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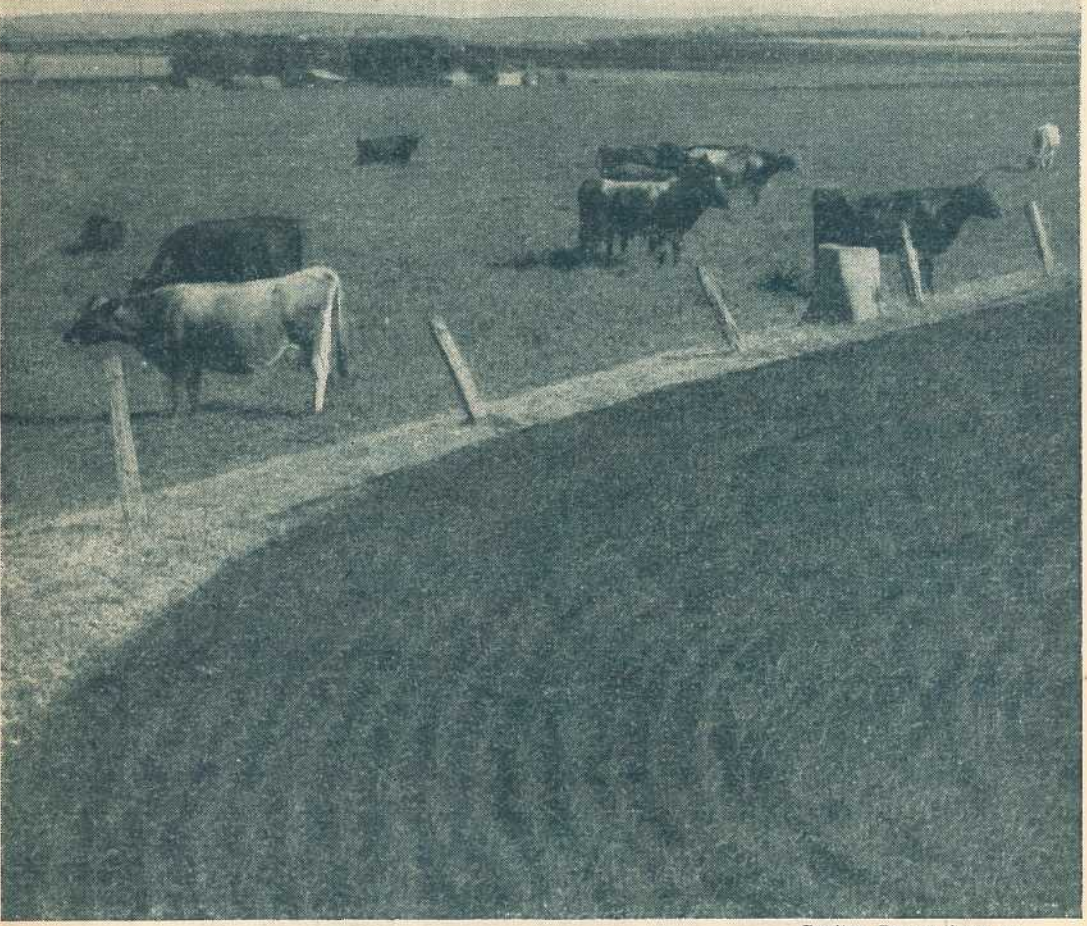
DEPARTMENT OF AGRICULTURE

QUEENSLAND AGRICULTURAL JOURNAL



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Paspalum.

OFFICERS OF THE AGRICULTURE BRANCH.

A native of South America, paspalum (*Paspalum dilatatum*) is now widespread in many tropical and sub-tropical countries. It is also grown for pasture in a number of temperate areas. It was introduced into New South Wales towards the end of the last century and came into favour rapidly in the coastal areas of that State. Sown paspalum pastures were also established in coastal Queensland districts and on elevated rain-forest plateaux following clearing and burning, where they have proved to be the foundation on which a dairying industry has been built.

Use is also made of this valuable grass as a component of irrigated pastures in Victoria, New South Wales, Western Australia and, of recent years, Queensland.

Most of the paspalum in rain-grown pastures in Queensland has now been sown for a period of 30 to 40 years. Because little rain forest or bastard scrub land is now available, annual expansion of the area under paspalum grass is on a limited scale only.

The widespread use of paspalum in Queensland is indicated by the 1952-53 sown pasture acreages, as provided by the Government Statistician:—

Paspalum—541,612 acres.

Other sown pastures—1,249,326 acres.

Total sown pastures—1,790,938 acres.

Description.

Paspalum is a perennial tufted grass with clustered, erect stems and short creeping rootstocks by means of which a sown pasture of the grass forms a compact sod. The short underground runners are responsible in a large measure for the ability of the grass, once established, to survive heavy grazing, since the growing buds are located underground and so escape damage from trampling. Long, broad leaves are produced in abundance from the crown of the plant and sparingly along the flowering stem. If allowed to mature, a paspalum pasture may reach a height of several feet, but for normal pasture purposes, growth should not be allowed to exceed 9-12 inches.

Paspalum pasture tends to become sodbound after a number of years, and its capacity to absorb rainfall decreases.

The grass is not an aggressive species, although it has a high degree of persistence. Thus it is not a serious weed in cultivations and is suitable for inclusion in crop rotation programmes.

Plate 1.

A New Pasture of Paspalum, White Clover and Red Clover at Peachester, in South-eastern Queensland.

Climatic Requirements.

Paspalum is essentially a summer-growing grass and for its full development requires a warm, moist growing season. Conditions on the wet tropical coast appear, however, to be somewhat unsuited to the grass. Although regarded as a very persistent species, its slow initial growth does not enable it to compete with vigorous tropical weeds such as lantana (*Lantana camara*), inkweed (*Phytolacca octandra*) and wild tobacco (*Solanum auriculatum*).

As a consequence of its moisture and warmth requirements, the grass makes almost its entire growth between October and May, with the maximum development during the wet months of January, February, March and April. Whilst it is unable to persist in dry climates, paspalum is capable of surviving protracted rainless periods. Severe frosts may destroy the grass, but light frosts merely retard its growth.

Plate 2.

A Paspalum Pasture at Maleny, in South-eastern Queensland. The padock adjacent to the windbreak contains kikuyu grass.

Plate 3.

Steep Paspalum Pastures on Rain-forest Country near Cooroy, South-eastern Queensland. The bare patches are evidence of landslides following heavy rains.

This pasture has achieved most success in Queensland on coastal lands in the south-eastern and central-northern parts of the State and on the coastal highlands of Springbrook, Beechmont, Tamborine, Maleny Plateau, Blackall Range, Eungella Range and the Atherton Tableland. These areas experience an average annual rainfall of over 50 inches, most of which falls in summer. Paspalum is also grown to some extent in the 30-40 inch rainfall zone, where it is usually found in low, moist gullies or on alluvial flats.

was established in scrub areas has been stocked for periods of 30 to 40 years and it is now evident that these pastures have deteriorated in both productivity and quality. Loss of fertility has occurred on the coastal lands and on the deep red loams of the scrub plateaux. Poor growth of pasture has been attributed to the depletion of the original high level of plant nutrients, particularly phosphorus, nitrogen and calcium, through faulty management and leaching by the heavy rainfall.

Excepting in favoured areas, pas-

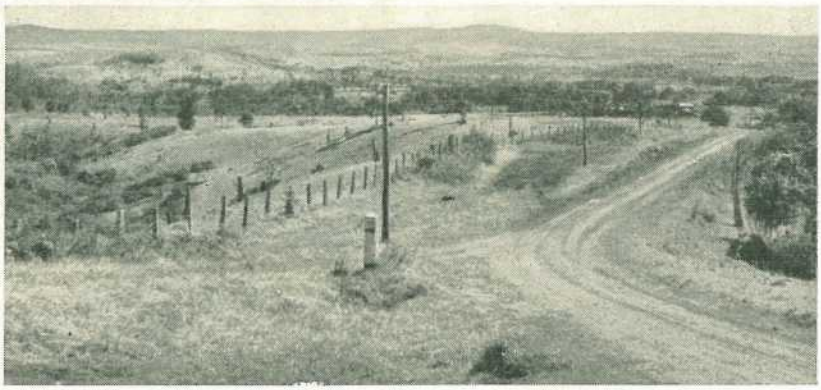

Plate 4.

The Pastures in this Section of the Dairying Country of the Atherton Tableland, in North Queensland, are Composed Mainly of Paspalum.

Where irrigation is available, soil moisture conditions can be made satisfactory for paspalum pastures and the grass forms a valuable component in irrigated pastures established in the 25-35 inch rainfall belt at Lockyer, Nanango and Theodore.

Supplementary irrigated paspalum pastures appear to have great potential use in Queensland, and in irrigation districts can be expected to greatly influence local dairy production.

Soils.

Paspalum requires fertile soils if it is to make best growth and it should not be sown on poor soils without fertilizer. A large proportion of the paspalum pasture in Queensland which

palum forms single-type pastures which have no legume component. The absence of a pasture legume is reflected in yellow coloration of the grass, which is a symptom of nitrogen deficiency. Considerable work needs to be undertaken to rejuvenate such areas by renovation and topdressing with fertilizers and soil amendments. A serious weed problem is likely to develop in pastures which lack vigour. The invasion of species such as the carpet grasses (*Axonopus affinis* and *A. compressus*), sour grass (*Paspalum conjugatum*), blady grass (*Imperata cylindrica* var. *major*), bracken fern (*Pteridium aquilinum*), and groundsel (*Baccharis halimifolia*) will accelerate the decline in productivity of the pastures.

Planting.

Paspalum should be sown in spring or summer either on freshly burnt scrub country or in reploughed and renovated land where soil fertility has been restored by crop rotation or by fertilizers. With irrigation, late autumn planting will be found to be satisfactory, but full development of seedlings cannot be expected until the warmer weather in August-September. Under non-irrigated conditions, a seeding rate of 8-12 lb. per acre is recommended, whilst under irrigation conditions 6 lb. per acre will be effective in a pasture mixture.

As a result of the appearance of ergot (*Claviceps paspali*) throughout Queensland and eastern Australia generally in 1935-36, very little high quality paspalum seed is now harvested in Queensland. The ergot destroys the seed embryo and little viable seed is set, and practically all paspalum seed sold in Queensland is now imported from southern States.

Delayed germination of immature seed occurs under field conditions, and this may result in excessive weed competition and serious delay in the establishment of the young pasture. This difficulty may be overcome in part by sowing seed of high quality. The germination percentage of paspalum seed sold in Queensland should not be less than 60.

A common method of providing against the slow early establishment of paspalum is to sow it in a mixture with either Rhodes grass or molasses grass. These two grasses cover very rapidly, choke weed growth and yield good feed while the paspalum stand thickens and improves. On scrub burns the large amount of growth made by the Rhodes grass or molasses grass is useful in carrying a burn to check undergrowth in the early establishment phase.

Though paspalum is a very vigorous grass under satisfactory soil fertility and rainfall conditions, certain other pasture plants can be mixed with it. White clover, red clover and lucerne have all been satisfactorily established with paspalum, and mixed pastures with such legume components are recommended.

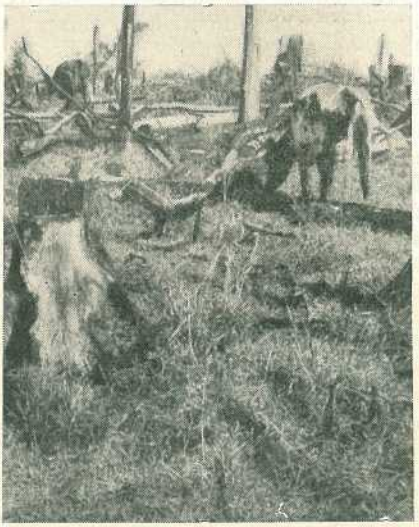

Plate 5.

Paspalum, Molasses Grass and Green Panic Established on the Atherton Tableland Following a Scrub Burn.

Some summer-growing legumes, such as tick trefoil (*Desmodium* sp.) and lespedeza (*Lespedeza striata*), will grow satisfactorily with paspalum, and in Near North Coast districts these two legumes contribute useful fodder, in addition to assisting in maintaining soil nitrate.

Subdivision.

As with all pastures, management and maintenance of paspalum pastures are extremely important, and efficient subdivision is essential. The extent of this subdivision will depend upon the size of the herd and on the area of available pasture. First-class paspalum country could be divided into unit areas of 5-7 acres so that during the period of rapid growth in summer a herd of 30-40 cows can be grazed for 3-4 days, to be followed by harrowing of the dung. With larger

herds, areas of 10-15 acres would be advantageous. The use of each paddock in turn as a night paddock assists in the even distribution of dung and urine, which are valuable fertilizers.

Paspalum makes rapid growth during the period January to March and it is during this period particularly that subdivision is important. The annual recurrence of ergot disease renders the proper management of paspalum pastures a necessity. The formation of seedheads must be restricted, either by grazing the grass down before the inflorescences emerge or, where practicable, by the use of a mower.

Plate 6.

Close Grazing During the Previous Summer Has Stimulated the Development of White Clover in This Paspalum Pasture Near Brisbane.

Experience has shown that paspalum maintained at a height of 6-9 inches is always palatable to dairy stock and there is less wastage than when rank growth is allowed to occur. When subdivision is adequate the excess grass produced during periods of lush growth can be mown and stored as hay or silage. In a mixed pasture, keeping paspalum short in the autumn is important, as this condition favours the development of white clover in the winter and spring.

Renovation.

The primary objects of pasture renovation are to improve the productive capacity of the pasture, and then to maintain productivity at a high level. For both purposes the pasture must be broken up to some extent, the soil kept open to permit rains to enter, and a sufficient supply of plant food added.

Due to decline in soil fertility, it is now common practice in some districts to renovate and fertilize pastures so that best results will be obtained. These operations should always be performed so as to coincide with suitable soil moisture conditions and warm weather. Renovation should not be carried out at a time when regrowth is likely to be retarded by cold weather or by dry conditions. Slow recovery of the pasture means not only lower production, but also susceptibility to weed invasion. Renovators will not work satisfactorily when there is a big body of grass, and the pasture should first be brought into a suitable condition by mowing or by close grazing. Any accumulated droppings should be scattered by harrowing during or prior to renovating.

The simplest method of renovation is to cultivate the pasture by means of tined implements. Narrow tines, spaced about five inches apart, are drawn through the sod and the soil. The operation should be performed first in one direction and then at right angles to that direction, and at a sufficient depth to prune the roots of the paspalum plants and break up the soil. The effectiveness of the operation depends largely upon securing adequate penetration of the tines. When renovating matted paspalum pasture, a suitably powered tractor should be used. Merely scratching the surface of the sod effects no appreciable improvement in the pasture.

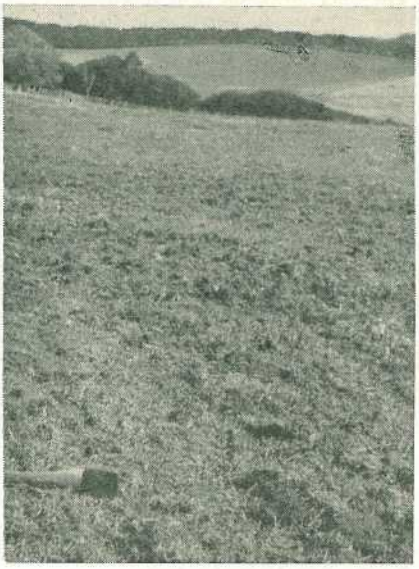

Plate 7.

Paspalum Pasture at Maleny Renovated With a Tined Implement.

Another type of renovator found to be useful is the power-driven rotary hoe. This machine under suitable soil moisture conditions will drastically chop up the pasture but should only be used during wet or showery weather to ensure regrowth without drying out. Under plateau conditions at Maleny, this form of renovation performed in March has been found very successful. The work is somewhat slow and expensive for pasture land but is thorough.

Renovation by means of ploughing has been found to be extremely useful in renovating paspalum pastures. Drastic ploughing with an English mouldboard plough allows the sod to sit on edge and sufficient material remains in an undried condition to enable regrowth. Light harrowing of the edged sods prevents rapid drying out and death of the pasture.

Renovation trials on the Atherton Tableland have shown that without the incorporation of legumes in the pasture or in the absence of fertilizers or crop rotation, the results of renovation alone will be transitory and that the initial increases in productivity will not be repeated after subsequent renovations.

Renovation may be impracticable on poorly cleared or steep, hilly country; under such conditions sound management with recourse to harrowing of the dung may be the only means of maintaining the pasture.

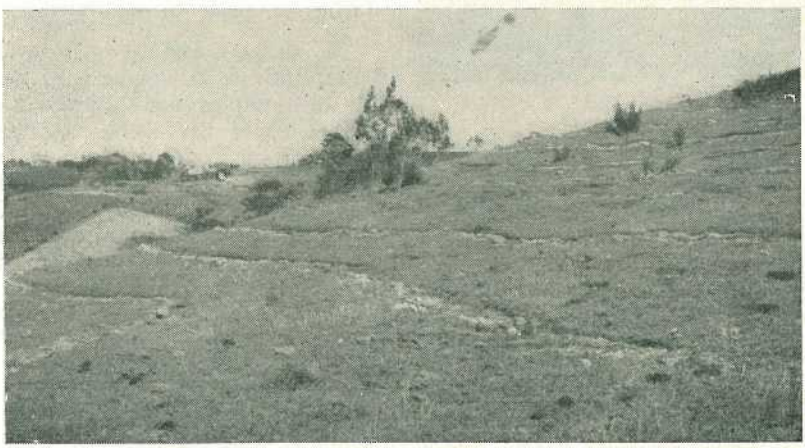

Plate 8.

Contour Furrows in Paspalum Pasture, South-eastern Queensland.

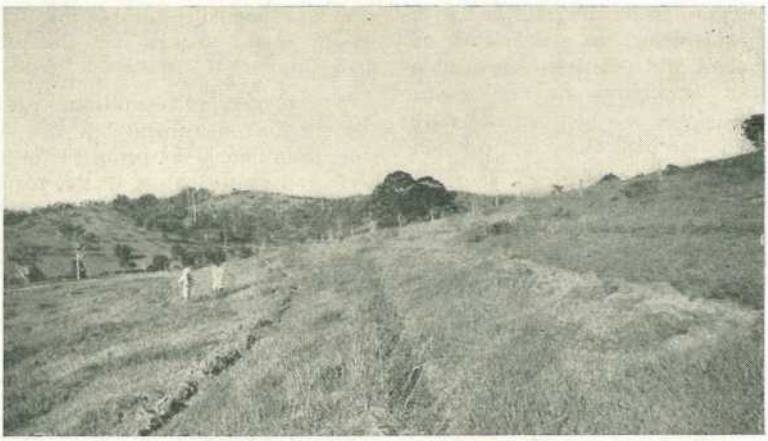

Plate 9.

A Contoured Paspalum Pasture Paddock in the Gympie District. A new furrow has been struck on each side of the old one shown in the centre.

Along creek and river flats or on land where erosion risks are not high, complete ploughing and cropping of the areas may be practised to advantage, and the use of leguminous crops will do much to improve soil fertility. A system of utilising land by including a period of pasture in the crop rotation at regular intervals has much to commend it. Both pasture growth and crop yields will benefit.

Topdressing.

As indicated earlier, the decline in pasture productivity in many Queensland areas has been associated with a decline in soil fertility. Many of the paspalum pasture areas have been established for periods in excess of 40 years and despite heavy grazing little has been done to return plant nutrients to the soil in the form of fertilizer.

