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BY THE WATERHOLE ON A LANDSBOROUGH DISTRICT FARM.

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Brucellosis-Tested Swine Herds (As at 31st March, 1956).

Berkshire.

A. P. and N. Beatty, "Deepdene," Barambah road, Nanango
S. Cochrane, "Stanroy" Stud, Felton
G. Handley, "Handleigh" Stud, Murphy's Creek
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
M. K. Collins, "Kennington" Stud, Underwood road, Eight Mile Plains
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" 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, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
J. H. N. Stoodley, "Stoodville," Ormiston
H.M. State Farm, Numinbah
N. F. Cooper, Maidenwell
R. H. Coller, Tallegalla, *via* Rosewood
E. J. Clarke, "Kaloon" Stud, Templin
M. G. and R. H. Atkins, "Diamond Valley" Stud. Mooloolah
W. F. Ruhle, "Felbrie" Stud, Kalbar
L. Puschmann, "Tayfeld" Stud, Taylor
Dr. B. J. Butcher and A. J. Parnwell, "Hartley Grange" Stud, 684 Logan Road, Greenslopes
C. E. Edwards, "Spring Valley" Stud, Kingaroy
G. McLennan, "Murcott" Stud, Willowvale
H. M. Wyatte, "Cumberland Vale," Cooyar
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
R. J. Webber, "Webberberry" Stud, 35 Caxton st., Petrie Terrace
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
The Marsden Home for Boys, Kallangur
M. F. Callaghan, Lower Mount Walker, *via* Rosewood
J. B. Lotz, M.S. 794, Kalbar
G. J. Hutton, Woodford
E. R. Kimber, Coalstoun Lakes
K. B. Jones, "Cefn" Stud, Pilton
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
L. Pick, Mulgeldie
J. W. Bukowski, "Secreto" Stud, Oxley

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
K. B. Jones, "Cefn" Stud, Pilton
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
K. A. Hancock, "Laurestonvale" Stud, Murgon
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
G. J. Hutton, Woodford
H. L. Larsen, "Oakway," Kingaroy
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
F. K. Wright, Narangba, N. C. Line
O. B. Vidler, Manneum, Kingaroy
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
Kruger and Sons, "Greyhurst," Goombungee
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. C. and C. P. F. Hill, 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
L. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
H.M. State Farm, Numinbah
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. H. Sattler, Landsborough
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
Q.A.H.S. and College, Lawes
R. H. Coller, Tallegalla, *via* Rosewood
A. J. Potter, "Woodlands," Inglewood
P. V. Campbell, "Lawn Hill," Lamington
L. C. and C. P. F. Hill, Kingaroy

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
J. Gleeson, "Iona Vale" Stud, Kuraby
C. R. Smith, "Belton Park" Stud, Nara
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
F. K. Wright, Narangba, N. C. Line
R. A. Collings, "Rutholme" Stud, Waterford
W. R. Dean, "Trelawn," Tandur, *via* Gympie
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
Mrs. R. A. Melville, "Wattledale Stud," Beenleigh road, Sunnybank
S. and S. Ouglitchinin, "Pinefields," Old Gympie road, Kallangur
A. J. Hicks, M.S. 98, Darlington, *via* Beaudesert
Kruger and Sons, "Greyhurst," Goombungee

British Large Black.

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

Tuberculosis-Free Cattle Herds.

The studs listed below have fulfilled the conditions of the Department's Tuberculosis-free Herd Scheme to 31st March, 1956.

