparatively high percentage of females.

Seasonal conditions, the state of stock routes and availability of labour are some factors which cause variation in the number of cattle which are turned off annually. Working on available information it would seem that the annual turnoff comprises approximately 9-10% of the total cattle which are carried on a property —that is, a property carrying 5,000 head of cattle would turn off between 450 and 500 head per year. It is estimated that up to 8,000 cattle are marketed from this area annually.

On properties where it is desired to keep the cattle population stable (that is, excluding properties which are building up cattle numbers), breeders represent about 25% of the total population. An annual branding of 20% of the total cattle population on a property is regarded as satisfactory. In concrete figures this means that a property carrying 5,000 head of cattle would have 1,250 breeders and brand 1,000 calves per year.

The figures for branding reveal that the calving percentage is relatively good but it is obvious that there are considerable losses between branding and turn-off. Since calves are dropped all the year round (but with the majority from November to January) and marking and branding takes place when the cattle are in hand, calves are branded at widely differing ages from two months upwards. The long distances which have to be travelled to water or feed in late spring, the ravages of ticks and dingoes and the absence of succulent feed are hazards for the calf in its first year of life. No doubt the hot conditions also play a part in producing lassitude and deaths in some types of animals.

MARKETING METHODS.

Within the last three years co-operative saleyards have been built at Mareeba and have provided a market place for Peninsula cattle. These yards have been of considerable benefit to Peninsula cattlemen because of the competition from local butchers, meatworks and cattle fatteners. Prior to the establishment of the yards, cattle were brought on the property or brought down for sale to a place agreed upon by the vendor and prospective purchaser. In either case the vendor was at a disadvantage.

Sales are usually held at monthly intervals from April until July. The following prices were obtained at a sale in June, 1953:—

Fat bullocks 5 to 7 years estimated dressed weight 650 lb. were sold at £35 5s. These bullocks were the heaviest in the yard—the average dressed weight of fat bullocks would normally range from 550 lb. to 700 lb.

Fat cows sold to £22 and were expected to dress at 450 lb. to 500 lb.

Forward store bullocks, four to five years of age, which would fatten within six months on favourable coastal pastures, ranged in price from £21 to £26. These were animals which were probably fat when mustering commenced in the Peninsula, but had deteriorated to stores on the journey to the yards. Buyers with properties available for coastal fattening prefer to buy the youngest cattle available provided such cattle will fatten in about six months. In other words there is no demand for the Peninsula "piker"—an aged bullock with an irregularly shaped frame and a pronounced inability to fatten.

Coastal butchers catering for the local trade in the North often buy stores and top them up in the Daintree Valley, which is within easy reach of slaughteryards.

The arrangement whereby one property (referred to previously) concentrates on producing stores for railing to southern Queensland appears to be satisfactory but rising transport costs are becoming a problem.

Distance from the market and a difficult stock route have prevented the development of the store cattle business on a large scale. Also, better quality stores have been available from other parts of North Queensland. It is likely, however, that provided a good type of animal is produced and offered for sale at about two years of age a market can be found for greatly increased numbers of stores. Much depends on further improvements being made to the stock route from Laura to Mareeba.

Plate 3.
Branding in a "Tailing" Yard on Lakefield.

Problems of Management.

Management problems are summarised as follows:—

(1) Ticks and buffalo fly are common to the whole area and represent a constant menace through anaemia and worry.

(2) The lack of permanent water over large tracts of country means that this country cannot be used at the time when it is most needed. Country adjacent to permanent water becomes badly overstocked. Where cattle water at springs some deaths occur as a result of weak cattle becoming bogged.

(3) Aboriginal labour is used for the stock work, usually with one or two white men in charge of each plant. While some excellent stockmen are to be found amongst the natives, difficulty is sometimes encountered owing to a shortage of suitable labour. The large areas to be mustered require more labour than fenced and subdivided properties, thus increasing the costs of running the property. Lack of fencing and yards makes "tailing" necessary, and this requires extra man-power.

(4) There is evidence of a phosphate deficiency in stock.

(5) The long walk to market, added to several prior weeks of mustering and "tailing," leads to loss of weight and quality in the bullocks. Outbreaks of footrot are common in travelling mobs and cattle often have to be left behind on this account. There is also a shortage of permanent water on the main stock route.

(6) Blight or ophthalmia is common in the British breeds but does not appear to affect the Zebu crosses

to the same extent. Eye cancer is not uncommon in white-eyed cattle.

(7) Large numbers of dingoes are to be found and take a heavy toll of calves when the breeders are weak. Other classes of weak cattle are also attacked.