Removal of nutrients in the form of beef, milk and cream has occurred in addition to the loss of nutrients by leaching. As few paspalum pastures have a good admixture of a suitable pasture legume such as white clover, nitrogen deficiency is frequently pronounced in long-established swards. Inadequate development of white clover presents a very real problem and in some instances (as for example on the Blackall Range) it has been found profitable to use applications of a nitrogenous fertilizer to correct nitrogen deficiency.

Plate 10.

Regrowth of Paspalum in a Maleny Pasture Paddock Following Mechanical Renovation and Topdressing.

Soil deficiencies of calcium and phosphorus are often found associated with poor legume development. Pas-

ture legumes will not thrive with insufficient calcium, as a deficiency of this element will often be responsible for poor nodulation on the roots. The application of lime or dolomite to supply the deficiency of calcium is recommended. Analyses of soils from many paspalum areas show an inadequate level of soil phosphorus. Thus when topdressing, a mixture of lime and superphosphate is commonly used. Rates of superphosphate and lime application are best determined after consultation with the local agricultural officer following soil analysis.

New methods of investigation at present in progress, involving the use of trace elements, may help considerably to improve paspalum pastures by stimulating growth of pasture legumes. There are indications also that it might be possible to reduce the heavy amounts of lime or dolomite usually considered necessary.

Conservation.

The conservation of surplus pasture growth for feeding to stock in dry times is of particular importance in coastal districts. The conservation of hay by normal means is sometimes difficult due to unfavourable haymaking weather. Paspalum, whilst somewhat difficult to cure evenly, will make an excellent hay which if made correctly will keep for many years. The use of modern hay-baling machinery has made possible the rapid baling and storage of the cured material.

Where weather conditions prevent the satisfactory drying of hay, consideration should be given to the conservation of paspalum in the form of silage. Good paspalum silage is both succulent and nutritive and when correctly made forms a useful winter and early spring feed.

The clamp ensilage process, which is widely practised under temperate English and New Zealand conditions, and which is receiving attention in southern Australia, is worthy of trial in the paspalum areas of Queensland. This mechanised method of ensiling surplus grass during the periods of flush growth has much to commend it, and early trials in south-eastern Queensland show that a valuable product can be made. Farmers interested in the ensiling of pasture grasses in clamps should contact the nearest agricultural officer for advice.

Feeding Value.

Paspalum is a very palatable grass and is relished by all classes of livestock. The grass has its maximum value for cream or milk production when in the young, leafy stage, and the pastures should be so managed that they are always grazed off in their most nutritive stage. The results of analysis of paspalum grass, hay

TABLE 1.

CHEMICAL COMPOSITION OF PASTURE PLANTS.

(Water-free Material.)

Plant.	Crude Protein.	Crude Fat.	Crude Fibre.	Analysis of Ash.	
				Lime.	P_2O_5.
	%	%	%	%	%
Short Young Paspalum ..	20·6	1·6	23·7	0·41	0·62
Old Stemmy Paspalum ..	4·1	0·9	41·4	0·24	0·14
Paspalum Hay	7·3	1·4	31·5	0·53	0·39
Paspalum Ensilage ..	7·9	2·1	34·9	0·39	0·50
Rhodes grass (young leafy growth)	16·4	1·7	27·1	1·12	0·72
Queensland Blue grass (green, in seed) ..	10·0	1·1	33·1	0·54	0·55
Lucerne (mature growth)	18·4	1·2	32·6	3·55	0·68

and silage are shown in Table 1 in comparison with other common pasture species.

Pests and Diseases.

A number of pests cause serious damage to paspalum pastures in Queensland. Roots may be damaged by white grubs and funnel ants, while armyworms and other caterpillars sometimes ravage the foliage. Slow recovery from damage may result in widespread weed invasion.

The fungus causing ergot in paspalum first appeared in epidemic form in Australia in 1935, and its widespread occurrence since that date has been responsible for serious losses in dairy production. Whilst ergot does not materially affect the growing plant, severe loss of seed occurs with the result that little fertile seed is set for natural regeneration. Under these conditions, depleted paspalum stands may require replanting because regeneration is too slow.

The symptoms of ergot poisoning produced in cattle resemble staggers. Ergot poisoning does not usually result in the death of the stock, but the sickness causes loss of milk production, staggering gait and loss of condition and commonly results in a milking cow being a poor productive unit, or even non-productive, for the remainder of her lactation period.

The eradication of a disease of this nature from a pasture is a very difficult problem. It can be kept in check somewhat by the use of sound management practices such as rotational grazing and mowing. Sound management is particularly important in the rapid periods of growth during January to March, for it is in this period particularly that precautions should be taken to avoid losses from ergot poisoning.

Interest in Irrigated Pastures.

Keen interest is being shown by dairy farmers in the Upper Burnett and Callide Valleys in the development of irrigated pastures as a possible means of maintaining high all-the-year-round production of butter.

The Minister for Agriculture and Stock (Hon. H. H. Collins) said recently that this interest is being stimulated largely by the establishment of irrigated pasture demonstration areas at Monto, under spray irrigation, and at Biloela, with border irrigation.

These demonstration areas are being supervised by officers of the Department of Agriculture and Stock. The progress of the experimental pastures will be followed carefully and, should a high level of butter production be obtained from the demonstration areas, a number of farmers in both districts who have adequate supplies of water available for irrigation will make plantings of irrigated pastures.

In the Monto District, water conserved by the construction of two weirs at Mungungo and Mulgeldie is available for irrigation. In the Callide Valley, several farmers have already developed bores and a number of others are sinking wells to provide water for irrigated pastures.

The Minister said the border method of irrigation is favoured by farmers because of the lower labour requirements, and it is expected that where the topography and soil type are suitable, the border method will find general use in these two districts.

Brucellosis Testing of Swine.

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.

In order for a herd to be retained on the list of Tested Herds, a semi-annual or annual re-test of the herd, as determined by the Director, is required. If at a re-test any animal gives a positive reaction to the test the herd is removed from the list; it is not listed again until subsequent tests, as determined by the Director, have been carried out.

TESTED HERDS (As at 15th April, 1954).

Berkshire.

J. J. Bailey, "Lucydale" Stud, East Greenmount
S. Cochrane, "Stanroy" Stud, Felton
G. Handley, "Handleigh" Stud, Murphy's Creek
J. L. Handley, "Meadow Vale" Stud, Lockyer
R. G. Koplick, "Melan Terez" Stud, Rochedale
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, 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, "Bardell," Goovigen
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, 684 Logan road, Greenslopes
W. F. Ruhle, "Felbar" Stud, Kalbar
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

Large White.

H. J. Franks 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. G. Koplick "Melan Terez" Stud, Rochedale
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
H. L. Larsen, "Oakway," Kingaroy
C. Allison, "Colrene" Stud, Lake and Reserve roads, Slacks Creek
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
M. E. Bryant, "Maryland Brae" Stud, Blunder road, Oxley
Miss G. R. Charity, Coondoo, Kin Kin.
W. J. Blakeney "Talgai" Stud, Clifton
F. K. Wright, Narangba, N. C. Line
A. B. Vidler, Manneum, Kingaroy

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
R. G. Koplick, "Melan Terez" Stud, Rochedale
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G. H. Sattler, Landsborough
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
P. V. Campbell, "Lawn Hill" Stud, Lamington

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
D. Kay and P. Hunting, "Kazan" Stud, Goodna
J. Gleeson, "Iona Vale" Stud, Kuraby
C. R. Smith, "Belton Park" Stud, Nara
H. H. Sellars, "Tabooba" Stud, Beaudesert
H. Thomas, "Eurara" 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
F. K. Wright, Narangba, N. C. Line
C. Allison, "Colrene" Stud, Lake and Reserve roads, Slacks Creek
R. A. Collings, "Rutholme" Stud, Waterford
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
M. E. Bryant, "Maryland Brae" Stud, Blunder road, Oxley
A. H. Groves, "Kinvara" Stud, Ingleside, West Burleigh
J. E. Heath, "Springlea" Stud, Murgon
Mrs. R. A. Melville, "Wattledale Stud," Beenleigh road, Sunnybank

British Large Black.

W. F. Ruhle, "Felbar" Stud, Kalbar

Ginger Production.

H. M. GROSZMANN, Horticulturist, Horticulture Branch.

Ginger (*Zingiber officinale*) is a fibrous rooted perennial plant with a branched underground stem or rhizome (Plate 1). The aboveground portion of the plant consists of several aerial shoots which are about three feet long and bear lanceolate leaves. The foliage dies down in winter. The plant is indigenous to the tropics and susceptible to frost injury. However, this does not prevent the commercial production of ginger in those parts of the tropics and subtropics which are subject to frost, provided suitable planting material can be obtained for new plantings each year.

Although ginger has been grown in Queensland for many years, it only became a commercial crop during World War II, when supplies from Oriental countries no longer reached the Australian market. At first the crop was grown mainly on the red-brown loams at Buderim Mountain, but the main centres of production are now located at Eumundi and Eudlo on clay loam soils (Plate 2).

Soil Requirements.

Clay loams or loams with a fairly retentive clay subsoil at a depth of 12–18 inches are usually selected for the ginger crop. As the plant is sensitive to waterlogged conditions, sloping ground is an advantage. Relatively flat land may be planted, however, if surface drains are constructed to prevent excessive ponding during heavy rains.

Land Preparation, Planting and Fertilizing.

The land is thoroughly cultivated during autumn and winter prior to planting the ginger in spring. Planting takes place from August to mid-October and usually two or more areas are established at intervals of about three weeks, partly to distribute the work and partly to reduce the risk of serious damage from high temperatures which occur in early spring when the crop is most susceptible to sunburn injury.

Drills are opened up to a depth of four inches with a spacing of two feet. A 5–13–5 or similar fertilizer mixture is applied in the drills at a rate of 10 cwt. per acre and scuffled into the soil.

Portions of the underground rhizomes weighing from 1–2 oz. each and known as "seed-pieces" are used as planting material. They are dropped into the drill at one foot intervals and covered with about one inch of soil; deep planting is undesirable, particularly on heavy clay loams, in which the plants tend to develop very slowly. About one ton of seed-pieces is required for each acre of the crop when planted at the usual row spacings.

A side dressing of a 10–8–7 fertilizer mixture is usually required in the growing crop during December, the rate of application being 5 cwt. per acre. The fertilizer is placed in a band close to the ginger row.

Mulching.

If a sawdust mulch is applied to the ginger, the stand can be held for a ratoon crop after the plant crop has been harvested. Mulching has other advantages: it conserves soil moisture, it controls weed

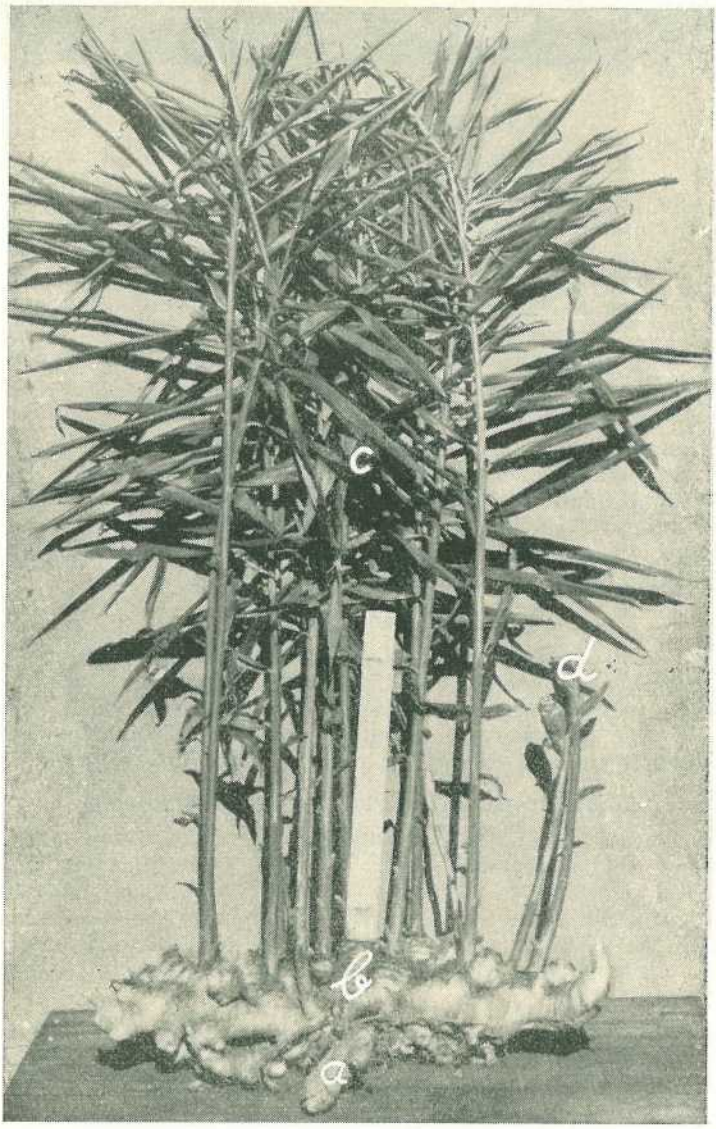


Plate 1.

A Typical Ginger Plant Showing (a) Seed-piece; (b) Rhizome developed from seed-piece; (c) Leaves; (d) Inflorescence.

growth, and the rhizomes are clean with a soft peel when harvested. The sawdust cover is applied as soon as the crop is planted and should be at least three inches thick. Sawdust mulched crops may become slightly yellowish during early summer, but plant growth and yields are apparently not adversely affected.

Sawdust may be replaced with a 6-inch cover of dry blady grass if this material is more readily available. The blady grass settles down fairly rapidly and is usually rotted away by the end of the summer. Ginger which has been mulched with blady grass cannot be ratooned effectively, and therefore should be handled as an annual crop.

In the absence of a mulch cover, germination in the ginger crop may be erratic, particularly in a dry spring. As the cost of planting material is high, mulching is desirable in commercial practice.

Plate 2.

An Irrigated Crop of Ginger from the North Coast from Which a Yield of 15 Tons Per Acre Was Harvested.

Care during the Growing Period.

No inter-row cultivation is practised in the ginger crop. Any weeds which appear in the plant rows are removed by hand and those in the inter-row spaces are eradicated with a Dutch hoe.

Young ginger plants are very susceptible to sunburn when screen temperatures exceed 90°F. Mild sunburn only affects the leaves but acute sunburn damages the whole shoot. The risk of damage can be reduced by (*a*) planting the crop early so that the plants are "self-shaded" before very hot weather occurs; (*b*) successional plantings so that the whole of the crop is not in a susceptible stage of growth during a heat wave; and (*c*) planting the crop on sloping ground where air movement takes place naturally and minimises extreme temperatures.

Harvesting.

The rhizome has normally reached its maximum green weight by the middle of April and is then at its best for the production of cargo ginger (ginger in syrup), which is used in the manufacture of con-

fectionery. After mid-April, the rhizomes become more fibrous and develop a pungent flavour which makes them more suitable for the manufacture of dried or ground ginger. In practice, the time of harvesting is determined by the requirements of the processor who handles the crop. Ratoon crops should, however, be harvested first, as the harvesting of plant crops before the rhizomes are mature adversely affects the following ratoon crop.

In crops which are not to be ratooned, the whole plant including the rhizome is dug carefully with a garden fork, the tops being detached and the rhizomes broken into small pieces at the same time. These pieces are usually graded into neck portions, intermediate portions and young pieces.

In crops which are to be ratooned, only that part of the rhizome developed during the current season is removed when the plant crop is harvested; it is cut from the original seed-piece with a sharp knife. The original seed-piece (now known as the "recovery"), with the neck attached, is left in the ground and shoots again in the following spring.

Yields average about six tons per acre and range up to 10 tons per acre. Ratoon crops are particularly profitable, as no expense is incurred in buying planting material, planting, or laying mulch.

Saving "Seed."

The cost of planting material is high. Growers therefore usually reserve the best portion of a crop for planting material, the size of any particular "seed" plot depending on the acreage to be planted in the following season. The plot is carefully dug in July, the rhizomes being cut into 1–2 oz. seed-pieces (Plate 3) and stored in a shady place

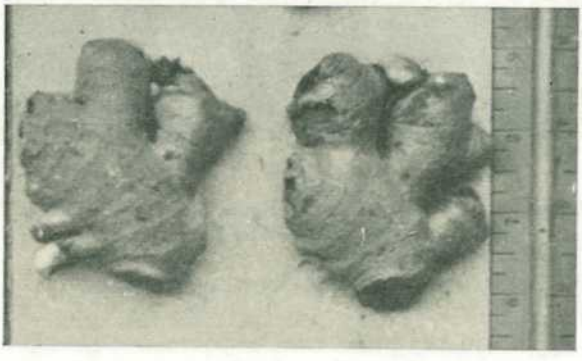


Plate 3.

Seed-pieces Suitable for Planting the Ginger Crop.

protected from rain. The seed-pieces are bedded in sawdust or placed in cases and covered with bags or a canopy of dry grass. Storage conditions should be such that the seed-pieces remain moist but not wet and the rhizomes must be handled carefully to avoid injury to the eyes.

Any crowns showing signs of tissue breakdown when harvested should be destroyed; under no circumstances should they be mixed with the seed-pieces in store.

Marketing.

All ginger, including seed ginger, is received, treated and marketed by the Buderim Ginger Growers' Co-operative Association Ltd. as agents for the Ginger Marketing Board.

MARKETING

Banana Price Movements on the Brisbane Wholesale Markets, 1948-1953.

PREPARED BY OFFICERS OF THE DIVISION OF MARKETING.

The following analysis deals with the general movement of banana prices on the Brisbane Market since 1st January, 1948. A brief survey of the relevant features of production and marketing is given, followed by a more detailed description of the seasonal price pattern and general trend.

PRODUCTION.

A significant feature of the Queensland banana industry is the steady decline in area harvested which has occurred over the last five years. The effect of this is somewhat masked by fluctuations in yields caused by weather conditions, but a good indication of the extent of the decline is provided by a comparison of production figures, which fell from 665,426 bushels in 1948-49 to 384,836 bushels in 1952-53. These figures show a drop of approximately 40% over the 5-year period. The average yield for both years was 105 bushels per acre, but the area harvested dropped from 6,325 acres in 1948-49 to 3,662 acres in 1952-53.

This fall in acreage has resulted largely from a shortage of rural labour. As the industry does not lend itself to extensive mechanisation, the shortage of labour was keenly felt and quickly led to a stage where individual farm production was more or less confined to such acreage as an owner-grower could conveniently handle without outside help. A simultaneous development was a tendency to concentrate on maintaining old areas at the expense of new plantings, thus raising the average age of plantations. However, latest reports indicate a slight easing in the labour position, although the requirements of the industry are not yet fully met. Whilst the area harvested in 1952-53 was the lowest for the period under review, both the number of growers and the total banana acreage showed an increase on the previous year, although this increased activity was no doubt partially stimulated by the high prices obtained for bananas during the last two years.

There are other factors affecting banana production apart from those outlined in the previous paragraph. These include seasonal weather conditions and the incidence of diseases such as bunchy top, panama disease and leaf spot. Reference to the effect on prices of production losses caused by abnormal weather is made later in this analysis. The effects of disease are of a general nature and do not warrant specific treatment from the prices aspect. However, it is interesting to note that the incidence of panama disease has wrought profound changes in the industry, particularly in the Redlands area where the Lady Finger Variety predominates.