Breed.	Owner's Name and Address.
Aberdeen Angus ..	The Scottish Australian Company Ltd., Texas Station, Texas
A.I.S.	M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
	F. B. Sullivan, "Fermanagh," Pittsworth
	D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
	W. Henschell, "Yarranvale," Yarranlea
	Con. O'Sullivan, "Navillus" Stud, Greenmount
	H. V. Littleton, "Wongalea" Stud, Hillview, Crow's Nest
	J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
	Sullivan Bros., "Valera" Stud, Pittsworth
	Reushle Bros., "Reubydale" Stud, Ravensbourne
	H. F. Marquardt, "Chelmer" Stud, Wondai
	A. C. and C. R. Marquardt, "Cedar Valley," Wondai
	A. H. Sokoll, "Sunny Crest" Stud, Wondai
	W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
	G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
	C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
	W. H. Thompson, "Alfa Vale," Nanango
	S. R. Moore, Sunnyside, West Wooroolin
	H.M. State Farm, Numinbah
	D. G. Neale, "Groveley," Greenmount
	Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
	A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
	W. D. Davis, "Wamba" Stud, Chinchilla
	Queensland Agricultural High School and College, Lawes
	C. K. Roche, Freestone, Warwick
	Mrs. K. Henry, Greenmount
	D. B. Green, "Deloraine" Stud, Durong, Proston
	E. Evans, Wootha, Maleny
	T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
	J. Crookey, "Arolla A.I.S. Stud" Fairview, Allora
	M. F. Power, "Barfield," Kapaldo
	A. H. Webster, "Millievale," Derrymore
	W. H. Sanderson, "Sunlit Farm," Mulgildie
	R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, via Murgon
	R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
Ayrshire	L. Holmes, "Benbecula," Yarranlea
	J. N. Scott, "Auchen Eden," Camp Mountain
	"St. Christopher's" and "Iona" Studs, Brookfield road, Brisbane
	E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
	C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
	G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
	T. F. Dunn, Alanbank, Gleneagle
Friesian	C. H. Naumann, "Yarrabine" Stud, Yarraman
	D. J. Pender, "Camelot," Lytton road, Lindum
Guernsey	C. D. Holmes, "Springview," Yarraman
	A. B. Fletcher, Cossart Vale, Boonah
	W. H. Doss, Degilbo, *via* Biggenden
	A. C. Swendson, Coolabunia, Box 26, Kingaroy
	C. Scott, "Coralgrae," Din Din road, Nanango
	R. J. Wissemann, "Robnea," Headington Hill, Clifton
	G. L. Johnson, "Old Cannindah," Monto
	A. Ruge & Sons, Woowoonga, *via* Biggenden
	G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428 Grantham
Jersey	Queensland Agricultural High School and College, Lawes
	J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
	J. F. Lau, "Rosallen" Jersey Stud, Goombungee
	G. Harley, Hopewell, M.S. 189, Kingaroy
	Toowoomba Mental Hospital, Willowburn
	Farm Home for Boys, Westbrook
	F. J. Cox and Sons, "Rosel" Stud, Crawford, Kingaroy Line
	R. J. Browne, Hill 60, Yangan
	P. J. L. Bygrave, "The Craigan Farm," Aspley
	R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
	P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
	E. A. Matthews, "Yarradale," Yarraman
	A. L. Semgreen, "Tecoma," Coolabunia
	L. E. Meier, "Ardath" Stud, Boonah
	A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
	W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
	Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
	F. W. Verrall, "Coleburn," Walloon
	C. Beckingham, Trouts road, Everton Park
	W. E. O. Meier and Son, "Kingsford" Stud, Alberton, *via* Yatala
	G. H. Ralph, "Ryecombe," Ravensbourne
	Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
	W. and C. E. Tudor, "Boree" Jersey Stud, M.S. 498, Gayndah
	Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
	D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
	J. W. Carpenter, Flagstone Creek, Helidon
	H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
	W. S. Kirby, Tinana, Maryborough
	S. A. Cramb, "Trecarne Stud," Lockyer
	G. & V. Beattie, "Beauvern," Antigua, Maryborough
	J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
	W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
	T. Nock, Dallarnil
	P. Fowler & Sons, "Northlea," Coalstoun Lakes
	F. Porter, Conondale (Jersey)
Poll Hereford ..	W. Maller, "Boreview," Pickanjinnie
	J. H. Anderson, "Inverary," Yandilla
	D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
	E. W. G. McCamley, Eulogie Park, Dululu
	Wilson and McDouall, Calliope Station, Calliope

A New Buffel Grass for Queensland Farmers

By G. H. ALLEN, Agronomist, Regional Experiment Stations Branch.

In December, 1955, seed of a new strain of buffel grass (*Cenchrus ciliaris*) was released in sizeable quantities to commercial seed growers by the Biloela Regional Experiment Station of the Queensland Department of Agriculture and Stock.

As the main regional testing of this strain has been done at Biloela and selected seed produced at that Station, it is proposed that the grass be called Biloela buffel grass. (The pronunciation is Bil-o-ee-la).

Small quantities of seed have been distributed over several years but bulk supplies were only available last year when a seed production area of 12 acres came into seed (Plate 1). Seed of this strain has been allocated to several growers in Central Queensland who will undertake the production of seed on a greater scale than is possible on the Regional Experiment Station.

Seed of this buffel grass was introduced to Australia by C.S.I.R.O as *Cenchrus ciliaris* Type D. The first material was received on November 10, 1937, from Mr. R. R. Staples, Botanist, Veterinary Research Laboratory, Mpwapwa, Tanganyika. Planting material of Type D was first obtained by the Veterinary Research Laboratory from Dodoma, but subsequently it was collected in the Central and Lake Provinces. It was noted at Mpwapwa to be leafier and denser in growth than the South African type.

Plate 1.

Biloela Buffel Grass. Portion of the seed production area at Biloela Regional Experiment Station, with the grass growing in rows.

The grass was planted by C.S.I.R.O. at its plant introduction station at Fitzroyvale, near Rockhampton, where it showed promise for pasture purposes. The officer in charge reported on the strain as follows in a C.S.I.R.O. Divisional Report: "CPI 6934 Type D remained green until

frosts, and was rather leafy with subfibrous culms. It warrants regional testing."