(8) The remoteness of the area increases transport charges on goods and materials required for development. The services of skilled persons such as engineers and carpenters are not easily available.

Strange as it may seem, pleuropneumonia has not been reported or noted in this area, although it is prevalent in the Gulf and along the Mitchell River.

TRENDS AND POSSIBILITIES.

It would appear that the beef cattle industry in this area is capable of expansion and some recent developments may be mentioned.

(1) Pasture improvement may offer possible means of increasing the productivity of the area.

The marine plain seems capable of development, providing suitable water can be found. At two different sites on one property, water has been obtained at 17 and 35 feet respectively, but on both occasions it proved to be salty. It is not known whether such water is to be found over the entire marine plain country; if so, it could prove to be a serious obstacle.

(2) There is general agreement that the Zebu cross animal is better adapted to the conditions than the British breeds and it is almost certain that there will be an increase in the production of this type of animal. Two main factors indicate that the changeover will not be rapid. Firstly, some men are afraid that crossbred cattle will get completely out of hand. It should be emphasised that Zebu cross cattle require different handling from British cattle and further that there is quite a difference between individuals in crossbred cattle. Zebu crosses are generally more timid and more intelligent. There is no doubt that the Zebu cross beast can move more quickly than its British counterpart and thus when cattle race away the crossbreds quickly take the lead. It must also be said that the bad-tempered Zebu cross animal is not an asset. However, in the experience of men who have worked crossbreds in this area the Zebu cross is not more difficult to handle than British cattle when the necessary experience is obtained. Crossbred cows are said to be easier to manage than British cows under some circumstances.

Under the prevailing conditions cattle usually race away when stockmen appear and often travel some distance before being brought under control. When controlled the British cows are distressed and will lie down or charge, while the crossbred cows can be driven. However, every effort should be made to improve husbandry and the test should be whether crossbreds can be handled under proper husbandry methods.

The second factor retarding the changeover to Zebu cross cattle is the shortage of suitable bulls. It is essential that these bulls possess a good temperament and be of suitable beef conformation. There is a strong desire to obtain animals of a reddish colour in order to maintain the general colour of the present cattle. It is likely that from ¼ to ½ Zebu blood is the desirable fraction, although few definite opinions have been formed to date.

In the absence of a fixed crossbred there is no doubt that ⅜ to ½ bred bulls backed by Zebu ancestry on both sides for 3-4 generations would be the best sires. Such bulls are scarce, and for practical purposes need not be considered. Only two practical alternatives are offering. Three-eighths to five-eighths bulls with fewer generations of Zebu blood may be purchased. Some compromise in respect of colour would have to be made and the progeny of such bulls would probably lack uniformity. At present the purchase of Zebu cross bulls is a compromise between what is wanted and what is available.

The second alternative is the purchase of a high-grade or pure Zebu bull with a view to breeding bulls on the property. Such selected bulls bred on the property are first cross and their progeny would lack uniformity. Selected mature females are used to mate with the Zebu bull—such females will have exhibited a certain amount of adaptability to the conditions and be of a reasonably good type. The cattle produced by such methods are at least not inferior to the present cattle. Further, a foundation is being established on which to build up a Zebu cross herd when more suitable bulls become available.

(3) The most recent development, the transport of cattle by sea, should have a beneficial influence on the future of this area.

A Cairns firm has fitted an L.S.T. barge of 375 tons to carry 200 head of adult cattle with a minimum of bruising and has established a loading base at Marina Plains on the Annie River and an unloading base on Skeleton Creek near Queerah Meat Works, Cairns. Other loading bases have been established by Peninsula graziers assisted by this firm at strategic points on the Endeavour and Starcke Rivers and at Port Stewart. The voyage from Port Stewart to Cairns takes approximately 36 hours and from the loading base on the Endeavour River approximately 14 hours.

The L.S.T. barge with its shallow draft (6 ft. 6 in.) can negotiate rivers that would not be navigable by orthodox vessels of similar tonnage. Its bow opens out and downwards and forms a ramp along which cattle can be loaded into the barge direct from a yard on a river bank, and unloaded without even the necessity for a yard.

This vessel operates between Cairns and Thursday Island, carrying timber, equipment and supplies, and is not used solely for cattle transport.

The practicability of this method of transporting cattle has already been demonstrated. Improved cattle husbandry practices are required, however, if the area is to obtain the full benefit of the fat cattle market which sea transport has made available. Extensive property improvements virtually throughout the area are necessary if a steady supply of fat cattle of suitable age is to be available.

Even with improved cattle husbandry methods it is considered that the marketing of store cattle will continue to be the mainstay of the industry.