With regard to production districts, reference to Table 1 shows that the main areas are located within the Moreton Statistical Division, which accounts for about 77% of the State's total production. Also apparent from Table 1 is the fact that production in the Cairns Division has been fairly well maintained at a time when other Divisions have registered a general decline. Moreover, under the influence of a bountiful yield, the Cairns Division in 1952-53 recorded its best harvest for the last four years.

TABLE 1.

BANANAS—QUEENSLAND.

Area, Production, and Yield in Main Statistical Divisions.

Statistical Division.	1948–49.	1949–50.	1950–51.	1951–52.	1952–53.
	Bearing Area—Acres.				
Moreton	4,614	4,413	4,049	3,225	2,886
Maryborough	865	668	584	392	325
Rockhampton	410	320	247	175	143
Cairns	227	187	237	166	211
Rest of State	209	146	119	78	97
Total State	6,325	5,734	5,240	4,036	3,662
	Production—Bushels.				
Moreton	496,852	469,768	473,412	369,989	306,740
Maryborough	86,570	61,882	63,155	35,555	27,560
Rockhampton	34,345	20,322	20,573	11,328	10,657
Cairns	27,679	16,134	26,206	21,645	28,999
Rest of State	19,980	12,842	12,939	8,357	10,880
Total State	665,426	580,948	596,285	446,874	384,836
	Yield—Bushels per Acre.				
Moreton	108	106	117	115	106
Maryborough	100	93	108	91	85
Rockhampton	84	64	83	65	75
Cairns	122	86	111	130	137
Rest of State	96	88	109	107	112
Total State	105	101	114	111	105

(Source: Queensland Government Statistician.)

MARKETING.

The various producing districts north from Maryborough to a large degree find their principal wholesale markets in the nearer of the larger coastal towns where ripening facilities are available. Similarly, Brisbane is the principal market for bananas grown between Gympie and Coolangatta, and the quantity handled here each year represents about 70% of the State's total production. However, a small proportion of production in the southern districts usually bypasses the Brisbane market by way of direct consignment to markets in the southern States. Brisbane is also at times an important outlet for bananas produced in the northern New South Wales districts between Murwillumbah and Tweed Heads, but the volume of receivals from that source is inclined to vary according to the relationship between prices in Brisbane and Sydney.

Details of Queensland production and interstate movements of bananas since 1949-50 are set out in Tables 2–4.

TABLE 2.

BANANAS—QUEENSLAND.

Production and Interstate Imports and Exports.

——	1949–50.	1950–51.	1951–52.	1952–53.
	Bushels.			
Production	581,000	596,000	447,000	385,000
Imports	n.a.	31,000	18,000	34,000
Exports	158,000	145,000	81,000	79,000

(Year ending 31st March.)

TABLE 3.

QUEENSLAND.

Interstate Imports of Bananas.

Period.	——	1950.	1951.	1952.	1953.
January–March ..	Bunches ..	2,230	4,322	8,080	17,647
	Cases ..	3,290	2,830	2,554	5,192
April–June	Bunches ..	4,052	2,439	7,868	18,076
	Cases ..	3,394	590	1,918	6,861
July–September ..	Bunches ..	1,523	523	9,278	3,739
	Cases ..	3,611	878	1,763	1,185
October–December ..	Bunches ..	4,210	1,018	7,156	8,519
	Cases ..	8,123	4,603	1,995	7,717
January–December ..	Bunches ..	12,015	8,302	32,382	47,981
	Cases ..	18,418	8,901	8,230	20,955

TABLE 4.

QUEENSLAND.

Interstate Exports of Bananas.

Period.	1949.	1950.	1951.	1952.	1953.
	Number of Cases.				
January–March	42,114	30,322	27,803	7,963	14,107
April–June	31,818	25,258	21,797	18,393	12,678
July–September	23,695	26,728	14,119	6,265	15,297
October–December ..	30,010	26,642	15,906	10,083	13,376
January–December ..	127,637	108,950	79,625	51,704	55,458

(Source: Department of Agriculture and Stock.)

Apart from the distribution aspect, the marketing of bananas has inherent characteristics which are peculiar to that trade. In the first instance, bananas are marketed in a green condition and undergo a ripening process before resale to the retail trade. This ripening process requires a minimum of about three days but can be extended to 10 days and sometimes longer. In Brisbane there are both private and co-operative firms with ripening facilities. These firms act in the capacity of wholesale merchants and they receive by direct consignment the great bulk of the bananas reaching this market. In addition, a small quantity of fruit on the bunch is usually available for public auction each day,

but most of this fruit is purchased by the merchants. Merchants' prices to growers for green fruit are generally related to the current price for ripe bananas, although they are also influenced by the merchant's expectations regarding the state of the market in the immediate future.

SEASONAL PATTERN.

Banana prices over the last six years reveal a definite and fairly regular seasonal pattern.

In view of disturbances to production resulting from abnormal weather conditions, changing acreages and varying yields, it is somewhat surprising that a definite pattern is so readily discernible. However, it would seem that the influence of supply on seasonal pattern is of only a minor character. This is readily understood when it is considered that the cutting of bananas is fairly well spread throughout the year, so that the periods of peak supply associated with most other varieties of fruit are not a feature of bananas.

The important determinant of seasonal movement in banana prices is fluctuation in demand.

Before proceeding to the detailed description, it is as well to mention that a comparison between prices for Cavendish and related varieties such as Mons Mare and Williams Hybrid reveals a marked similarity of movement. This similarity exists regardless of whether presentation is in bunches or cases. Quotes for green and ripe fruit and for the various grades of cased bananas also tend to move in sympathy. Consequently, the detailed description has for convenience been restricted to the movement of ripe cased Cavendish and the grade selected for analysis is "sevens." The Lady Finger variety constitutes only a small percentage of total receivals and any difference in seasonal pattern as compared with Cavendish is dealt with later.

Information on these prices is contained in Tables 5–7 and Fig. 1.

TABLE 5.

BANANAS (LADY FINGER).

Ripe Bunches.

Average Monthly Prices—Brisbane Wholesale Markets.

Month.	1949.	1950.	1951.	1952.	1953.
	Pence per lb.				
January	6·0	5·0	7·5	9·6	14·3
February	6·4	4·2	7·6	9·8	12·7
March	5·9	4·6	7·0	10·5	9·7
April	4·8	4·8	4·8	12·1	8·1
May	5·4	4·7	6·5	12·0	8·1
June	5·2	4·7	7·3	13·4	8·0
July	4·3	3·9	7·8	14·5	10·0
August	4·6	4·4	6·5	14·5	10·0
September	4·7	4·2	6·5	14·5	10·8
October	4·9	5·6	7·0	12·6	11·8
November	4·2	5·6	7·5	14·0	12·5
December	4·7	7·4	7·7	14·8	12·0

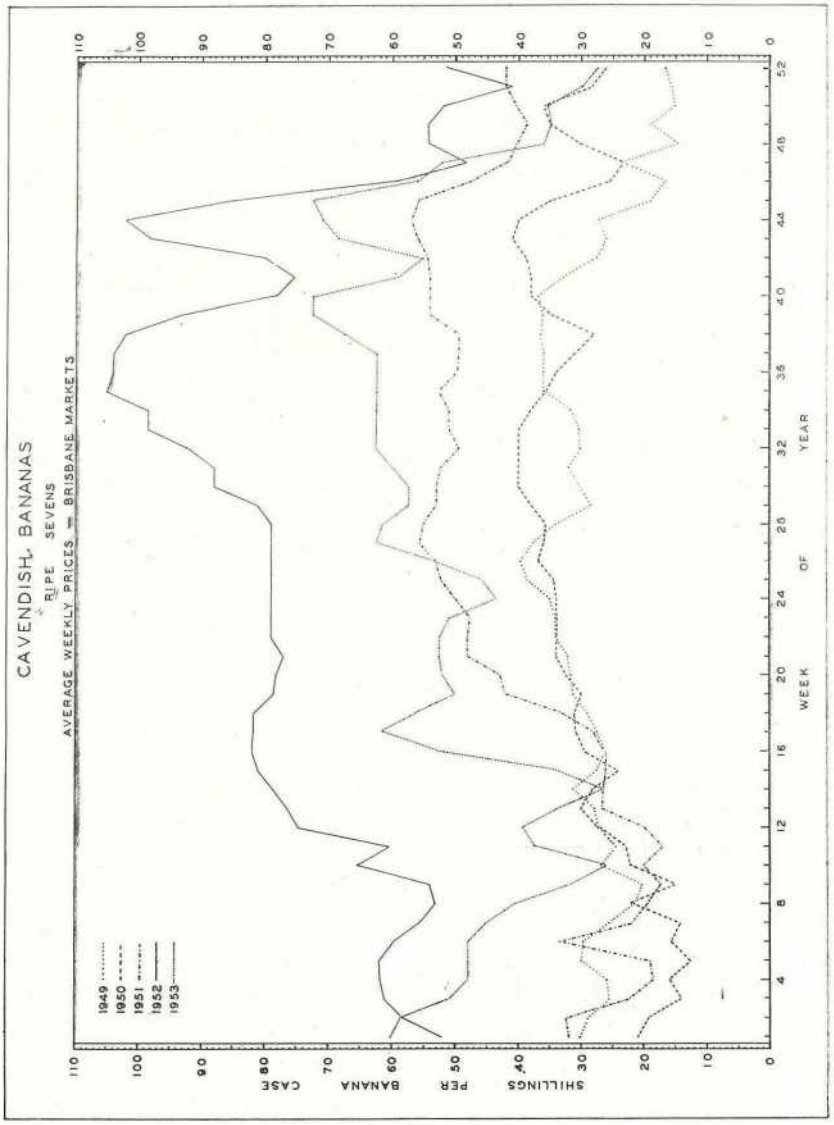


Fig. 1.

Average Weekly Prices of Cavendish Bananas (Ripe Sevens), 1949-1953.

TABLE 6.

BANANAS (CAVENDISH).

Ripe Bunches.

Average Monthly Prices—Brisbane Wholesale Markets.

Month.	1949.	1950.	1951.	1952.	1953.
	Pence per lb.				
January	4·0	3·0	4·1	8·5	8·5
February	4·1	2·2	3·7	8·4	7·9
March	3·6	3·3	3·6	10·0	6·3
April	3·8	3·7	4·2	11·4	6·9
May	4·0	3·5	6·2	11·5	7·6
June	4·8	3·9	7·0	12·0	7·5
July	4·4	4·3	7·8	12·3	8·0
August	4·6	4·6	6·4	14·9	8·0
September	4·5	4·1	6·1	15·1	8·9
October	4·4	5·2	7·7	11·7	10·3
November	3·2	4·3	6·7	9·2	9·5
December	2·8	4·4	6·4	7·8	5·7

(Source : Division of Marketing.)

TABLE 7.

BANANAS (CAVENDISH).

Ripe Sevens.

Average Monthly Prices—Brisbane Wholesale Markets.

Month.	1948.	1949.	1950.	1951.	1952.	1953.
	Shillings per Banana Case.					
January ..	16·8	27·6	16·9	24·8	59·3	54·8
February ..	13·4	26·7	15·8	23·0	57·0	45·7
March ..	15·2	25·7	22·7	20·3	68·8	36·2
April ..	23·2	28·3	28·2	26·5	81·0	42·5
May	28·8	31·2	32·3	43·2	78·2	52·5
June	34·8	36·4	34·8	51·0	79·0	48·0
July	33·1	32·5	37·4	54·1	83·9	58·8
August ..	30·0	32·0	38·6	51·4	98·5	61·8
September ..	26·9	36·1	31·9	50·7	100·9	65·5
October ..	28·6	30·8	38·9	55·3	86·8	63·9
November ..	20·1	19·8	30·8	46·3	61·8	62·9
December ..	21·6	16·7	31·8	40·4	48·6	33·2

(Source : Division of Marketing.)

[TO BE CONTINUED.]

PLANT PROTECTION

A Strawberry Ripe Fruit Rot.

O. W. STURGESS, Assistant Pathologist, Plant Pathology Section.

The presence of a new disease of the strawberry, capable of causing minor losses within crops, was responsible for nearly 50% ripe fruit wastage in some plantings during the susceptible period of October 1952. The disease was originally recorded in the previous season at Ormiston. Subsequently, diseased berries were detected in plantings at Lindum, Wellington Point, Birkdale, Cleveland, Eight Mile Plains, Rochedale, Upper Mount Gravatt, and Mitchelton towards the end of the 1953 season.

Symptoms.

Only full coloured, ripe berries exhibit signs of the rot; unripe berries, even if subject to infection, do not express symptoms. On mature fruit the disease is characterised by the formation of tan or dark-brown, slightly depressed areas which, as they enlarge, are accompanied by a shrivelling of the affected tissues (Plate 1). Pink spore masses are located on the berry surface but are not readily discernible with the naked eye unless held to the light. Infection initiates at any point on the fruit and frequently more than one spot may be present. Unless secondary soft rot organisms gain entry, the area of decay is firm and the final process is one of mummification.

Leaf and flower stalks affected by the disease show black, slightly depressed, longitudinal lesions scattered along the stalks (Plate 2).

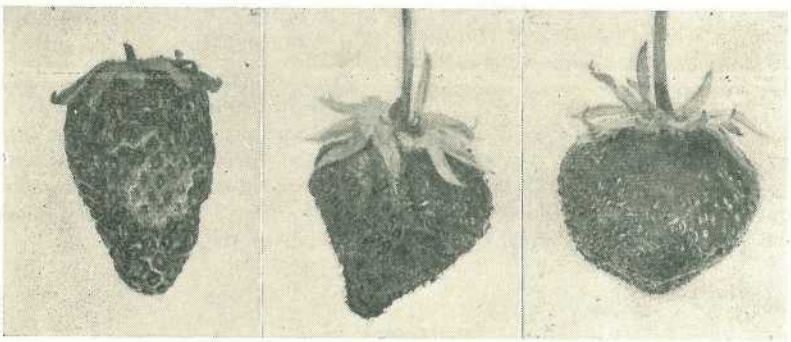


Plate 1.

Strawberry Ripe Fruit Rot. Left, early stage rot. Centre, later stage showing shrivelling. Right, healthy berry.

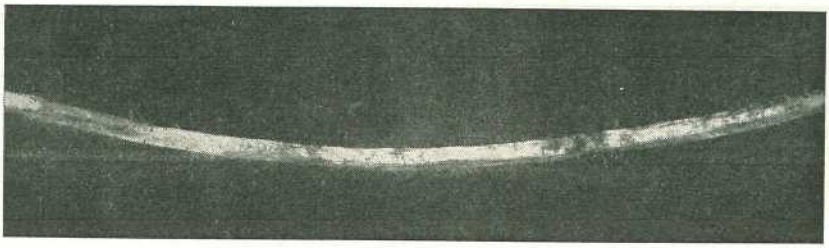


Plate 2.

Strawberry Ripe Fruit Rot. Leaf stalk symptoms. Note the scattered black marks running along the stalk.

Cause and Spread of the Disease.

The causal organism is a species of the fungal genus *Gloeosporium*. Germinating spores are capable of penetrating an unbroken fruit surface If the berry is green, the fungus undergoes a period of dormancy and then as the berry ripens further growth takes place and fungal threads penetrate the tissues, resulting in the spot described.

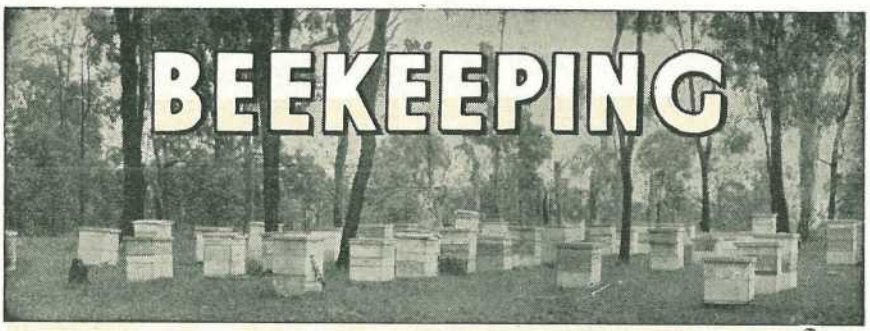
In south-eastern Queensland, the optimum temperature requirement of the fungus of 75° F. to 85° F. restricts the fruit rot to the mid-spring and early summer months. Under normal seasonal conditions, the bulk of the strawberry crop is harvested by mid-spring, leaving the final crop of small jam berries subject to infection. Temperature studies show that high summer and low winter temperatures do not favour the development of this disease. This accounts for the absence of ripe fruit rots during the winter crop.

Autumn temperatures also favour fungal growth and the development of spores on the leaf stalks of strawberry mother plants. These spores infect the strawberry runners, enabling the disease to be taken into new plantings. Rainfall and irrigation waters are responsible for field spread from infection centres during the autumn and spring.

Recommendations.

Investigations to determine methods of field control of the strawberry ripe fruit rot have not been conducted. There are several factors which restrict the use of fungicides on the berries themselves. Firstly, a complete and continuous fungicidal coverage on the surface of developing berries is difficult to maintain. Secondly, fungicidal residues reduce fruit quality. However, the routine fungicidal application maintained by some growers for leaf-spotting diseases will assist in checking the ripe fruit rot. If a copper fungicide can be applied in the runner beds in the autumn without damage by trampling, treatment at this time is recommended.

It is recommended that all diseased berries be collected and removed during the routine pick. Unripe berries for jam purposes should be held on the farm until ripe so that affected berries may be rejected before despatch to the cannery.



The Honey Flora of South-Eastern Queensland.

S. T. BLAKE (Botanist) and C. ROFF (Adviser in Apiculture).

(*Continued from page 206 of the April issue.*)

Groundsel Bush.

Botanical Name.—*Baccharis halimifolia* L.

Other Common Names.—Groundsel, tree groundsel.

Distinguishing Features.—A dense shrub with toothed leaves, yellow or white flowers and " seeds " like thistledown (Plates 76, 77).

Description.—This is a dense leafy shrub with woody stems, mostly 4–8 ft. high, sometimes higher, and often as wide. The leaves are arranged alternately along the branches ; they are roughly oval in outline, about 1–2 in. long, and usually with 3–7 sharp teeth ; they are greyish green in colour, and in some lights the young growth looks as though it had been silverfrosted at some time. The flowers are small and exceedingly numerous ; they are grouped into small heads about $\frac{1}{6}$ in. long and wide, each of which has the general appearance of a single flower. Male and female flowers are produced on separate bushes ; the males are dull yellow but the females are white. The " seed " resembles thistledown.

Distribution.—Moreton District and the southern part of the Wide Bay District. The bush is a bad weed in coastal localities and has spread rapidly in recent years.

Usual Flowering Time.—March–April.

Colour of Honey.—Light amber.

Importance as Source of Honey.—Minor.

Importance as Source of Pollen.—Medium.

General Remarks.—This bush provides a valuable pollen supply in coastal districts during autumn and is worked heavily by bees. The honey obtained is of use only as bee food.

Note.—In other parts of Australia the name " groundsel " is commonly used for a very different kind of plant (some species of *Senecio*).