Upon C.S.I.R.O. terminating its observations at Fitzroyvale, promising species of plants were removed to a nursery of the Department of Agriculture and Stock at Glenmore, near Rockhampton, for further nursery testing. Plants of buffel grass Type D were transferred from there to the Biloela Regional Experiment Station in 1950, the strain was allocated the Department's identification number Q2948, and testing for yield, palatability, and nutritive value commenced.

This new strain has now been fully tested under Biloela conditions and has proved superior to other strains of buffel grass grown at the Station. It has produced more bulk with a higher proportion of leaf and in practically all instances it has contained more protein than other buffel grasses, green panic and Rhodes grass at comparable stages of growth.

It has given excellent long-season production, and early spring regrowth has been very satisfactory. The slightly rhizomatous habit ensures hardiness under dry conditions. The strain is palatable to livestock. Cross breeding with other strains does not occur.

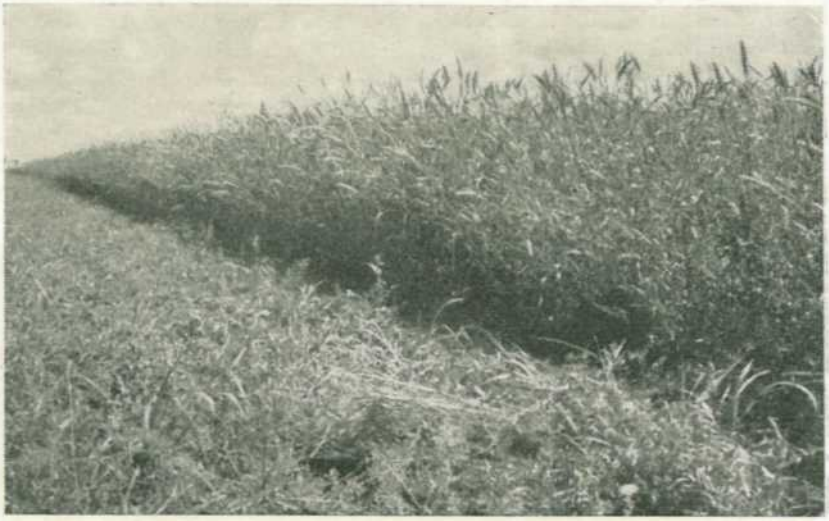

Plate 2.

Biloela Buffel Grass. This view of the seed production area at Biloela Regional Experiment Station shows the erect, leafy habit of the grass.

Biloela buffel grass can be soundly recommended for the Callide Valley and Dawson River districts on cultivated land and on the lighter forest soils. It should be equally satisfactory for areas of similar climatic and soil conditions.

A pamphlet describing this new grass and outlining procedures for planting and management for grazing and seed production is being prepared by officers of the Biloela Regional Experiment Station.

Wheat Variety Trials at Hermitage Regional Experiment Station

By T. K. KELLY, Officer in Charge, Hermitage Regional Experiment Station.

An annual check on the performance of leading wheat varieties in Queensland is maintained in what are known as standard varietal trials at the Hermitage Regional Experiment Station on the south-eastern Darling Downs (Plate 1).

Five such trials carried out since the 1949 season have yielded results that it is thought will be of considerable interest to growers.

It should be pointed out that all five trials have been conducted in the same paddock, three of them on one section and the other two on another section. The soil is a self-mulching dark-brown clay of

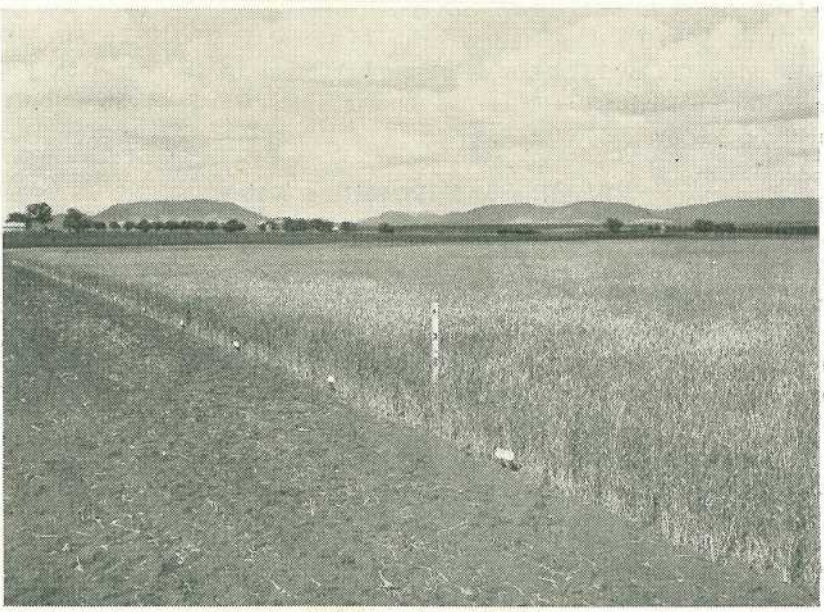

Plate 1.
A Standard Wheat Variety Trial Embracing Ten Varieties.

fairly high fertility and good moisture-holding capacity. It is generally typical of the alluvial lands on which wheat is grown in the south-eastern Darling Downs.

The arrangement of the varieties in the trial blocks has been changed from year to year to even up any effects due to soil differences. By carrying out the trials for several years, the effect of seasonal variations in rainfall, temperature, humidity and disease occurrence has been overcome to a large extent.

Land preparation in each year has followed a pattern in keeping with district methods where burning of stubble is not practised. This generally involved an initial disc cultivation to about 3 in., followed by treatments with tine implements for weed control and moisture conservation. Any variation usually involved a second disc treatment with either a tandem disc or a sundercut.

Cropping History.

The three previous crops for each year's trial are set out hereunder:

Year.	Site of Trial.	Three Previous Crops.
1949 ..	Block X ..	Barley (green manure), wheat, cowpeas (green manure)
1950 ..	No trial ..	..
1951 ..	Block Y ..	Grain sorghum, wheat, cowpeas (green manure)
1953 ..	Block X ..	Grain sorghum, wheat, wheat
1953 ..	Block Y ..	Wheat, grain sorghum, wheat
1954 ..	Block Y ..	Wheat, wheat, grain sorghum.

Block Y had a long fallow prior to wheat in 1953. In all cases where wheat followed grain sorghum harvested in the previous year the fallow period was of course longer than when wheat followed wheat or barley.

Planting and Harvesting Dates.

The dates of sowing and harvesting are set out in Table 1, together with the total rainfall received during the growing period. Very good germination was obtained each year. The 1953 sowing was made dry in July and germination occurred after good rain at the end of August. In this season, the growing period was only 96 days for the quick-maturing varieties and 101 days for the mid-season varieties.

TABLE 1.

SOWING AND HARVESTING DATES AND RAINFALL DURING CROP GROWTH.

Season.	Date Sown.	Date Harvested.		Rainfall During Growth (inches).
		Quick-maturing Varieties.	Mid-season Varieties.	
1949 ..	June 8 ..	Nov. 18 ..	Nov. 30 ..	12·87 (to Nov. 18)
1951 ..	June 25 ..	Nov. 22 ..	Nov. 22 ..	3·12
1952 ..	June 11 ..	Nov. 27 ..	Dec. 1 ..	14·70
1953 ..	July 29 (dry)	Dec. 9 ..	Dec. 14 ..	4·80 (+ 1·26 at germination)
1954 ..	July 11 ..	Nov. 27 ..	Dec. 6 ..	15·20

Yields.

The yields of grain obtained are set out in Table 2.

TABLE 2.

YIELD OF GRAIN IN BUSHELS PER ACRE.

Variety.	Season.					Average Last 3 Years.	Average Last 4 Years.	Average Last 5 Years.
	1949.	1951.	1952.	1953.	1954.			
Quick-maturing								
Spica	..	45·62	44·36	43·80	31·57	39·91	41·34	..
Seafoam ..	35·00	41·48	40·36	40·70	31·30	37·44	38·46	37·77
Gabo	50·32	51·05	39·65	44·50	28·08	37·41	40·82	42·72
Puora	38·25	41·27	36·57	39·80	27·83	34·73	36·37	36·74
Fedweb 5 ..	42·72	46·27	39·39	45·20	26·88	37·16	39·43	40·09
Mid-season—								
Lawrence ..	32·82	39·38	43·77	37·20	33·03	38·00	38·34	37·24
Festival ..	..	..	37·36	39·20	32·97	36·51	..	..
Charter ..	43·10	41·72	34·63	39·20	30·75	34·86	36·57	37·88
Celebration ..	..	..	41·25	43·40	28·20	37·61	..	..
Puseas ..	36·92	40·00	29·21	38·70	23·10	30·33	32·75	33·59
Average Yield ..	39·87	43·35	38·65	41·17	29·37	..	..	..

In order to point out the association between rainfall and yield, the monthly rainfall figures for each year are set out in Table 3.

TABLE 3.

RAINFALL (IN POINTS) AT HERMITAGE REGIONAL EXPERIMENT STATION, 1949–1954.