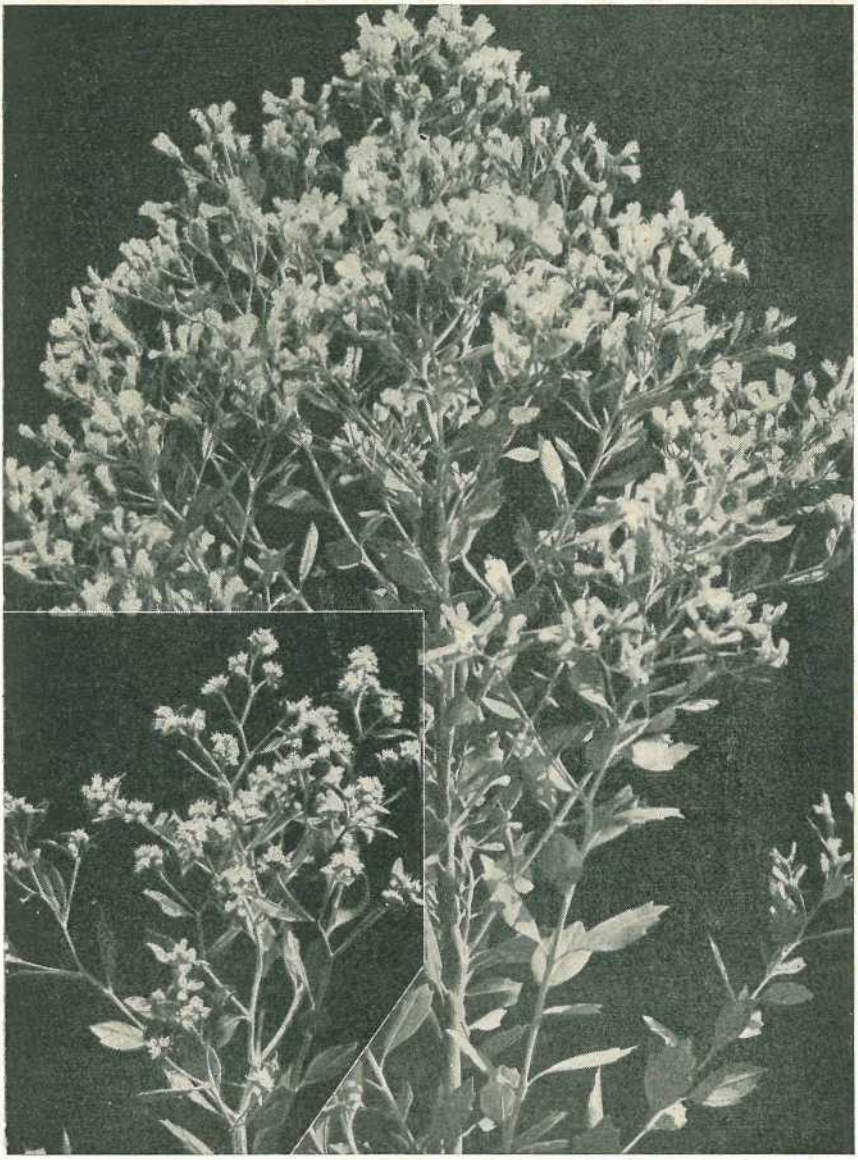


Plate 76.

Groundsel Bush (Baccharis halimifolia). Flowering branches; male plant at left on a slightly smaller scale.

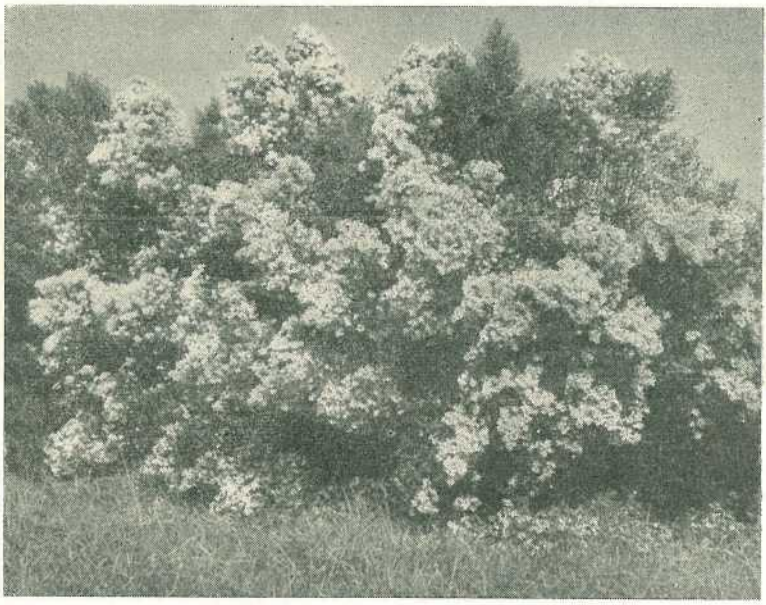


Plate 77.
Groundsel Bush (Baccharis halimifolia). Chermside.

[TO BE CONTINUED.]

Eradicating Bracken Fern.

A total of 218 acres of bracken country has now been rolled with the bracken fern eradicator sent to the Atherton District in April last year, the Minister for Agriculture and Stock (Hon. H. H. Collins) announced recently.

Since its arrival in the Atherton District, the machine has been used by 13 farmers. Ten of them used it a second time to treat a total of 196 acres. Of these, five used it a third time over a total of 135 acres, and three of these farmers completed four rollings over 95 acres.

Mr. Collins said that there has been a significant increase in pasture coverage after the second and subsequent rollings. Kikuyu, common Guinea and green panic grasses appear to be quickest in re-covering the treated areas.

The machine can be drawn by either a horse or a tractor. Powered by one horse, the eradicator will roll one acre of bracken in two hours. With a tractor the time is reduced to 1¼ hours.

Where operations have not met with interference from logs and undergrowth, the bracken has been beaten to the ground and the stems bruised in up to four places.

Effective bruising was achieved when the machine was travelling at 4 m.p.h., but at higher speeds the efficiency dropped off.

Demonstration of methods of eradicating bracken is one of the projects in Queensland under the Commonwealth Dairy Industry Extension Grant.

Still More Wool!

Part 4. What Will You Gain from Classing?

G. R. MOULE and R. E. CHAPMAN, Sheep and Wool Branch.

Your purpose in classing or selecting sheep is to choose those which are to become parents. You aim to choose ewes and rams which are better than the rest of the flock, hoping they will pass on some of their good points to their offspring.

However, it is not quite as easy as that! In most flocks, there is a limit to the number of ewes you can choose. In the previous article of this series a method was explained by which you could determine your possible level of selection. In many flocks in Queensland the lamb-marking percentages are not high enough to allow the culling of many more than 25% of the young ewes. Of course, in stud work, it is often possible to select a few of the very best ewes from a flock, such as the reserves, to go into the top stud.

Similarly, you need to select comparatively few rams each year to meet replacements in any flock or stud. The position is a little different in a stud selling rams. Its aim is to sell as many rams as possible, provided quality is maintained.

What you get from classing will depend on how accurately you select your sheep for the characters you want. If you actually measure the characters you require in your sheep, your selection will be more accurate. It is easy enough to weigh fleeces as sheep are shorn. A 4 oz. sample taken from the mid side area of each fleece can be sent to the Wool Laboratory in the Sheep and Wool Branch for scouring. The staple length, fibre diameter and evenness can also be measured. The sample can be judged for trade count and trade type.

You can also weigh your sheep. The results obtained from doing these things will give you most of the facts and figures you require to assist you in making your selection more accurate.

Suppose you have 1,000 young ewes and you wish to select the 750 which will cut the heaviest greasy fleeces. By weighing each fleece, and placing some identification mark on each animal which can be related to the recorded fleece weight, you could readily select the 750 heaviest cutting sheep.

If you arrange the fleeces in weight groups each ½ lb. heavier than the previous, you may find results similar to those in Table 1.

TABLE 1.

DISTRIBUTION OF FLEECES IN WEIGHT GROUPS FROM 1,000 YOUNG EWES.

Greasy Fleece Weight (lb.)	2¾–3¼.	3¼–3¾.	3¾–4¼.	4¼–4¾.	4¾–5¼.	5¼–5¾.	5¾–6¼.
Average weight (lb.)	3	3½	4	4½	5	5½	6
No. of fleeces ..	1	14	34	70	128	183	200

Greasy Fleece Weight (lb.)	6¼–6¾.	6¾–7¼.	7¼–7¾.	7¾–8¼.	8¼–8¾.	8¾–9¼.	
Average weight (lb.)	6½	7	7½	8	8½	9	..
No. of fleeces ..	167	116	55	25	3	4	..

You can get a better idea of the distribution of the fleeces in the various weight groups by seeing the results in picture form, as shown in Figure 1.

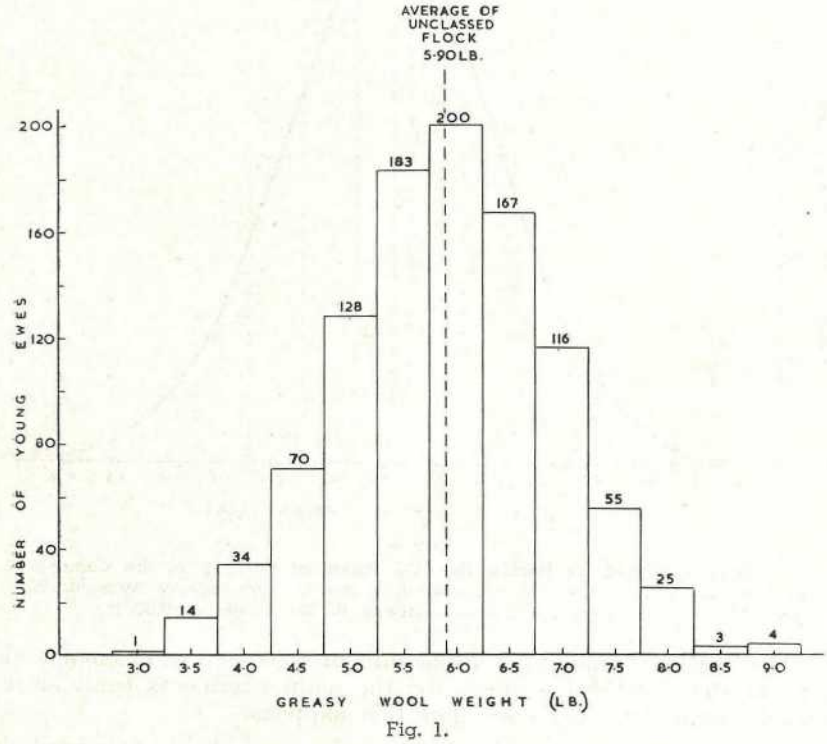


Fig. 1.

Distribution of Greasy Fleeces from 1,000 Young Ewes in Various Weight Groups Ranging from 3 lb. to 9 lb. The numbers in the groups are represented by the heights of the columns.

Here you will notice the average fleece weights of the groups are marked off at equal intervals on the line across the page—that is, 3 lb., 3½ lb., and so on. The height of each column represents the number of fleeces in that particular weight group. The scale to which these heights are drawn is on the left side of the page. You can see that the fleeces are grouped fairly evenly on either side of the column whose centre point is 6 lb.

By drawing a line through the points at the top of the columns you obtain the bell-shaped curve shown in Figure 2. If you measure other characters, such as clean scoured fleece weights, staple length, fibre diameter or numbers of fibres per square inch, of a fairly large number of unclassed sheep and plot the results, you would obtain curves similar to that in Figure 2. These usually agree closely with what are known as curves of normal distribution, and are typical of measurements made on a group of animals of comparable ages in which there has been no selection.

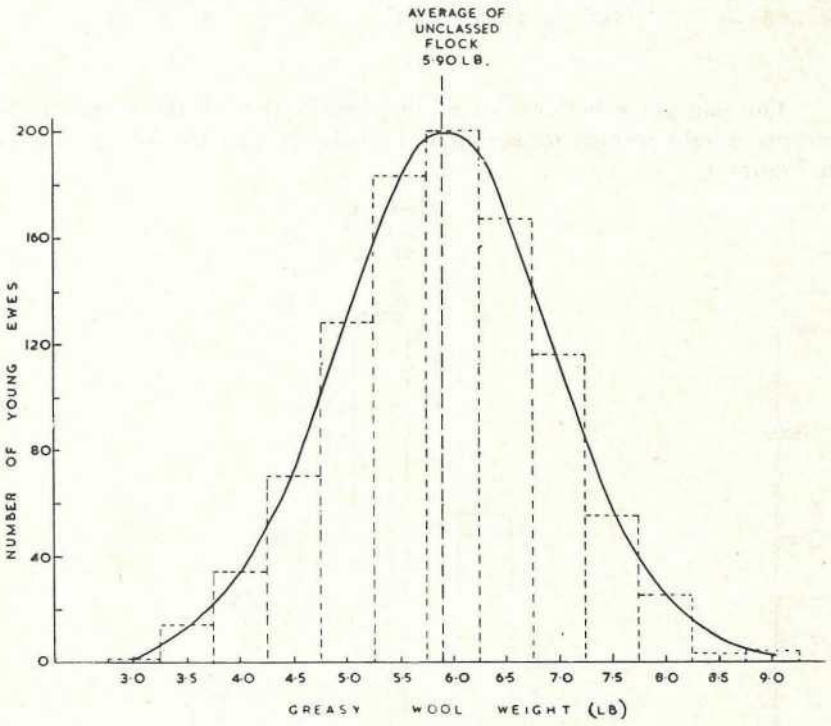


Fig. 2.

Curve Obtained by Joining the Mid Points at the Top of the Columns in Fig. 1. Notice how this distribution curve is very nearly symmetrical about the line marking the average greasy fleece weight of 5.90 lb.

The object of classing, culling and/or selection is to change the shape of the distribution curve for the main characters contributing to wool production. Let's see how this happens.

The average cut per head of the young sheep presented in Figure 1 is 5.90 lb. of greasy wool. Suppose we were to take off the 25% of lowest cutters. Our flock would be divided as in Figure 3.

The average cut per head of the lowest cutting 25% of sheep would be 4.63 lb.—of the remaining 75% it would be 6.32 lb. This means that by taking out 25% of the sheep you have increased the average cut per head by (6·32–5·90) lb. = 0·42 lb. Similarly, if you took off the 25% heaviest cutters you would have 250 sheep whose average cut per head would be 7.24 lb. of wool. Their cut per head would be (7.24–5.90) lb. = 1.34 lb. of greasy wool above the average of the unclassed flock.

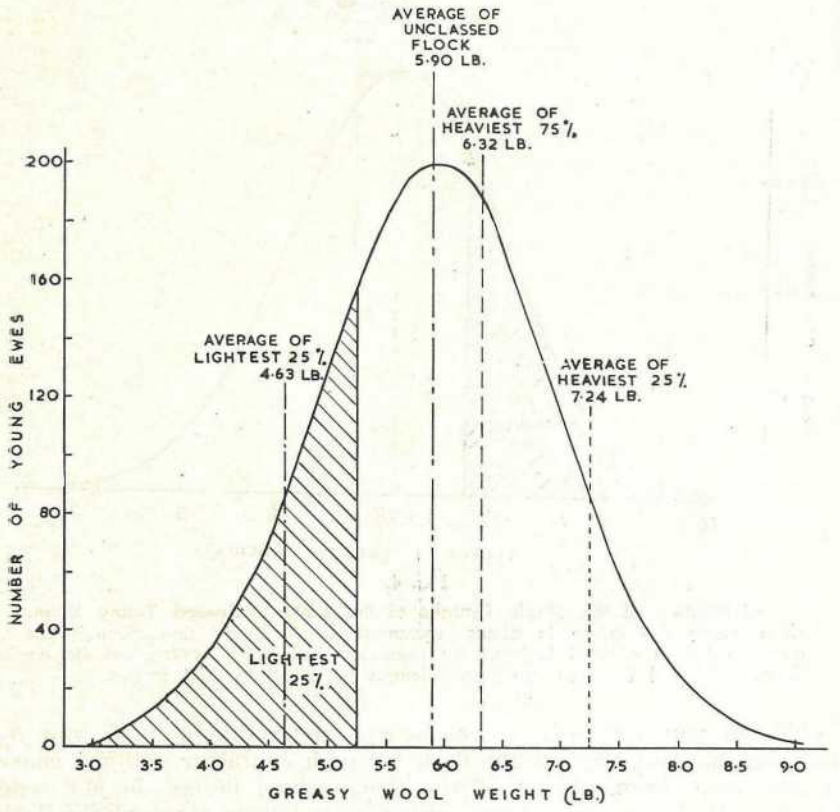


Fig. 3.

Showing How the Group of 1,000 Young Ewes is Divided when 250 Sheep with Light Fleeces in the Shaded Area are Culled.

You could study the other factors which contribute to wool weight in a similar manner. For instance, if you know the staple length of each sheep in a group, you could find the number of sheep with each different length. By plotting the results you might obtain a curve similar to Figure 4, which is for the 1,000 young ewes mentioned previously. The average staple length of these sheep is 2½ inches. If you take off the 250 sheep with the shortest staples, the average staple length of the remainder would be 2.6 inches. Hence, your gain in staple length from classing would be (2.6–2.5) = 0.1 inch.

You could go on to consider clean fleece weights and fibre diameters in the same way. However, the case of fibre diameter is somewhat different, in that you have to take into account the type

of wool best suited to your district. The sheep you would reject would be those that were too strong and too fine. This means that you would cut off both ends of your distribution curve instead of only one end, as in Figures 3 and 4.

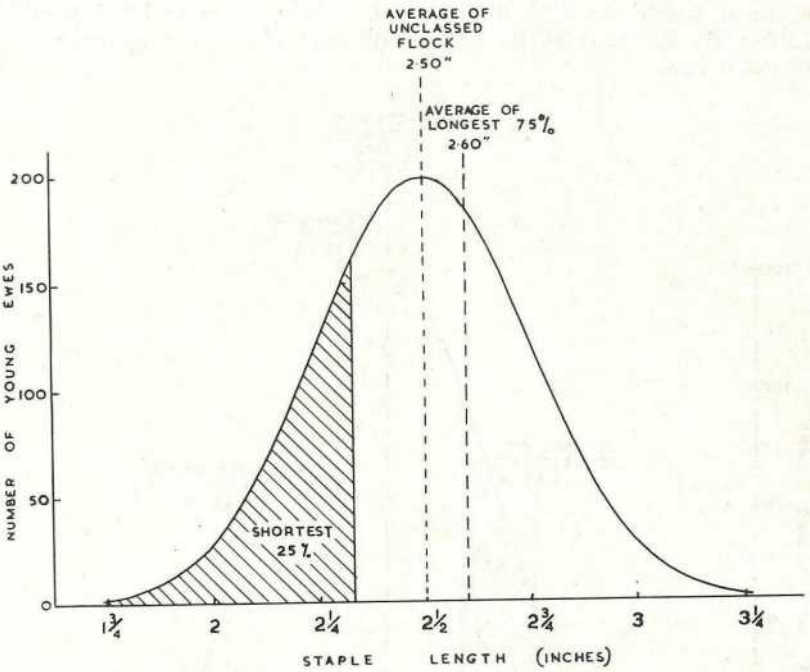


Fig. 4.

Distribution of the Staple Lengths of the 1,000 Unclassed Young Ewes. Here again the curve is almost symmetrical about the line through the average length of 2.50 inches. By removing 250 sheep with short staples (shown shaded) the average staple length is raised to 2.60 inches.

When you get down to considering individual animals you will find that the best 75% of the flock for each character will not consist of the same sheep. Some of the sheep whose fleeces do not weigh heavily will be amongst those which have longer staples. Similarly, some of the sheep which have a lower percentage yield may be amongst the sheep which cut heavier fleeces. Therefore, you have to decide which of the sheep you intend to reject and which ones you would like to keep. You will have to give ground on some points. While you will reject most of the sheep whose fleeces are light, you may have to leave in some of those which have shorter stapled wool, or whose fleeces do not yield so well. Also it may be necessary for you to reject some of the sheep with heavier fleeces because they are far too strong or too fine for your flock.