Year.	January.	February.	March.	April.	May.	June.
1949	369	364	410	5	90	329
1950	179	570	119	86	80	817
1951	1,003	28	110	112	107	264
1952	38	352	404	186	378	241
1953	443	398	191	119	110	..
1954	202	702	68	145	35	120

Year.	July.	August.	September.	October.	November.	December.	Total
1949	156	62	210	668	214	131	30·08
1950	328	42	122	686	480	22	35·31
1951	11	82	58	128	37	248	21·88
1952	24	171	48	696	290	193	30·21
1953	12	165	3	122	346	83	19·92
1954	121	223	199	758	324	56	29·53

It will be seen that the two years in which average yields exceeded 40 bus. per acre (1951 and 1953) were years of comparatively low rainfall during the growing period. Two points arise from this observation:

(1) Good yields can be obtained by building up reserves of moisture in the subsoil during the fallowing period.

(2) A wet growing period may depress the grain yield.

In both 1951 and 1953 the seedbed at the time of sowing was wet to a depth of at least 36 in. Given sufficient rainfall for a good germination and later rain to promote secondary root development, a

TABLE 4.

DATA ON MATURITY, RUST AND LODGING.

Variety.	Earliness of Heading*.	Leaf Rust.†	Stem Rust.†	Lodging.‡
Spica	– ME, ME, ME, ME	– N, M–H, L, M	– N, T, N, T	– 1A, 5A5B, 2A1B, 10B
Seafoam	E, E, E, E, E	H, N, M, L, H	L, N, T, N, L	9B, 1A, 3A, 2A, 1A
Gabo	E, ME, ME, ME, E	M–H, N, M–H, L, H	L, N, T, N, L	4A, 1A, 1A, 1A, 0
Puora	E, E, E, E, E	M–H, N, M–H, L, H	M–H, N, M–H, L, L–M	8B, 1A, 9A, 3A, 9A1D
Fedweb 5	ME, ME, ME, ME, ME	M–H, N, M, L, L	L, N, L–M, T, L	8B2D, 1A, 1A, 1A, 1A
Lawrence	ML, ML, ML, ML, L	N, N, L, L, M	N, N, N, N, N	3B7D, 1A, 6A4B, 2A1B, 5A
Festival	– – M, M, ME	– – L, T, L	– – N, M, N	– – 3A, 1A, 7A3B
Charter	M, M, ML, M, ME	M, N, M–H, L, M	L, N, M, L, T	5B5D, 1A, 6A4B, 2A2B, 7A3B
Celebration	– – L, L, L	– – L, L, M	– – N, N, T	– – 8A2B, 2A, 0
Puseas	M, M, M, ME, ME	L, N, M, L, M	L, N, M, L, L	4B6D, 1A, 8A2B, 2A1B, 5B

* *Earliness of Heading*:—Puora is indicator of early group (E), with 4-day intervals separating the classes ME (mid-early), M (mid-season), ML (mid-late) and L (late).

† *Rust*:—Reaction is classed as N (nil), T (trace), L (light), M (medium), and H (heavy).

‡ *Lodging*:—Scale 0 (no lodging) to 10 (completely lodged). Notations A—angle of 30°, B—60°, C—almost flat, D—erect or semi-erect but with badly broken or tangled straw.

payable crop can be obtained if there is a good reserve of subsoil moisture for the crop to draw on. Moderate to good rainfall at the flowering or heading stage can be very valuable.

Waterlogging of the soil in years of high rainfall can be very harmful. This is due largely to two effects. Firstly, when the soil is poorly aerated, formation of nitrates in the soil is restricted. Secondly, those nitrates that are formed in the feeding zone of the roots are washed through the soil and lost to the crop. The result is insufficient nutrients to balance the water supply, causing depression of yield and protein quality of the grain.

Rust and Lodging.

The varieties Yalta and Kendee were included in the 1949 trial but were subsequently withdrawn because of their susceptibility to a new race of stem rust that made its appearance at that time. Gabo, Fedweb 5 and Charter were also affected but have retained moderate resistance.

The reaction of varieties to rust during the five trials is shown in Table 4, which also includes data on lodging and maturity.

Points of Interest.

Spica has given good yields over a variety of seasons.

Gabo was an outstanding variety in 1949 and 1951 but has not yielded so well in recent years (Plate 2).

Seafoam proved a reliable variety with particular value for late sowing.

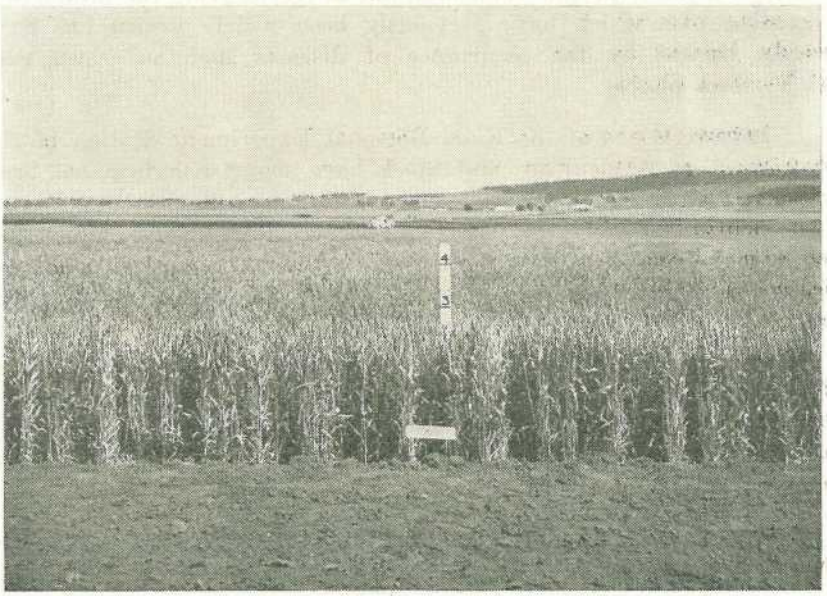

Plate 2.

Gabo was a Leading Variety in 1949 and 1951 but was Surpassed by Spica in Later Seasons.

The stem rust susceptibility of Puora reduced its yields in some seasons.

The slow-maturing varieties Lawrence and Celebration have performed irregularly. In 1952 they were much superior to the mid-season varieties Charter, Festival and Puseas; these mid-season varieties, particularly Charter, were affected by frost.

Celebration gave a surprisingly good yield under a short growing season in 1953 but did not yield well under wet maturing conditions in 1954. On the other hand, Lawrence gave the highest yield in 1954 and the lowest in 1953.

Festival is a reliable variety with moderately good yields and medium frost tolerance; it exhibited stem rust resistance during the trials.

WINTER GRAZING ON THE ATHERTON TABLELAND.

The provision of green cereal grazing during the winter is most desirable on the Atherton Tableland, but in recent years the production of grazing oats which have previously been widely grown has been severely limited by the occurrence of diseases such as crown rust and Victoria blight.

Investigations at the Kairi Regional Experiment Station of the Department of Agriculture and Stock have shown a hybrid oat bred at the Hermitage Regional Experiment Station on the Darling Downs to be outstanding over the past two seasons. This hybrid, which has been named Bovah, has been multiplied by the experiment stations and released to farmers for production of commercial supplies of planting seed.

Bovah is an erect early type which tillers freely. At Kairi in 1955 it produced 3½ tons of cured hay per acre when cut 135 days after planting, while Vicland was so affected by crown rust that hay was not made. Bovah in a grazing trial was grazed six times and produced a total of almost 10 tons of green material per acre.

Dairy farmers who cannot obtain Bovah oat seed this season are advised to plant Lawrence or Celebration wheat in April or early May.

CROP PLANTING TABLES

Showing Times of Planting and Rates of Sowing for Field Crops.

BY OFFICERS OF THE AGRICULTURE BRANCH.

Queensland is a large State covering a wide range of climatic conditions, and in a crop planting summary it is impossible to define accurately planting and harvesting times for each and every area. The tables which have been compiled for the various agricultural areas are intended to be a general guide with reference to the seasons generally experienced, and in determining sowing times attention has been paid to the seasonal conditions under which it is expected harvesting would be carried out.

Zones.

For the purposes of the tables, Queensland has been divided into three main zones as follows:—

Southern Districts.—Included in this zone is the area south of latitude 25° (approximately Bundaberg) to the southern border of Queensland.

Central Districts.—This zone lies between latitude 20° (approximately Bowen) and latitude 25°.

Northern Districts.—All districts north of latitude 20° are grouped in this zone.

The Coastal Districts within each zone refer, for the most part, to the land between the main coastal ranges and the seashore—approximately a 30-mile strip. In some areas, where the influence of coastal rainfall extends further inland, this strip may be wider. The Inland Districts are defined as beyond that limit to the outer edge of the 25-inch annual rainfall belt. Tableland Districts refer to elevated areas within about 100 miles of the coast.

Generally speaking, the bulk of the annual rainfall in Queensland is received during the summer months. In areas with an annual rainfall lower than 25 inches and with a high rate of evaporation of soil moisture, crop production is hazardous without supplementary irrigation. The accompanying map shows the main rainfall lines.

Explanation of Terms.

The meaning of most terms used in the tables is obvious, and the only ones in which confusion in interpretation may arise are "green feed" and "food."

The term *green feed* is used where the crop can be cut and fed immediately in the green state to farm animals. The term *food* is used where the crop can be harvested and fed immediately to farm animals, or if required held in good condition for some time in the field without harvesting, or harvested and then stored in farm structures.

It is recognised that individual farmers may use some crops in other ways than indicated in the tables, but the intention here is to name the *main purposes* for which various crops are used.