However, if your selection has been successful, the shape of your fleece weight curve will be similar to that in Figure 5. The larger space on the left between the curves for the classed and unclassed group shows that you have taken out a considerable proportion of the ewes with light fleeces, and kept as many as possible of your sheep with heavy fleeces.

You will notice that the average of the 750 ewes selected is 6.12 lb., which is a gain of (6.12–5.90) lb. = 0.22 lb. This is rather less than the (6.32–5.90) lb. = 0.42 lb. gain which you would have obtained if you could have considered fleece weight alone. This shows that the more points you consider the slower will be your rate of progress in increasing fleece weight.

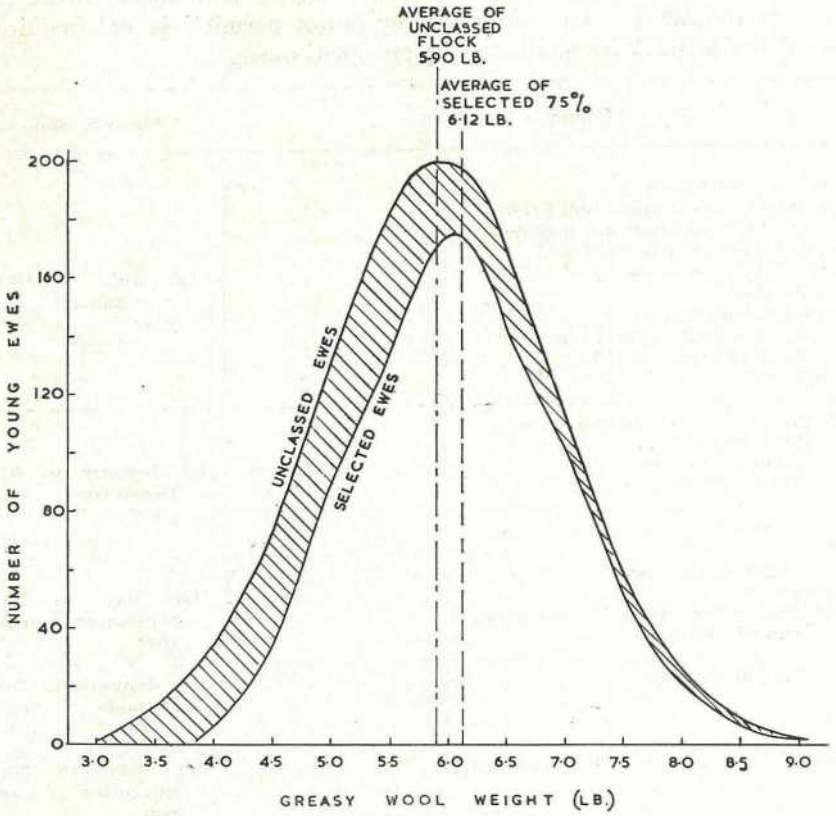


Fig. 5.

Distribution of Fleece Weights of 750 Young Ewes Selected from the Original 1,000 for Other Characters in Addition to Fleece Weight. The shaded area represents those that were culled. Notice that there is no longer the clear-cut division as in Fig. 2. Also, the average fleece weight has been raised to 6.12 lb., compared with 6.32 lb. in Fig. 2.

Had you been able to cull more than 25% of your young ewes, your gain would have been greater. For instance, if you culled 40% of the previously unclassed 1,000 young ewes for light fleece weight, the average cut per head of the remaining 600 would be 6.53 lb. Your gain would then be (6.53–5.90) lb. = 0.63 lb.

If, on the other hand, you culled only 5% of the lowest cutters amongst the original 1,000 young ewes, the average cut per head of the remainder would be 6.01 lb. In this case, the gain would be only (6.01–5.90) lb. = 0.11 lb., which is considerably less than for the heavier culling rates.

The gain you obtain from classing is an immediate one. However, not all of it will be passed on to the following generation. This is the subject that will be discussed in the next article of this series.

Open Seasons for Birds.

For commercial and sporting purposes the birds listed in the following table have fixed open seasons, and any person in possession of an "open season fauna permit" may hunt or trap them during the periods indicated. An "open season fauna permit" is not required to take wild duck or quail during an open season.

Common Name.	Open Season.
Black-throated finch Chestnut-breasted finch (bull finch) Diamond firetail (diamond sparrow) Banded finch (double-bar finch) Longtailed finch (grass finch) Masked finch Plum-headed finch Red-browed finch (redhead finch) Star finch (redfaced finch) Zebra finch	1st July to 30th September each year
All introduced birds including :— Java sparrow Non-pareil finch Nutmeg finch Strawberry finch Goldfinch	1st January to 31st December each year
Budgerigah or shell parrot King parrot Rainbow lorikeet (Blue Mountain parrot) Red winged parrot	1st May to 30th September each year
Rosellas (all species)	1st January to 31st December each year
Cockatiel (cockatoo parrot or quarrian)	1st May to 30th November each year
Brush or scrub turkey	1st June to 30th September each year
Grey duck (black duck) Maned goose (wood duck) Quail (all species)	1st January to 31st December each year in certain districts, and as declared from time to time in other districts
Australian snipe Pin-tailed snipe Knot Great knot Sandpiper Stint Tattler Whimbrel	14th November each year to 15th March in the following year

ANIMAL HEALTH

Foot-rot of Cattle.

O. H. BROOKS, Divisional Veterinary Officer, Rockhampton.

An epidemic of foot-rot can seriously upset a milking herd, as no other disease, with the exception of mastitis, causes such a rapid decline in milk production. The complaint is usually more prevalent following a long period of wet weather, and tends to be of seasonal occurence. During 1950, it was common to find that 30% of milkers affected by the disease had become permanently dry before being treated effectively.

The disease sometimes does make its appearance during dry weather, when cattle have to walk over stony ground or graze on hillsides and steep embankments. Under such conditions, however, cases are sporadic rather than of an epidemic nature.

Plate 1.

Foot-rot in Bull, Showing Hard Granulation Tissue and Separation of Coronet. The animal has a white foot.

Adults Only Affected.

Foot-rot is confined to adult stock on account of predisposing factors necessary for the infection to gain entry to the soft tissues of the foot (see later).

Bulls are very susceptible, more especially when subject to the predisposing factors common to cows. Their extra weight would be an additional factor.

Source of Infection.

Foot-rot is caused by a germ (*Fusiformis necrophorus*) which is found under a wide variety of conditions, wherever stock are congregated.

The germ persists in soil for long periods, although it may not infect cattle until conditions are favourable for it to penetrate the coronet and cleft of the foot.

After the germ passes through the skin of the coronet or cleft, it multiplies rapidly, causing an inflammation which, on account of the closely knit structures of the foot, produces severe pain from pressure. The pressure over the affected area arises from the inflammation, exudates, and in the later stages, pus.

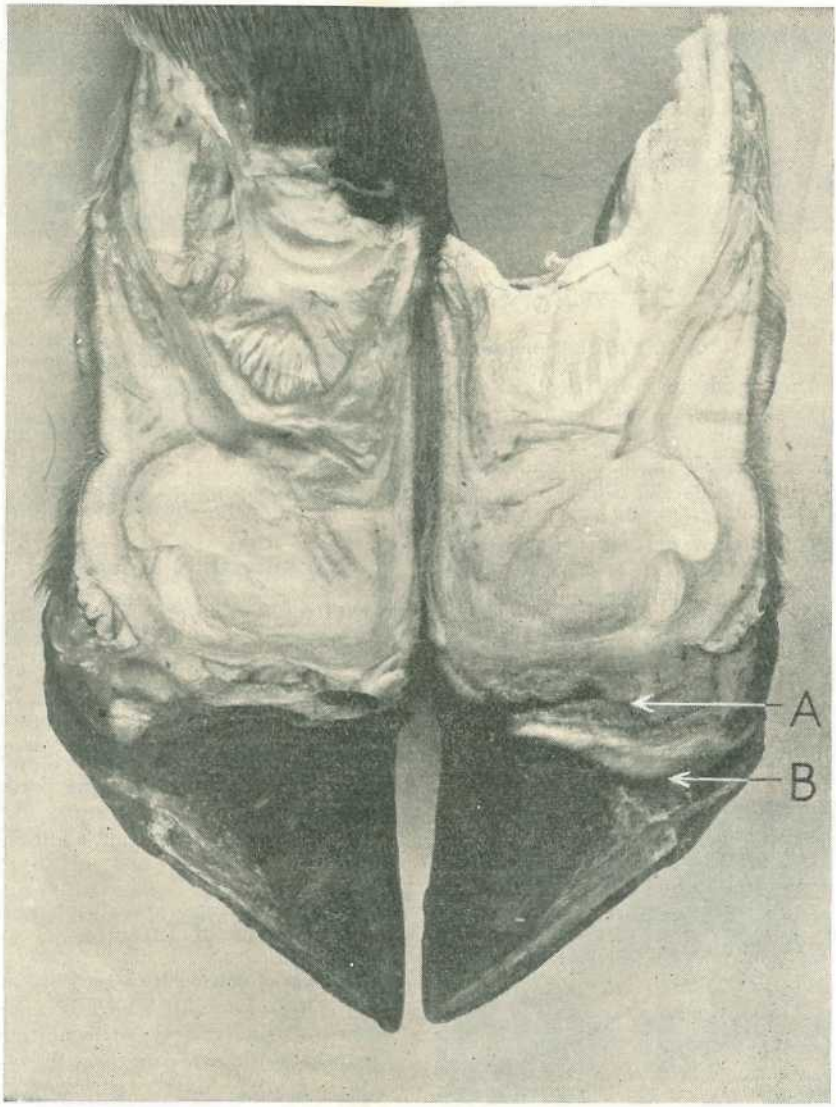


Plate 2.

Section of Foot Affected with Foot-rot. Ulceration of the joint is shown at A and separation of the hoof at B.

Symptoms.

Affected animals begin to favour the affected leg soon after the infection becomes established. The symptoms become more pronounced within 48 hours until the animal moves reluctantly and often carries the affected leg. It is usual for only one foot to be affected. At this stage the swelling of the tissue above the coronet, and in the cleft of the foot, is readily seen after it is cleaned. Cases do occur where there is considerable lameness but no swelling.

The cleft of the foot is the more common site of entry of the germ, and the swelling is then located in this region. Pressure with the fingers

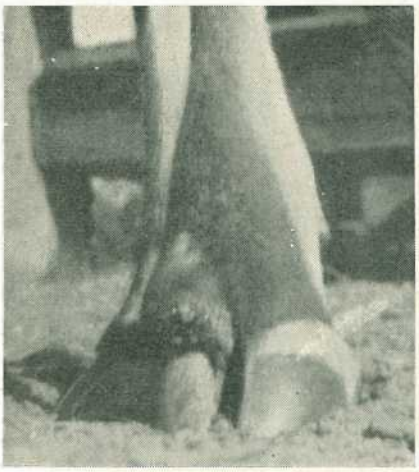


Plate 3.

Foot-rot, Showing Ulceration Above the Coronet Extending into the Cleft.

over the affected area will produce evidence of acute pain. As the condition progresses, the swelling extends further up the leg and may be observed as far as the knee or hock.

Plate 4.

Foot-rot, Showing Extreme Lameness. The abnormal position of the right foreleg is the result of pain in the affected foot.

After a few days the skin over the affected area usually ruptures, and allows the escape of a thick, creamy pus, which forms into a scab. When this is removed, the underlying tissue is in the nature of an ulcer; it has a raw fleshy appearance, and pus can be expressed from it. This tissue, referred to as granulation tissue, eventually replaces the damaged and necrotic tissue in the process of recovery. In the more acute cases, several abscesses may form around the coronet, leading to the formation of channels from which discharges escape intermittently.

If untreated, the infection may penetrate to the deeper tissues, such as the tendons and joints of the pastern, when the loss of a claw is not an uncommon sequel.

Neglected cases of foot-rot usually result in the formation of a club foot. The accumulation of fibrous tissue laid down to localise the infection remains as a disfigurement, and the animal is usually left with a permanent limp, as the foot cannot make complete contact with the ground.

Such conditions often lead to overgrowth of the claws, which usually turn upwards to form long horn-like structures. Due to lack of wear, they continue to grow until the animal is unable to move with the herd and is usually culled.

Predisposing Causes.

Any happening which lowers the resistance of the skin of the foot to infection may allow the entry of the foot-rot germ. The most common predisposing cause is prolonged wet conditions, when yards and watering places become very boggy and the softened skin is easily bruised. As stones are often used to minimise boggy conditions in yards, they can be a serious factor when they eventually become mixed with mud.

The outlet of the bails is often a place where injuries to the foot occur, more especially when the soil is eroded away from the concrete floor, leaving a considerable drop into a mudhole. Deep hoofprints, made in wet weather, often cause foot damage when the ground dries and hardens. Such irregularities are common around gates, dams, water troughs, etc.

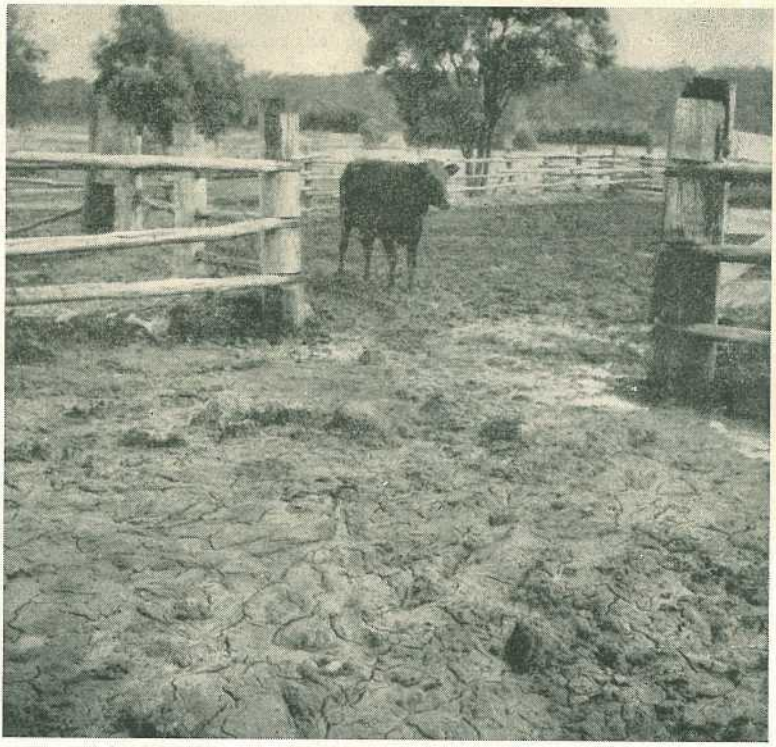


Plate 5.
A Yard Such as This is Often Responsible for an Outbreak of Foot-rot.

Stony ground, more especially on hillsides and steep embankments, can also be a serious predisposing factor. Deep eroded cattle pads on embankments and leading to the bails can also be a source of injury to the hoof.

Cattle stalls with earth floors become contaminated and are a serious source of infection, as the predisposing factors are usually present under these circumstances. The use of a footbath at showgrounds has proved effective in minimising the infection from this source.

Treatment.

One dose of 100 c.c. of sodium sulphamezathine solution (33⅓%) given as an injection is sufficient to treat the average dairy cow, providing it is applied before extensive damage to the hoof has occurred. A second dose may be necessary in 2-3 days, if the response is not complete.

Penicillin, given as a single massive dose of about 3,000,000 units, is also effective, and may be a little cheaper.

Where a footbath is available, good results are sometimes obtained by allowing the affected animal to stand in a bath of a 10% solution of bluestone for 20 minutes daily for a few days. This form of treatment may also be used as a preventive when the cattle walk through a bath on their way to the bails.

Prevention.

Where foot-rot reaches epidemic proportions, the removal of predisposing causes becomes worthwhile. Steps can be taken to ensure that the holding yard and surroundings of water troughs and dams do not become excessively boggy. A concrete pathway leading from the bails has been found to be an advantage. Concrete floors in stalls likewise are of value.

The Use of the Newer Insecticides in the Control of Cattle Tick.

(*Continued from page 211 of the April issue.*)

PREPARED BY OFFICERS OF THE ANIMAL HEALTH STATION, YEERONGPILLY.

Tick Resistance.

So far as is known there has been no authenticated report of DDT resistance in Australia.

Resistance to BHC has, however, been reported, and there is no doubt it exists and is probably widespread. The late Mr. L. F. Hitchcock, of C.S.I.R.O., recently published a paper on the subject.

Some years ago in South Africa the blue tick, a parasite very much like the cattle tick of Australia, was found to be resistant to arsenic and treatment was switched to BHC at low concentration. This was effective for a short period, then it was found necessary to increase the BHC level in the dipping fluids. The process has been repeated several times until now 20 times the original BHC concentration is being used. We have no experiences in Queensland on a level with this, but there is a definite and appreciable resistance to BHC in some districts.

Work on the subject of resistance in ticks is rather complicated and difficult, but has yielded some interesting results. Ticks from the southern extremity of the coastal tick-infested zone of eastern Australia were suspected to be arsenic-resistant, and on testing the progeny of some of these parasites this was confirmed. The same ticks, however, showed no resistance to half a dozen insecticides tested, including DDT, BHC, toxaphene and chlordane. On the other hand, some ticks reported as showing resistance to BHC in North Queensland were fairly resistant to toxaphene, chlordane and heptachlor, a little resistant to arsenic, but susceptible to DDT. This suggests that resistance to one insecticide may mean resistance to others. Altogether the position tends to become complex, and will probably become more aggravated in this direction as more new insecticides are discovered and come into use.

Toxicity to Cattle.

Some of the newer insecticides are definitely toxic to cattle under certain circumstances. DDT is apparently not toxic when used alone in a dipping fluid. However, when in the form of a paste containing an emulsifier or a wetting agent and used in conjunction with arsenic, the penetration of the latter through the skin is facilitated. Death by arsenic poisoning may then result and in fact heavy mortality of cattle has been experienced in these circumstances.

BHC has been responsible for some losses in Queensland. It would appear as if those preparations in which the BHC is in an emulsion form are the most dangerous. Poverty appears to be a predisposing factor, though there are instances where good conditioned cattle have died after treatment, with clinical evidence of BHC poisoning. In one herd heavy losses followed two dippings with a 3-day interval. There was no evidence of sickness after the first treatment.

Toxaphene has been found at times to be toxic to young calves, and there is one instance where 12 calves of a mob of 30 under three months old died after dipping.

Experience with the other preparations has been too limited to permit comment.

In the U.S.A. it was found that poor sheep were much more susceptible to BHC than those in robust

condition, one estimate being that such sheep were about eight times more susceptible.

When Cattle Should be Treated.

During the non-parasitic stage, ticks require heat and moisture. It is understandable, therefore, why the incidence varies in different parts of the State under average conditions, and this again is thrown further out of line when rainfall is above or below the average for a period of several months.

Most of our experimental work, field trials, etc., have been carried out in south-eastern Queensland, where the winter temperature is relatively low when compared with much of the rest of the tick-infested areas of the State. We have noted in south-eastern Queensland that, given an average season and average stocking rates, cattle have to be treated about 6-7 times over the summer period, starting about the middle of October and finishing about April-May, the intervals between treatments being about 30-35 days. Winter treatments are quite unnecessary unless there has been late summer rain and mild weather in the early winter, when treatment may have to be extended into June-July. On the other hand, if there are no good spring or early summer rains and conditions remain dry, it may not be necessary to treat until towards the end of the year or perhaps even later. One can go further and state that if drought prevails throughout the summer, dipping or spraying, whichever is used, may not be necessary at all, or only in a limited way. Temperature and rainfall distribution keep the tick in control.

Conditions are different in central and north Queensland, where the winter temperatures are high enough to allow of fairly rapid development of the parasite all the year round, and where therefore treatments by dipping or spraying may be necessary for the whole year.

Some owners continue to treat cattle during periods when tick incidence is low. Indeed, it has been advocated in some quarters that it is a suitable time to treat, so that the parasites will not be given an opportunity to breed up to pest proportions. One has, however, to consider the great danger involved in completely suppressing the tick over considerable intervals of time, at least in recognized tick-infested areas, because the cattle involved may easily lose their resistance to tick fever, this naturally being something that must be avoided. We have known more than one instance where disastrous losses from tick fever have followed this practice of continuous dipping over a period of some months when tick incidence was low, and where the parasite was practically eradicated. In recognized tick-infested areas, treatment should definitely cease once reasonable control has been obtained, and should not recommence until the parasites begin to show an increase.

Residual Effects.

A good deal of stress has been placed on the residual effect of some of these insecticides. Tests have shown that DDT is good in this respect, and larval ticks are mostly destroyed if placed on an animal within 10 days of treatment. However, exposure to very gross infestations may result in some larvae finding attachment within a week or even a shorter period.

BHC has a good residual effect though it is not so high as with DDT. Both toxaphene and chlordane have good residual effect and appear to be about equal to BHC. Little is known of the other insecticides. It is recognised, of course, that arsenic has a very poor residual effect.

Resistance of the Tick at Different Stages.

Young recently-moulted adults are very susceptible to all the insecticides.

Older adults are more resistant and may escape if the concentration falls below the appropriate level.

Larval ticks are also relatively easy to destroy and so are recently-moulted nymphs.

The fully-engorged nymph which has developed far enough to be protected by a double integument—the old and the new—is the most resistant of all stages. Nymphs which are actually in the moult (that is within 24 hours of the emergence of the young adult) continue to develop, but the new adult does not always attach and may wander through the hair for 2-3 days before finally dying.

Applying the New Insecticides.

It is not proposed to deal here with the subject of power spray races or dipping vats, but merely to emphasise some points which are already fairly well known.

For dairy herds the ordinary power spray with a pair of nozzles is all that is required. Dairy herds up to 100 cows—and there are not many in Queensland larger—can be dealt with in a short race, without any elaborate fittings, in 3-4 hours. These power sprays are fitted with a 1-2 h.p. petrol engine, a compressor and a few feet of half-inch hose which terminates in a metal tube 3-4 feet long, at the end of which are the two nozzles set at about 6 inches apart. The outlet is supplied with a trigger control.

With such a piece of apparatus, spraying fluids can be applied expeditiously and a good cover of the average dairy cow obtained with about one gallon of fluid or even less. The material can be made up freshly each time the herd is treated and there is no need to attempt the collection of any run-off.

With beef cattle the power spray is not very suitable and the dipping vat is necessary.

Forms of Insecticides.

In arsenical fluids the arsenic is always in solution in water. The newer insecticides, being very complex in their structure, are not soluble in water. They can be put up in the form of a very fine wettable powder, which when mixed with water will disperse throughout, but tends to settle out if the fluid is not agitated. Such forms may be useful in sprays, but are not so satisfactory in dipping vats as they tend to settle out when the vat is not being used.

Colloids represent a very fine form where the particle size is smaller then in a wettable powder. It would seem as if, in the two well-known proprietary forms of DDT and BHC, the active principle is in the colloidal form.

In emulsions the active principle is in solution in a suitable solvent such as toluene, and then to this is added what the chemist calls a dispersing agent. On the addition of water an emulsion is formed. Emulsions tend to "crack"—a term used by the chemist to indicate the separation out from the emulsion of its various ingredients into layers, the heavier naturally sinking to the bottom. Many of the insecticides used by us in spraying trials were in the emulsion form, and the toxaphene used in dipping vats appears to be of the same type. Up to the present—three years in one case—there has apparently been no "cracking" of the toxaphene.

SUMMARY.

DDT.

DDT has been put into a suitable form for use in dipping vats or spraying fluids for the control of ticks. It is a little uncertain in its effects on the tick, and even when employed at considerably higher levels than the one recommended, some ticks, especially engorged nymphs, may escape destruction.

It appears to be stable in dipping vats (up to five years), and is not affected by the large quantities of organic matter which result from frequent use of the vat.

Ticks do not become tolerant to DDT—at least, that is our experience up to the present.

Its residual effect is high.

The most suitable level is about 0.5%.

It is not toxic to cattle but should not be mixed with arsenical dipping fluid.

It destroys the parasites rather slowly.

BHC.

BHC is also available in a suitable form for use in dipping and spraying fluids. It also is a little uncertain in its effects, and some engorged nymphs may escape destruction.

It remains stable in dipping fluids (up to five years).

There is some evidence that ticks may become resistant to BHC. This is in line with overseas experience.

Its residual effect is fairly high, but a little below that of DDT.

The most appropriate level seems to be about 0.05% of the gamma isomer, though lower levels are quite effective.

BHC can be toxic to cattle. Poverty seems to be a predisposing factor. The emulsion form seems to be the more toxic.

Toxaphene.

Toxaphene is available in a suitable form for use as spraying or dipping fluids. It seems to be a little more certain in its effects than either DDT or BHC.

It has remained stable in dipping vats up to three years.

There is a little evidence suggesting that ticks with some resistance to BHC may be resistant to toxaphene. Otherwise, toxaphene has been used up to five years (as spraying fluids) on the one property without evidence of ticks becoming tolerant.

The residual effect is fairly high.

The most appropriate level is about 0.5%.

Toxaphene may be toxic to calves under three months of age.

It kills ticks very quickly.

Chlordane and Dieldrin.

Chlordane (0.25%) and dieldrin (0.05%) have both been used in the field as spraying fluids in dairy herds, the former over a period of five years, dieldrin over a period of three years, with quite satisfactory results. Neither has been used in the field in dipping vats and neither is yet registered in Queensland for use as a cattle dip.

There is no evidence that either of these insecticides is toxic to cattle.

The residual effect of each is fairly high, and up to several days.

Both kill ticks fairly quickly.

Other Insecticides.

Several other insecticides, including menthachlor, heptachlor, E605 (parathion) and aldrin, have been tested under laboratory conditions and found suitable for controlling ticks, but have not been used in the field.

Treatment.

In south-eastern Queensland in normal years about 6-8 treatments are necessary to control ticks on the average farm in average seasons, treatment to commence about October and finish about April the following year. Treatments should be 30-35 days apart. In dry years fewer treatments are required.

In Central and North Queensland, treatments are often necessary all the year round.

It is not a wise procedure to continue treatments, whether by dipping or spraying, once the ticks have been brought under reasonable control. Owners who have pursued this course with the object of eradicating the parasites have often met with disaster

through the cattle losing their immunity to tick fever. A residuum of ticks is necessary to maintain this immunity.

Resistance.

The tick, which has already developed a strong resistance to arsenic in certain parts of Australia, is now developing a resistance to some of the other insecticides. The position is becoming complicated because arsenic resistance does not mean resistance to the newer insecticides or vice versa. Also, resistance to one of the newer insecticides may mean resistance to at least some of the others.

TOBACCO GROWERS.

The Department of Agriculture and Stock now has for sale seed of the following varieties:—Virginia Bright Leaf, Mammoth Gold, 400, 401, 402, Yellow Special, Kelly, Gold Dollar, Hicks, and Virginia Gold.

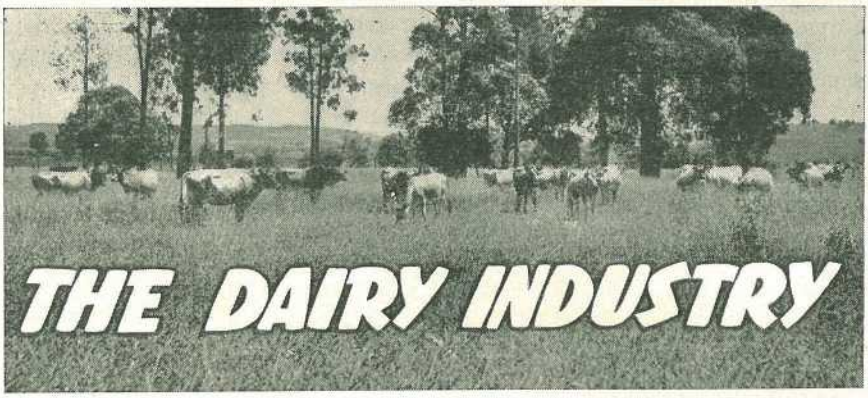
The price of this seed, cash with order, or C.O.D., is 6s. per oz. to registered Queensland tobacco growers and 10s. per oz. to others.

Address enquiries to The Under Secretary, Department of Agriculture and Stock, Brisbane.

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 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.



Report on Group Herd Recording for the Year Ending 30th September, 1953.

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

During the Group Herd Recording year which ended on September 30, 1953, seasonal conditions for dairying were good until the end of April, when a dry spell commenced which continued to the end of September, although some districts experienced fair rains at the end of August.

During the year there were 51 groups in operation, but two of them were small and were operated by the one recorder. Lactations were completed during the period by 34,304 cows from 1,073 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.	Test.	Butterfat.
			Lb.	%	Lb.
1948–19	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	3,476	4·3	150

* A drought year.

The average production of 150 lb. butterfat would have been higher but for the dry spell from May onwards. In this State, where cows are usually grazed on pasture or cultivated crops, production varies greatly according to seasonal conditions. Much of the drop in production caused by dry spells could be obviated by the storage of an adequate supply of fodder, and its utilisation as soon as the effect of adverse conditions is noticeable.

Table 2 gives, according to age groups, the number of cows which completed lactation periods of 270 days or less, and their average production of milk and butterfat. All completed lactations up to 270 days are included.

TABLE 2.

AVERAGE PRODUCTION OF COWS WHICH COMPLETED LACTATION PERIODS OF 270 DAYS OR LESS.

Age Group.	No. of Cows.	Average Production per Cow.		
		Milk.	Test.	Butterfat.
		Lb.	%	Lb.
2 years	3,854	2,821	4·5	126
3 years	3,875	3,138	4·4	138
4 years	3,872	3,527	4·4	155
Mature	15,676	3,694	4·3	158
Unknown	7,027	3,508	4·3	149
Total	34,304	3,476	4·3	150

The average production of cows with a full lactation period of 270 days was 195 lb. butterfat, while the average production of cows with completed lactations of less than 270 days was 130 lb.

Details according to age are given in Tables 3 and 4.

TABLE 3.

AVERAGE PRODUCTION PER COW, ACCORDING TO AGE, OF COWS WHICH MILKED FOR THE FULL LACTATION PERIOD OF 270 DAYS.

Age Group.	No. of Cows.	Average Production per Cow.		
		Milk.	Test.	Butterfat.
		Lb.	%	Lb.
2 years	1,253	3,821	4·5	172
3 years	1,154	4,115	4·5	184
4 years	1,193	4,425	4·4	196
Mature	4,779	4,720	4·3	205
Unknown	2,170	4,498	4·3	192
Total	10,549	4,468	4·4	195

TABLE 4.

AVERAGE PRODUCTION PER COW, ACCORDING TO AGE, OF COWS WHICH COMPLETED LACTATION PERIODS OF LESS THAN 270 DAYS.

Age Group.	No. of Cows.	Average Production per Cow.		
		Milk.	Test.	Butterfat.
		Lb.	%	Lb.
2 years	2,601	2,339	4·5	104
3 years	2,721	2,723	4·4	119
4 years	2,679	3,126	4·4	137
Mature	10,897	3,244	4·2	138
Unknown	4,857	3,066	4·2	130
Total	23,755	3,036	4·3	130

These totals show that the 10,549 cows which completed a 270 days lactation period averaged 65 lb. butterfat, or 50% more than the 23,755 cows with a lactation period of less than 270 days. The wide difference in production emphasises the importance of cows milking for a full lactation period. It is considered that a much greater percentage of cows would milk for a full lactation period if the standard of nutrition was maintained at an adequate level.

The average length of completed lactation was 210 days. The average length of lactations for each year is given in Table 5.

TABLE 5.

AVERAGE LENGTH OF COMPLETED LACTATIONS.

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

The average length of lactation for each age group in each district for 1952-53 is given in Table 6.

TABLE 6.

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

District.	2-Year old.	3-Year old.	4-Year old.	Mature.	Unknown Ages.	All Cows.
	Days.	Days.	Days.	Days.	Days.	Days.
Atherton Tableland ..	235	230	234	232	224	231
Mackay	218	197	220	209	185	200
Rockhampton	195	192	185	195	151	186
Port Curtis	185	213	214	212	192	207
Upper Burnett	184	209	218	215	203	207
Central Burnett	198	189	211	209	211	205
South-Burnett	187	195	204	204	194	200
South-eastern Queensland..	202	211	217	215	210	213
Eastern Downs	224	215	218	217	210	215
Western Downs	192	195	198	204	212	202
All Queensland	204	207	214	213	208	210

It will be noted that the average length of lactation was longest on the Atherton Tableland with 231 days, the next highest being on the Eastern Downs, where the average length was 215 days. The shortest average lactation period was in the Rockhampton district, where the period was only 186 days.

Table 7 shows the average production per cow in each of the herd recording groups.

TABLE 7.

AVERAGE LENGTH OF LACTATION, AVERAGE PRODUCTION PER COW, AND NUMBER OF COWS WHICH COMPLETED LACTATION FOR THE VARIOUS GROUPS, 1952–1953.

District/Group.	Herds.	Cows.	Length of Lactation.	Av. Milk.	Av. Test.	Average Butterfat (lb.)		
						1952-53	1951-52 *	1950-51
			Days.	Lb.	%			
Atherton Tableland—								
Malanda No. 1	21	836	237	4,733	4·1	192	162	195
Malanda No. 2	23	550	227	4,128	3·8	159	145	207
Malanda No. 3	31	740	223	3,753	4·3	160	128	160
Millaa Millaa	22	719	234	3,648	4·4	161	153	186
Rockhampton—								
Raglan-Marmor ..	20	418	173	2,360	4·2	99	..	..
Callide-Wowan	4	123	229	3,101	5·2	160	..	..
Mackay—								
Mackay	19	493	200	2,636	4·7	124	95	106
Port Curtis—								
Wallaville	22	625	207	2,833	4·6	129	103	64
Upper Burnett—								
Monto	22	1,300	207	3,840	4·0	155	127	159
Central Burnett—								
Biggenden	27	748	218	3,473	4·5	157	114	105
Gayndah	6	135	200	3,514	4·3	150	107	..
Mundubbera	22	487	185	3,000	4·6	137	91	64
South Burnett—								
Goomeri	20	882	190	3,185	4·1	131	85	117
Kilkivan	23	816	186	2,945	4·3	126	73	..
Kingaroy No. 1 ..	28	754	213	3,414	4·2	142	79	136
Kingaroy No. 2 ..	29	628	212	4,103	4·0	163	118	138
Nanango	19	357	216	3,593	4·1	147	96	..
Proston	22	488	169	2,422	4·3	104	..	..
Tansey	20	852	214	3,425	4·3	147	105	132
South Eastern Queensland—								
Beaudesert	21	1,135	207	4,029	4·0	160	131	170
Boonah	22	661	214	3,792	4·4	167	124	149
Cedar Pocket	21	441	232	3,789	5·0	191	135	162
Coomera	23	1,112	202	3,161	4·0	127	98	..
Cooroy No. 1	21	858	207	2,960	4·5	132	99	145
Cooroy No. 2	23	1,141	218	3,146	4·6	143	98	133
Esk No. 1	22	773	215	3,458	4·4	151	117	129
Esk No. 2	20	223	201	3,313	4·4	147	..	..
Gympie	18	602	218	3,155	4·7	148	88	122
Ipswich	2	100	247	4,208	4·7	196	..	..
Kenilworth	20	825	225	3,801	4·6	174	108	157
Kilcoy	25	939	201	3,085	4·6	141	92	124
Landsborough - Caboolture	21	288	207	2,656	4·9	129	..	..
Maleny No. 1	19	678	231	3,788	4·8	183	138	170
Maleny No. 2	23	1,025	227	3,505	4·7	165	128	176
Mapleton-Kureelpa ..	22	817	230	3,654	4·5	163	119	137
Maryborough	25	773	161	2,368	4·4	105	64	..
Merrimac-Mudgeeraba ..	21	940	209	3,176	4·1	130	90	..
Miva-Theebine	22	850	222	3,023	4·9	147	90	127
Mount Tamborine ..	26	698	211	2,730	4·6	126	111	147
Pomona No. 1	25	793	227	2,790	4·6	127	93	133
Pomona No. 2	21	525	189	2,509	4·7	118	..	..

TABLE 7—*continued.*

AVERAGE LENGTH OF LACTATION, AVERAGE PRODUCTION PER COW, AND NUMBER OF COWS WHICH COMPLETED LACTATION FOR THE VARIOUS GROUPS, 1952-1953.

District/Group.	Herds.	Cows.	Length of Lactation.	Av. Milk.	Av. Test.	Average Butterfat (lb.)		
						1952-53	1951-52*	1950-51
			Days.	Lb.	%			
Eastern Downs—								
Crow's Nest	19	470	201	3,873	4·0	156	89	150
Goombungee	14	408	224	4,200	4·3	179	91	135
Oakey	23	1,122	220	4,511	4·1	183	152	191
Pittsworth	20	559	207	4,623	4·2	192	157	186
Toowoomba	20	217	212	4,076	4·2	172	106	174
Warwick..	25	626	217	4,383	4·3	190	154	166
Western Downs—								
Chinchilla	20	460	184	2,982	3·9	117	68	100
Dalby	28	411	196	3,551	4·3	152	..	..
Miles	17	874	196	3,554	3·9	137	107	136
Warra	23	985	217	4,492	4·1	186	101	149

* Drought year.

That many farmers are making use of herd recording is evident from the improvement in production shown by many herds. Two such cases are shown in Table 8.

TABLE 8.

PRODUCTION RECORDS OF TWO HERDS WHICH HAVE SHOWN IMPROVEMENT IN PRODUCTION SINCE RECORDING WAS COMMENCED.

Year.	No. of Cows.	Average Production.			Increase in Total Production over 1948–49.
		Milk.	Test.	Butterfat.	
		Lb.	%	Lb.	Lb.
Mr. A. Visini, Cedar Pocket Group.					
1948–49	49	2,613	5·2	137	..
1949–50	53	3,248	5·2	169	33
1950–51	44	4,285	5·2	221	45
1951–52*	44	4,418	5·1	225	47
1952–53	67	4,544	5·2	234	134
Her Majesty's State Farm, Beaudesert Group.					1949–50.
1949–50	62	3,182	4·7	150	..
1950–51	69	3,919	4·8	188	39
1951–52*	62	3,332	4·7	156	4
1952–53	76	4,163	4·9	202	65

* Drought year.

This table shows that the average production per cow of Mr. Visini's herd has been increased by 71% since the first year of recording and the total production has been increased by 134%.

The average production per cow according to main districts of the State is given in Table 9.

TABLE 9.