Additional Tables.

Preceding the actual crop planting tables is a table showing frost occurrence in various agricultural centres. This table is explained in the section immediately following.

After the general crop planting tables, certain additional tables have been included to provide useful information relating to seed weights, germination percentages, plant spacings, etc., which will be of considerable assistance in determining planting rates.

The first of these tables gives recommended mixtures and rates of sowing for various types of irrigated pasture. Most of the component species in these mixtures will also be found in the general tables, but there the recommendations apply to rain-grown plantings. This additional table is therefore necessary to meet the special requirements of irrigated pasture sowings.

The next table gives bushel weights of all the main crop seeds and those of some of the pasture seeds. In some instances, these are standard bushel weights which are legally defined. In all other cases the figures indicate the approximate bushel weights which would be expected from sound seed samples.

The third table provides approximate numbers of seeds per pound for a wide range of field crops and pasture grasses and legumes. It is followed by a table showing the approximate numbers of seeds which will fall on each square foot of ground where a uniform broadcasting rate of 1 lb. per acre is used. This is followed by a further table showing germination percentages for a range of crops and grasses. These three tables, used separately or in conjunction, will be of great assistance in determining suitable planting rates for special requirements.

A further table gives the number of plants per acre for various row and plant spacings, and the final table gives quantities of fertilizer per square perch and per square yard corresponding with various rates per acre.

At the conclusion of the tables is a map of Queensland showing the main rainfall lines. Areas, for example, which lie between the 25 in. line and the 30 in. line receive an *average* annual rainfall between 25 and 30 in.

Frost Occurrence in Agricultural Areas.

Information on frost occurrence in the agricultural and adjacent areas, compiled by Mr. J. C. Foley, of the Commonwealth Meteorological Bureau, and published originally in the Bureau's Bulletin No. 32 in 1945, is summarised here as a guide to Queensland producers.

In presenting the information in Bulletin No. 32, Mr. Foley wrote "..... It is considered that in view of the range of temperature which is critical for various crops susceptible to damage, and the variability of temperature differences between the ground and the thermometer screen under frosty conditions, a screen temperature of 36 deg. F. should provide a fair general basis for statistics of light to moderate frosts at or near ground level, while a screen temperature of 32 deg. may be adopted to give similar information for the level of foliage, blossom and setting fruit at a height of approximately 4 feet above the ground and heavy frosts on the ground."

The accompanying table shows, for both light and heavy frosts, the earliest and latest dates on which frost has occurred, the periods during which the first and the last frosts usually occur, and the average frost-free period. A number of centres (including Ayr, Bowen, Bundaberg, Charters Towers, Childers, Rockhampton, and Southport) which have recorded occasional frosts are excluded from the table, as they may be regarded as being virtually frost-free.

The original tables prepared by Mr. Foley were based on records from official recording stations, which in many centres are the post offices. The surrounding districts may or may not experience the same frosts.

FROST OCCURRENCE AT VARIOUS CENTRES.