AVERAGE PRODUCTION PER COW ACCORDING TO DISTRICT.

District.	No. of Herds.	No. of Cows.	Average Production.		
			Milk.	Test.	Butterfat.
			Lb.	%	Lb.
Atherton Tableland ..	97	2,845	4,087	4·1	169
Mackay	19	493	2,636	4·7	124
Rockhampton	24	541	2,529	4·5	113
Port Curtis	22	625	2,833	4·6	129
Upper Burnett	22	1,300	3,840	4·0	155
Central Burnett	55	1,370	3,309	4·5	149
South Burnett	161	4,777	3,284	4·2	137
South East Queensland ..	464	16,221	3,266	4·5	146
Eastern Downs	121	3,402	4,353	4·2	181
Western Downs	88	2,730	3,732	4·1	154

The average production of butterfat in the lowest and highest producing herds in each district according to herd size is shown in Table 10.

Table 11 shows the number and percentage of cows in the various butterfat ranges according to age. Of the 34,304 cows which completed their lactations, 7,589 (22.12%) produced less than 100 lb. butterfat, compared with 10,102 (43.69%) last year, and 40 (0.12%) cows produced over 400 lb. butterfat.

Table 12 shows the number and percentage of herds in each district in various production ranges.

Of the herds surveyed, 17.6% had an average production of under 100 lb. butterfat compared with 43.9% last year, while those averaging over 200 lb. increased from 3.4% last year to 10.1%.

Highest Producing Herds.

The highest producing herds according to the number of cows which completed lactations are as follows:—

Highest Herd.	Group.	Breed.	No. of Cows.	Average Production.			Days.
				Milk.	Test.	Butter-fat.	
				Lb.	%	Lb.	
To 25 Cows.							
A. M. Lee	Warwick ..	Jersey ..	11	6,215	5·4	333	267
P. W. N. Sippel ..	Esk No. 2 ..	Jersey ..	11	5,063	5·1	291	254
C. W., A. E., and G. S. Black ..	Kingaroy 2 ..	A.I.S. ..	8	7,112	3·8	272	229
26–50 Cows.							
R. N. Burrows ..	Kingaroy 1 ..	Jersey ..	33	5,671	4·9	278	265
J. Macintyre ..	Mapleton-Kureelpa	Jersey ..	40	5,989	4·4	266	253
R. Devine and Son	Toowoomba	A.I.S. ..	33	6,578	4·0	266	256
51–100 Cows.							
F. Porter ..	Maleny 2 ..	Jersey ..	71	4,281	5·9	253	232
A. Bridges ..	Kenilworth ..	Jersey ..	59	5,030	5·0	252	262
W. and E. Adlem	Kingaroy 2 ..	A.I.S. ..	51	6,145	4·0	244	247
101 Cows and Over.							
Haselwood Bros.	Warra ..	A.I.S. ..	116	6,024	4·0	241	237
Est. T. Curtis ..	Warra ..	Jersey ..	108	4,169	5·6	233	242
R. L. Harrison ..	Beaudesert ..	A.I.S. ..	120	5,182	3·9	202	228

Most of these herds have been under test since the inception of a Herd Recording Group in the area in which they are situated.

The herd which had the highest average production is that of Mr. A. M. Lee, Goomburra, Eastern Downs. This herd had the highest production in 1950-51 and 1951-52. During 1952-53 Mr. Lee had only 11 cows which completed lactations. This is due to his withdrawal from the Group Herd Recording Scheme, as he has now entered his herd under the Pure Bred Production Recording Scheme.

The improvement in production of this herd can be noted by the figures set out below.

Year.	No. of Cows.	Average length of Lactation.	Average Production per Cow.		
			Milk.	Test.	Butterfat.
		Days.	Lb.	%	Lb.
1948–49	18	253	5,892	4·3	256
1949–50	19	245	4,490	4·6	208
1950–51	20	270	5,728	5·1	293
1951–52	17	259	5,163	5·4	281
1952–53	11	267	6,215	5·4	333

This increase in production is a very commendable example of what can be accomplished by the intelligent application of herd recording information to the herd and farm management programme.

The cows are fed on pastures and cultivated crops supplemented as required by chaff and grain.

Mr. R. N. Burrows, Kingaroy No. 1 Group, has a herd of grade Jerseys and has always used purebred Jersey bulls whose dams have qualified for entry into the Advanced Register.

Culling is practised according to production and Mr. Burrows rears a minimum of six heifers annually as herd replacements. All matings are controlled and cows are dried off eight weeks prior to calving.

The cows are grazed on pasture and cultivated crops, and supplementary feeding in the bails is practised throughout the year. The supplementary feed used is all grown on the farm, and consists of grain (mostly maize) and lucerne hay. Strip grazing is practised on the cultivated crops. Mr. Burrows is making provision for the storage of a greater quantity of conserved fodder in the future.

Mr. F. Porter, Maleny No. 2 Group, had the highest average production in the 51–100 cows herd group.

Mr. Porter has a herd of registered purebred Jerseys and the farm is situated on the banks of the Mary River at Cambroon.

The cows are fed mainly on pastures and grazed on cultivated crops in winter with some supplementary feeding of concentrates.

Mr. Porter commenced recording under the Group Scheme in August, 1951, and the average productions for the two years are:—

Year.	No. of Cows.	Average length of Lactation.	Average Production per Cow.		
			Milk.	Test.	Butterfat.
		Days.	Lb.	%	Lb.
1951–52 (drought) ..	64	241	3,401	5·6	190
1952–53	71	237	4,281	5·9	253

Hazelwood Bros., Warra Group, had the highest average production for herds of 101 cows and over.

Theirs is an A.I.S. herd and it has been the policy to purchase only bulls from cows with high production records. The size of the herd was reduced during the 1951-52 drought.

The average production of the herd since it was first recorded in 1949 is:—

Year.	No. of Cows.	Average length of Lactation.	Average Production.		
			Milk.	Test.	Butterfat.
		Days.	Lb.	%	Lb.
1949–50	152	212	3,933	3·5	138
1950–51	171	236	4,585	3·7	169
1951–52	144	117	3,061	3·6	111
1952–53	116	237	6,024	4·0	241

The increase in the average production may be attributed largely to:—

(1) The keeping of production records for individual cows and the extensive use of such records for the purpose of culling and selecting breeding families.

(2) The selection of sires according to the available production records of closely related females.

(3) The use of electric fences to control the rotational grazing of oats and Sudan grass.

(4) Provision of water in paddocks and at the bails.

(5) Conservation of fodder in the form of ensilage and baled hay.

That the interest in herd recording in this State continues to increase is evident from the number of applications received to form new Herd Recording Groups. The results obtained from herd recording stress the necessity to provide the cows with sufficient suitable fodder to enable their production to be in keeping with their capabilities, and the realisation of this leads to greater interest in all phases of farm activities. Such interest must be reflected eventually in increased production per cow and per acre.

TABLE 10.

AVERAGE PRODUCTION OF THE LOWEST AND HIGHEST HERDS IN EACH DISTRICT ACCORDING TO SIZE OF HERD ACCORDING TO COMPLETED LACTATIONS.

District.	Average Production of Butterfat.									
	1–10 Cows.		11–20 Cows.		21–50 Cows.		51–100 Cows.		Over 100 Cows.	
	Lowest Herd.	Highest Herd.	Lowest Herd.	Highest Herd.	Lowest Herd.	Highest Herd.	Lowest Herd.	Highest Herd.	Lowest Herd.	Highest Herd.
Atherton Tableland ..	39	236	76	218	91	262	146	243	..	..
Mackay	27	78	101	139	91	196	97	130	..	..
Rockhampton	37	109	69	135	128	173	176*	176*	..	..
Port Curtis	78	202	99	178	93	184	120	147	..	..
Upper Burnett	12*	12*	..	..	117	178	113	195	130*	130*
Central Burnett	61	208	48	182	68	200	125	230	..	..
South Burnett	11	272	58	210	81	278	79	244	148*	148*
South Eastern Queensland	3	195	24	291	45	266	77	253	100	202
Eastern Downs	7	215	125	333	110	266	102	229	..	..
Western Downs	27	226	61	217	76	264	65	206	233	241

* One herd only in range.

TABLE 11.

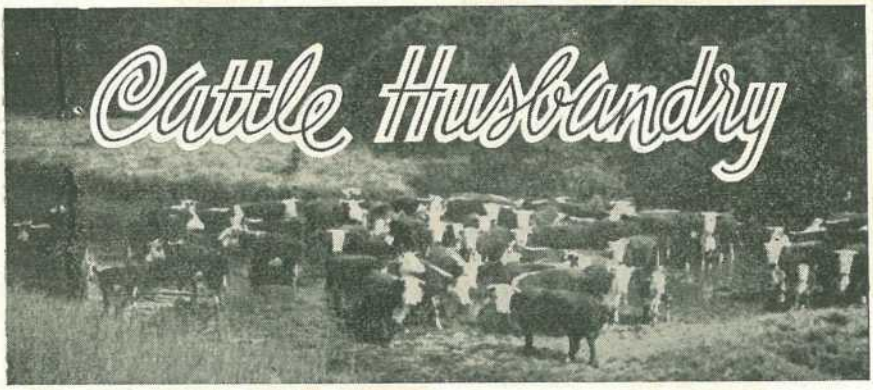
NUMBER AND PERCENTAGE OF COWS GROUPED ACCORDING TO AGE AND PRODUCTION.

Age Group.		Under 100 lb.	100–149 lb.	150–199 lb.	200–249 lb.	250–299 lb.	300–349 lb.	350–399 lb.	400–449 lb.	450–499 lb.	Over 500 lb.	Total.
2 Years	No.	1,321	1,210	860	346	100	17	..	..	..	..	3,854
	%	34·28	31·40	22·31	8·98	2·59	0·44	..	..	..	..	..
3 Years	No.	1,040	1,298	920	437	130	39	10	1	..	..	3,875
	%	26·83	33·50	23·74	11·28	3·35	1·01	0·26	0·03	..	..	..
4 Years	No.	688	1,193	1,130	596	183	61	16	4	..	1	3,872
	%	17·77	30·81	29·18	15·39	4·73	1·58	0·41	0·10	..	0·03	..
Mature	No.	2,910	4,405	4,389	2,593	958	314	79	16	7	5	15,676
	%	18·57	28·10	28·00	16·54	6·11	2·00	0·50	0·10	0·04	0·03	..
Unknown	No.	1,630	2,029	1,858	960	404	114	26	6	..	..	7,027
	%	23·19	28·87	26·44	13·66	5·75	1·62	0·37	0·09	..	..	..
Total ..	No.	7,589	10,135	9,157	4,932	1,775	545	131	27	7	6	34,304
	%	22·12	29·54	26·69	14·38	5·17	1·59	0·38	0·08	0·02	0·02	..

TABLE 12.

NUMBER AND PERCENTAGE OF HERDS IN VARIOUS PRODUCTION RANGES, 1952–53.

District.		Total No. Herds.	Under 100 lb.	100–149 lb.	150–199 lb.	200–249 lb.	250–299 lb.	Over. 300 lb.
Atherton Tableland	No.	97	8	34	39	13	3	..
	%	..	8·2	35·1	40·2	13·4	3·1	..
Mackay	No.	19	7	9	3	..	..	..
	%	..	36·8	47·4	15·8	..	..	..
Rockhampton	No.	24	12	10	2	..	..	..
	%	..	50·0	41·7	8·3	..	..	..
Port Curtis	No.	22	5	12	4	1	..	..
	%	..	22·7	54·5	18·2	4·5	..	..
Upper Burnett	No.	22	1	8	13	..	..	..
	%	..	4·5	36·3	59·1	..	..	..
Central Burnett	No.	55	9	22	21	3	..	..
	%	..	16·4	40·0	38·2	5·4	..	..
South Burnett	No.	161	32	78	42	5	4	..
	%	..	19·9	48·4	26·1	3·1	2·5	..
South Eastern Queensland	No.	464	81	200	142	35	6	..
	%	..	17·5	43·1	30·6	7·5	1·3	..
Eastern Downs	No.	121	9	26	57	25	3	1
	%	..	7·4	21·5	47·1	20·6	2·5	0·8
Western Downs	No.	88	25	29	24	8	2	..
	%	..	28·4	32·9	27·3	9·1	2·3	..
All Queensland	No.	1,073	189	428	347	90	18	1
	%	..	17·61	39·89	32·34	8·39	1·68	0·09



Growth Rates of Beef Cattle in Tropical Queensland.

W. F. MAWSON, Senior Adviser, Cattle Husbandry Branch.

SUMMARY.

Brahman cross weaners on natural pasture at the head of the Burdekin, in North Queensland, put on 231 lb. per head in a year, compared with 159 lb. by British breeds.

This works out at about 10 oz. per day for the Brahman cross cattle and about 7 oz. for the British breeds.

These are the results of a single year's observations by the Department of Agriculture and Stock. Regular weighings of the 50 cattle concerned are to be made up to the time of slaughter, when carcase appraisal will be made.

Seasonal, pasture and other conditions during the first year are described in this article, and the results of the weighings are discussed.

Introduction.

For some years it has been felt that factual information on growth rates of beef cattle in Queensland was desirable. A need also exists for information on the ability of animals of pure British and Brahman crossbred strains to thrive in the subtropical and tropical areas of the State. A further consideration—at least in tropical Queensland—concerns the relative abilities of the animal of British origin and the Brahman crossbred as producers of beef.

With the co-operation of Messrs. K. J. Atkinson and Sons, of Wairuna Station, a cattle weighbridge was installed on Wairuna in November 1952 for the purpose of obtaining information on the relative weight gains of British breed and Brahman cross animals of a similar age and sex.

A further aim is to obtain information on the rate of growth made on the natural pastures of the coastal tableland in North Queensland. Although the pattern of rapid growth during and following the wet summer, followed by loss of condition in the dry spring, has been generally recognised, few measurements have been made previously. When sufficient data have been obtained it will be possible to calculate the cost of seasonal weight losses and then accurately assess the economics of management practices designed to eliminate or minimise such losses.

There are many strongly held opinions concerning the merits of both species of cattle, but very little factual information is available. The

present investigation will furnish information on the performance of two different breeds of cattle of the same age and sex under the prevailing conditions.

Location.

Wairuna is situated on the coastal tableland of North Queensland, about 50 miles west of Cardwell and 70 miles south-east of Mt. Garnet. The Burdekin River heads on Wairuna, where it consists of several channels interspersed with islands. The property lies roughly midway between the Great Dividing Range to the west and the Cardwell Range to the east. It is situated between 18 and 19 deg. south and at 1,800 feet above sea level.

Soil and Vegetation.

The soil consists almost exclusively of a light sandy granite overlying clay. Some silt appears on the edges of lagoons, which flood during the wet season and dry back slowly in the late winter and spring. The silt dries out into a surface hardpan after the water recedes but it carries couch grass while any moisture remains.

The country is fairly level and consists mainly of open forest broken by gullies and fringed by ridges.

Narrow-leaved ironbark, poplar gum, bloodwood and bull-oak in the gullies are the main tree types. Kangaroo grass, black spear grass, and love grasses are the most common grasses in the woodland country. Where ringbarking has been performed and regrowth destroyed, a type of blue grass (*Bothriochloa decipiens* var. *cloncurriensis*) has appeared. Some edible shrubs grow near the banks of the Burdekin River.

The grasses listed grow in stools rather than as a sward, particularly on elevated areas. Couch grass appears on the edges of the lagoons as water recedes after the wet season and provides some green fodder at a time when the bulk of the native grasses are mature and dry.

Climate.

The climate is typical of the summer rainfall areas. Storm rains are experienced in November and December, followed normally by three months "wet" season and a gradual decline in rainfall until July. August, September and October are normally the dry months. The average rainfall is 28 inches per annum. Rainfall for the year under review did not follow the usual pattern and will be discussed in detail.

Summer temperatures are high, reaching several degrees over 100°, while frosts are common in winter and were severe during the winter of 1952. On one occasion the reading was as low as 24° F.—that is, there were eight degrees of frost.

Notes on the weather and state of the pastures are given below.

November-January.—Following 116 points of rain at the end of October, 344 points were recorded in the first week of November, followed by a further 376 points in December. Following a short heat wave late in December and during the first half of January, the wet season set in and 833 points were recorded in the last fortnight of January.

During November and December, cattle confined their grazing to the short green shoots on a recently burnt portion of the paddock. In late December and early January, the paddock was overgrazed and feed scarce. At the end of January, grass was making vigorous growth and cattle were grazing all species.

February-April.—The wet season ended abruptly in mid-February, by which time 785 points of rain had been registered. No further useful rain fell during the quarter. Pasture was lush and plentiful early in the quarter—by mid-March the grass was seeding. In April, water started to recede in the lagoons and cattle were grazing the couch grass. The blue and spear grasses reached the mature stage but some fresh growth appeared

from the nodes of blue grass. Kangaroo grass was carrying a greater number of green leaves than the other native species. The stock showed a preference in the following order—couch grass, kangaroo and blue grasses and a little spear grass on the high country. Mature spear grass on the level country was avoided.

May-July.—Several severe frosts were experienced in May and had an adverse effect on the pasture. Most of the grass was mature and seed had fallen following the frosts. Grazing was confined to couch grass and to kangaroo grass growing in the gullies. The spear grass area was burnt in May. In June, stock were moved to another paddock. At the end of the quarter, grasses other than couch were supplying ample bulk, but were mature and frosted.

August-October.—Very cold (down to 24°F.) and dry conditions prevailed early in August. At the end of the month 222 points of rain fell in two days. September was cool and overcast but no rain fell. Heat-wave conditions were experienced for a period in October, temperatures being as high as 101°F.

Couch grass formed the chief grazing but on burnt country other species of grass made slow but valuable growth until the end of the quarter—late in October, cattle were browsing edible shrubs. Other species of grass on the unburnt country were carrying plenty of bulk but were very dry.

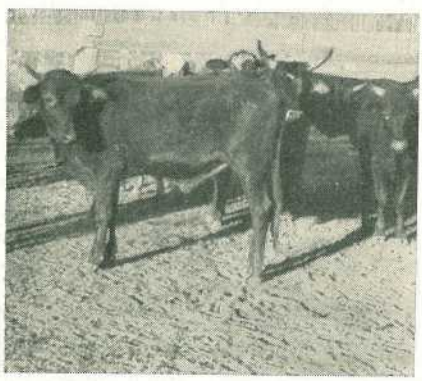
Features of the Seasons.—(*a*) Total rainfall was 2,707 points, which is about one inch below average for this property.

(*b*) There was an unusual distribution of rainfall, which was much above average during October, November and December, 1952, followed by a drying-out period in the first half of January. The wet season terminated abruptly about the middle of February and no useful rain occurred from that date until the end of August. The good August falls avoided what appeared likely to be a very bad spring.

(*c*) The early, heavy frosts in May had the effect of decreasing palatability of the main grasses and probably also markedly decreasing the protein content.

Description of Cattle.

The cattle used in these investigations were weaners at the commencement of weighing. They were all steers bred on the property and comprised 25 head of the British breed and 25 head of the Brahman cross. They are regarded as being representative of the commercial cattle on the property. The age range was probably 7-11 months. In the selection



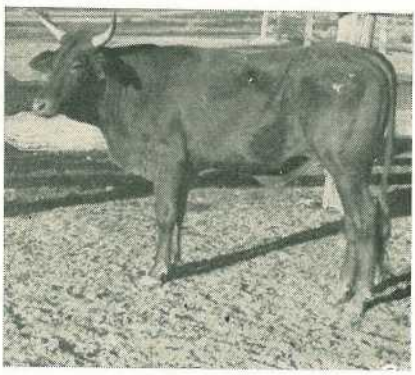


Plate 1.

Brahman Cross Steers Photographed 28th September, 1953.

of cattle for this work, apparent age was the chief factor taken into consideration.

In the case of the British breeds it was found after selection that the group comprised 12 Shorthorn steers, half of which are polled, and 13 Shorthorn-Hereford cross steers, nine of which are polled. Such a composition occurred purely by chance, as no breed selection was made within the British breeds.

The Brahman cross group was ⅜ Brahman ⅝ British. The sires used were ¾ Brahman ¼ Shorthorn, being bred from ½ Brahman ½ Shorthorn cows sired by a pure Brahman bull. Of the dams of the steers, 17 are Shorthorn and 7 are Shorthorn-Hereford cross.

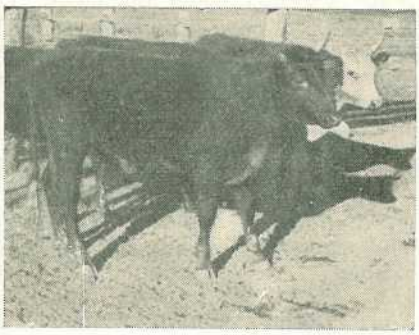
As the year progressed one Brahman cross steer died from unknown causes, while one British breed steer failed to make reasonable growth. In assessing results, these two head have been entirely ignored and all comparisons are based on the performance of 24 head in each group.

Management.

At all times both groups of cattle were run together as one mob and were subject to exactly the same environment and management. Because of the necessarily frequent mustering for weighing purposes, the stock had to be held within reasonable proximity of the scales, which are attached to yards near the homestead. So it is possible that the pasture available to these cattle was overgrazed more than the average of the property.

All cattle were given a light spraying with DDT at monthly intervals during summer for control of buffalo fly. This was discontinued after April, as the fly disappeared after that month.

Two dippings in a DDT preparation, one in January and the second in April, were carried out for the purpose of controlling cattle tick. All cattle were dipped, although the Brahman cross steers did not carry so many ticks as the British group. It was repeatedly observed that animals with long woolly hair carried the greatest tick burden. Some British cattle carried a noticeable tick population right through the winter, while the crossbreds were comparatively clean.



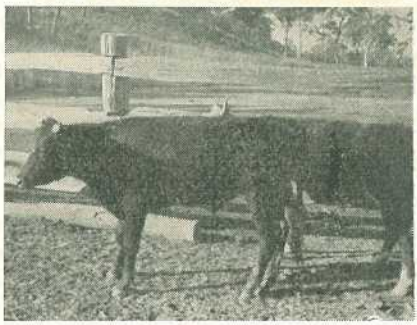


Plate 2.
British Breeds Steers Photographed 28th September, 1953.

The crossbreds have exhibited a notable ability to lose the old hair quickly when conditions improve and have had a sleek new coat about one month before the British breeds. At no time did the hair on the crossbreds grow either as long or as woolly as that of the British group.

Identification and Weighing Technique.

All cattle were fire-branded and also tagged by means of a numbered ear-tag.

Normal weighing procedure is to muster the stock about 5.30 in the afternoon and commence weighing about 7 o'clock on the following morning, the cattle thus being held in the yards for 13-15 hours prior to weighing. On two occasions (January and February) the cattle were brought in directly from the paddock and weighed immediately. For the purpose of uniformity in plotting the growth curve, the average weights for these two months have been decreased by 10 lb. on each occasion.

The scale used is a lever-operated platform-type scale with a capacity of 1 ton.

Weighing was done at approximately monthly intervals and 12 weighings were made during the period under review. Weighing commenced on November 5, 1952 and this report covers the period up to October, 1953.

Results of Weighings.

Plate 3 shows the average growth rate of both groups. At the initial weighing the British breeds group averaged 325 lb. per head and the Brahman cross animals averaged 44 lb. heavier at 369 lb. per head. At their heaviest average weights, both recorded in May, the British group averaged 554 lb. and the crossbreds were 651 lb., a difference of 97 lb. in favour of crossbreds. Weights at October show that the British group averaged 484 lb. and the crossbreds averaged 600 lb. The crossbreds were thus 116 lb. heavier at this stage.

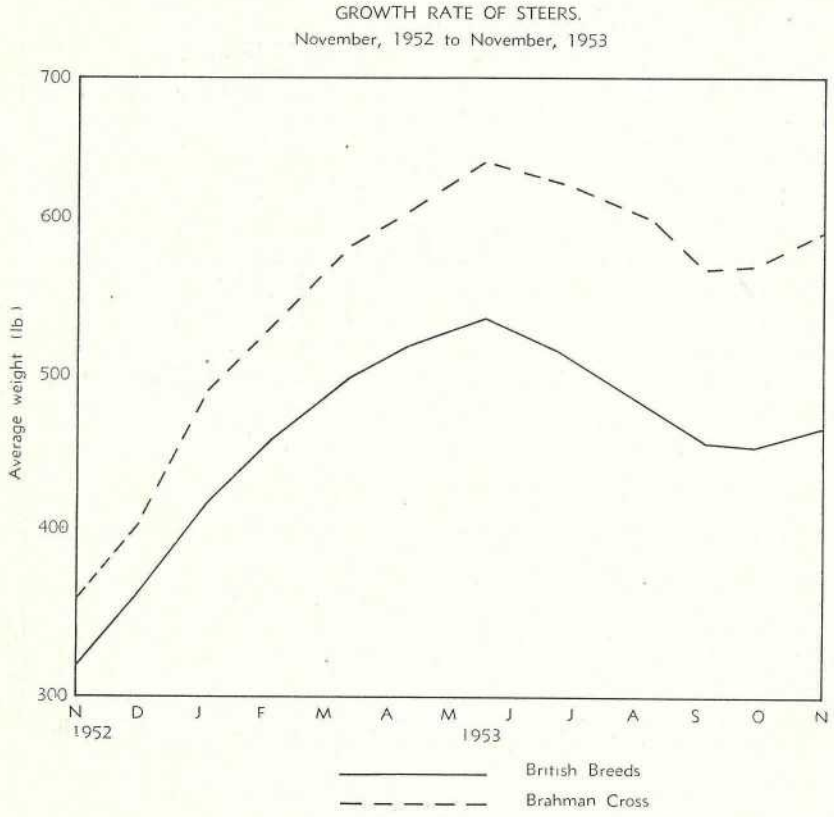


Plate 3.
Graph Showing Growth Rate of Steers.

At the conclusion of 360 days the crossbred group had gained 231 lb. and the British group 159 lb. This shows an average increase of 72 lb. per head in favour of the crossbred group, thus giving a 44% greater weight gain.

During June, July and August both groups lost weight and the British group also lost a little weight in September. Further weight gains then followed as a result of better pasture growth stimulated by the rain in late August.

The Brahman cross group gained 282 lb. per head between November and May, lost 75 lb. per head between May and August, and then gained 24 lb. per head in September and October. Comparative figures for the British are 229 lb. per head, a loss of 85 lb. per head and a further increase of 15 lb. per head.

On nine occasions the crossbred group either gained more or lost less weight than the other group, whilst on the other three weighing dates the British group showed to slight advantage.

Plate 4 shows the average daily increase or decrease in weight, calculated on a monthly basis. Monthly rainfall in points is also shown.

The crossbred group made the greatest daily gain when it averaged 1.9 lb. per day in January 1953. During February the British group reached

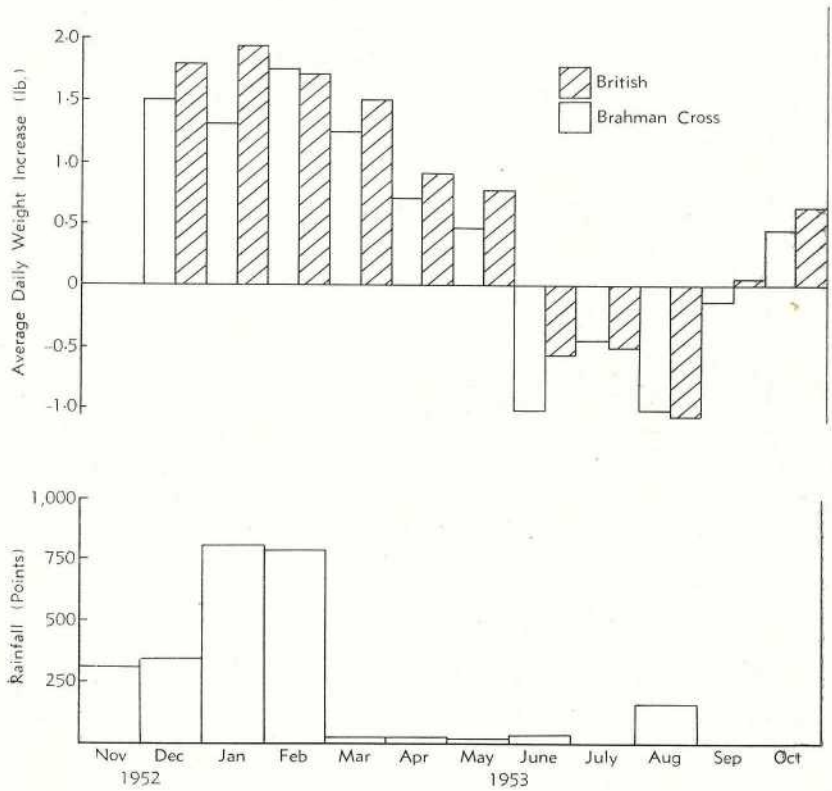


Plate 4.

Graph Showing Growth Rate of Steers in Relation to Rainfall.

its maximum daily rate of gain of 1.75 lb. In June and again in August the British group showed losses of 1 lb. per day, but the greatest loss of 1.1 lb. daily was recorded for the crossbred group during August.

For the 360-day period the British group made a net weight increase of 159 lb. or .44 lb. per head per day. The Brahman cross group shows a net increase of 231 lb. weight or an average of .64 lb. per head daily.

Comparison of Breeds and Crosses.

Although no great significance is attached to differences within the two main groups, the figures are interesting. Weights given show the net increase over 360 days.

British breed group—average gain 159 lb., consisting of:—

12 Shorthorn—average gain 160 lb.

12 Shorthorn-Hereford cross—average gain 159 lb.

Brahman cross group—average gain 231 lb., consisting of:—

16 steers from Shorthorn cows—average gain 229 lb.

8 steers from Shorthorn-Hereford cross cows—average 239 lb.

Discussion.

This is an interim report only. It is too early to draw definite conclusions. The work is proceeding and it is proposed to perform regular weighings until the animals are slaughtered, when carcase appraisal is to be performed.

It is obvious that for the period reported upon the Brahman cross group was superior to the British group. The Brahman crosses made greater weight gains when conditions were good and did not lose as much weight under poor pasture conditions. The crossbreds made a quicker response when conditions improved after the August rain.

Both groups showed the same general trend. Although the rate of gain was slowing down during April and May it is thought that gains would have continued had it not been for the heavy frosts at the end of the third week in May. These frosts marked the beginning of three very unfavourable months during which further heavy frosts were experienced and no useful rain was recorded.

The weight losses of 85 lb. per head and 75 lb. per head for the British breed and crossbreds respectively during the months of poor pasture supply give some indication of the loss in beef production during these periods.

Acknowledgement.

It is desired to acknowledge with appreciation the co-operation of Messrs. K. J. Atkinson & Sons, without whose valuable assistance this work could not be performed.

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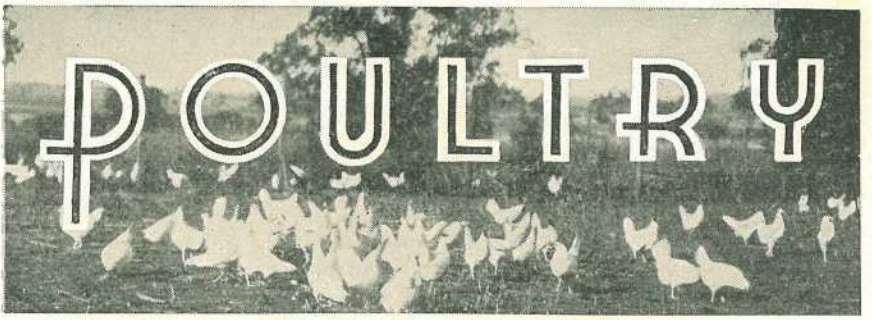

Brooding Chickens.

Part 1. Principles of Brooding.

F. N. J. MILNE, Husbandry Officer, Poultry Branch.

Rearing chickens by artificial brooding is not a difficult matter provided you are aware of certain basic facts in brooding. Generally it is neglect of these basic points which results in heavy losses, and it is surprising how many of the people concerned blame the hatchery rather than consider themselves at fault.

The hen provides us with a valuable lesson in brooding. She has no need to attend a baby clinic to learn how to rear chickens, for instinct tells her that her brood must be kept warm, their crops full even at her own expense, and a safe environment provided at all times. The conditions she supplies—warmth, food and security —are the three cardinal points in artificial brooding of chickens.

Warmth of Chickens.

The modern brooder is designed to supply adequate warmth and to give some measure of security, but the best and most expensive brooder is only as efficient as the place where it is housed and the person attending it.

Let us take the case of the brooder house. If it is draughty, then you can easily chill your baby chicks. An easy way to detect "draughts" is to hold a lighted match or cigarette lighter near floor level to see whether the flame flickers. The writer recalls going into makeshift brooder houses on a farm on a westerly windy day. So fierce were the draughts that matches would not stay alight and the farmer wondered why only half of his chickens survived the first week.

The behaviour of chickens under a "colony" or a "battery" brooder is the most reliable guide to correctness of temperature. At nighttime, if the brooder is warm enough, the chicks will be evenly spread out from the centre to the outside edge of a "hover" brooder or towards the sides of a battery brooder. They will be sleeping quietly with an occasional contented "chirrup." If they are cold, they will naturally huddle as close as possible to each other and to what warmth there is. Their persistent loud cheeping will soon tell you something is wrong.

When day-old chickens are introduced to the brooder, the temperature should be about 95°. The heat should be gradually reduced day by day so that by the time the chickens are three to four weeks old they can do without heat. However, be guided by the prevailing weather conditions, because in bleak wintery weather it may be necessary to hold the one temperature for a few days and even increase it slightly at nighttime.

A circle of hessian-covered wire-netting, plywood or other material, about a foot high, is generally put around a hover brooder in order (*a*) to keep the chickens close to the source of heat during the first few days, (*b*) to train them to find the heat readily, and (*c*) to eliminate any floor draughts should they be present.

In some instances farmers are over-zealous and confine chickens too close to the brooder. This will result in poor ventilation and "sweating" (condensation of moisture), both predisposing causes of chilling.

Thermometers offer a very convenient method of judging temperature but can be a pitfall if too much reliance is placed on them. They are easily damaged and then give incorrect readings. Before putting young chickens in a battery "brooder" or under a "hover" brooder, check the thermometer. This can be done very simply by taking your own temperature with it and if the reading is within the range of 97.5° F. to 98.5° F. you can rest assured that the thermometer is reading fairly accurately.

A case can be quoted to illustrate how a faulty thermometer was indirectly responsible for recurrent heavy losses in young chickens, and incidentally strained relations between the farmer and the hatchery owner. A poultry officer visited a farm in answer to a request for advice on recurrent heavy losses in chickens obtained from a certain hatchery. According to the farmer he was rearing his chicks just as he had done for years with very successful results. Therefore he maintained that the hatchery was supplying him with poor quality chickens. Upon inspection the chickens appear cold, and although the thermometer was reading 90°F., it was quite obvious from the amount of heat radiating from the electric elements that either the brooder was defective or the thermometer reading incorrect. On checking the thermometer with a clinical thermometer, it was found to be out by seventeen degrees, so that the actual temperature under the brooder was 73° instead of 90°.

What is the Best Food for Chickens?

Chickens from day-old to eight weeks of age need a special type of all-mash. It should have a minimum protein content of 18 per cent., a fairly low level fibre content (max. 7 per cent.) and be supplemented with a rich source of vitamins A and D_3. It may also be necessary to add a trace mineral, manganese, in the form of manganese sulphate, should the amounts of bran and pollard—rich natural sources of manganese—together total less than 40 per cent. of the ration. An example of a good quality chick starter mash formula which measures up to these requirements is the one used at the Rocklea Animal Husbandry Farm and is as follow:—wheatmeal 20 lb.; maize-meal 20 lb.; bran 20 lb.; pollard 20 lb.; meatmeal 11 lb.; buttermilk powder 7 lb.; bone meal 1½ lb.; common salt ½ lb.; supplemented with ¼ oz. manganese sulphate and a fish oil emulsion containing vitamins A and D_3.

Not all prepared chick mashes contain vitamin supplements as it is the practice to include them only in mashes fed to stock being reared indoors. Both vitamin A and vitamin D_3 supplements should be added to all chick mashes irrespective of where the chicks are brooded and whether or not they are supplied with green feed as a source of vitamin A.

A number of cases of "rickets" due to the lack of vitamin D_3 in chick mashes have occurred because farmers did not read the label on the feed bag and fed this unsupplemented mash to chickens reared indoors away from sunlight and without green-feed. Although the lack of vitamin D_3 with its easily detected symptoms of rubbery beaks and soft bones was the obvious deficiency, a more serious

but less noticeable deficiency was that of vitamin A.

Vitamin A and D_3 supplements are available as cod liver oil, fish oil emulsion or as a preparation of synthetic crystalline vitamins A and D_3. Their presence in a chick mash may not be indicated as such on the feed bag label. You will note, however, that in addition to the chemical analysis of the mash (percentages of protein, fibre, fat, calcium and phosphorus), the minimum amounts of vitamin A (2,000 I.U. per lb.) and vitamin D_3 (135 I.U. per lb.) may be stated.

If such levels of vitamins A and D_3 have not been set out on the label, then you must add a vitamin supplement to the mash.

The subject of "feeding" cannot be adequately dealt with in these few lines and the reader is referred to the pamphlets "Poultry Nutrition" and "Feeding Poultry from Day-old to Maturity" for further information.

Security.

Fear is a natural instinct, which in wild animals plays a very important part in the preservation of the species. In the close confines of a brooder house, this instinct for self-preservation can be responsible for deaths due to smothering. Fear leads to panic which spreads like wildfire through the brooder house or battery brooder. It can be caused by a strange movement, a sudden noise or sudden darkness. When a group of chickens panic from some cause or other, they often crowd into a corner and those underneath are smothered. Try as you may, chicks will take fright, but if the corners in the house are rounded off, the chances of death by misadventure are lessened.

Occasionally at night-time, electrical blackouts occur and rooms with infra-red brooder lamps are plunged into darkness. This can cause panic. To prevent losses due to panic, some farmers have a lighted hurricane lantern in brooder rooms equipped with infra-red lamps. The light given out from the lantern is sufficient to allay fear in the chicks.

Rats can be a very serious problem in a brooder house because of their disturbing presence and their partiality to a chicken diet. An example of destruction caused by rats occurred some years ago on a farm in North Queensland. Out of a group of 600 week-old chickens, 10 per cent. were killed in one night in a brooder house which had not been rat-proofed. Another serious aspect of the presence of rats in a brooder house is that they harbour certain disease micro-organisms which can be transmitted to chickens. These three points are sufficient justification for expenditure incurred in efficiently rat-proofing the brooder house.

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