Station.	Light Frost—Screen Temperature 36°.				Heavy Frost—Screen Temperature 32°.				Average Frost-free Period (Days.)
	Earliest on Record.	Usual First.	Last on Record.	Usual Last.	Earliest on Record.	Usual First.	Last on Record.	Usual Last.	
Atherton	Apr. 29	May 28—July 6	Oct. 2	July 10—Aug. 29	May 27	June 6—July 18	Sept. 13	July 18—Aug. 23	316
Biloela	Apr. 22	May 10—June 6	Oct. 5	Aug. 13—Sept. 10	May 18	June 6—July 6	Oct. 5	Aug. 13—Sept. 11	252
Bybera	Apr. 6	Apr. 13—Apr. 27	Oct. 23	Sept. 27—Oct. 11	Apr. 14	Apr. 21—May 1	Oct. 23	Sept. 9—Oct. 9	197
Cambooya	Mar. 29	Apr. 18—Apr. 30	Nov. 17	Sept. 24—Oct. 12	Mar. 29	Apr. 24—May 28	Oct. 10	Sept. 11—Sept. 29	202
Charleville	Apr. 22	May 16—June 30	Oct. 2	Aug. 16—Sept. 11	May 26	June 6—June 28	Sept. 13	July 26—Aug. 27	273
Clermont	Apr. 28	June 11—July 1	Sept. 10	July 22—Aug. 19	May 15	June 22—Aug. 5	Aug. 25	July 10—Aug. 13	319
Dalby	Apr. 17	May 3—June 2	Oct. 1	Sept. 4—Sept. 22	May 8	June 6—June 28	Sept. 16	Aug. 11—Sept. 4	246
Emerald	Apr. 28	June 8—July 8	Sept. 11	Aug. 4—Aug. 26	May 26	June 15—July 25	Aug. 25	July 11—Aug. 6	311
Gatton College	Apr. 17	May 29—July 6	Sept. 13	July 29—Aug. 30	June 7	June 19—July 23	Aug. 21	July 5—July 25	306
Gayndah	Apr. 24	May 31—June 18	Oct. 12	Aug. 19—Sept. 4	May 14	June 10—June 28	Sept. 17	July 8—Aug. 9	285
Goondiwindi	Apr. 17	May 19—June 12	Oct. 16	Aug. 19—Sept. 8	May 19	June 10—July 20	Sept. 13	July 13—Aug. 24	274
Gympie	Apr. 24	June 1—June 21	Sept. 19	Aug. 15—Sept. 8	May 15	June 16—July 14	Sept. 9	July 6—Aug. 13	287
Herberton	Apr. 29	June 21—July 15	Sept. 30	July 8—Aug. 15	June 21	June 26—July 20	Sept. 12	July 7—July 25	340
Ipswich	May 21	June 10—July 8	Sept. 3	July 31—Aug. 17	June 11	..	Aug. 24	..	319
Killarney	Mar. 29	Apr. 19—May 11	Nov. 17	Sept. 14—Oct. 10	Apr. 17	Apr. 27—June 2	Oct. 21	Aug. 31—Sept. 20	214
Maryborough	June 5	June 14—June 24	Aug. 31	July 5—Aug. 6	June 25	..	July 16	..	332
Miles	Apr. 17	Apr. 28—June 5	Oct. 21	Sept. 10—Oct. 4	Apr. 24	June 3—June 17	Oct. 5	Aug. 21—Sept. 11	238
Mitchell	Apr. 11	Apr. 21—May 21	Oct. 12	Sept. 9—Oct. 1	Apr. 24	May 20—June 17	Oct. 10	Aug. 16—Sept. 11	227
Mount Morgan	May 25	June 12—July 22	Aug. 26	July 21—Aug. 10	June 25	..	Aug. 15	..	335
Nanango	Mar. 26	Apr. 21—May 24	Nov. 6	Sept. 13—Oct. 7	Mar. 26	May 29—June 18	Oct. 12	Sept. 2—Sept. 28	225
Pittsworth	Apr. 17	May 6—June 17	Oct. 12	Aug. 16—Sept. 17	May 25	June 11—July 5	Sept. 3	July 31—Aug. 20	267
Roma	Apr. 17	May 7—June 4	Oct. 12	Sept. 6—Sept. 30	May 2	May 27—June 20	Sept. 22	Aug. 9—Aug. 31	244
Stanthorpe	Mar. 15	Mar. 31—Apr. 21	Nov. 17	Sept. 28—Oct. 24	Apr. 8	Apr. 16—May 16	Nov. 5	Sept. 19—Oct. 9	180
TamborineMountain	June 2	June 14—July 8	Sept. 29	July 12—Aug. 17	June 2	..	June 21	..	330
Toowoomba	Mar. 29	May 6—June 9	Oct. 13	Aug. 28—Sept. 17	Apr. 17	May 29—July 3	Sept. 16	July 31—Sept. 4	257
Wallangarra	Mar. 29	Apr. 14—May 8	Nov. 17	Sept. 21—Oct. 15	Mar. 29	May 1—June 10	Nov. 8	Sept. 8—Oct. 14	204
Warwick	Apr. 10	Apr. 24—May 30	Oct. 12	Sept. 10—Sept. 30	Apr. 17	May 23—June 16	Oct. 12	Aug. 20—Sept. 15	233

In most years temperatures do not fall to 32° at Ipswich, Maryborough, Mount Morgan or Tamborine Mountain.

SOUTHERN DISTRICTS.

SOWING AND PLANTING TABLE FOR FIELD CROPS.

(This Table requires to be adapted to suit individual circumstances.)

Crop.	Main Purpose for Which Grown.	When to Sow or Plant.			How Sown or Planted.				Approximate Period of Growth of Crop in Months.	Remarks.
		Coastal Districts.	Tableland Districts.	Inland Districts.	Distance Rows Apart.	Distance Between Plants.	Quantity of Seed per acre if Drilled.	Quantity of Seed per acre if Broadcast.		
					Ft. in.	Ft. in.				
Arrowroot	Flour and pig food..	Aug. to Oct.	..	..	5 0	2 0	10 to 12 cwt. of bulbs	..	8 to 10 ..	Suited best to coastal districts
Artichoke	Pig food	Aug. to Nov.	Sep. to Nov.	..	3 6	1 6	4 to 5 cwt. of tubers	..	4 to 5 ..	Difficult to store; will keep better in the soil
Barley (Cape and Skinless)	Grazing and green feed	Mar. to June	Mar. to July	Mar. to June	Drilled	..	1 bus. ..	1½ bus. ..	2 to 4 ..	..
Barley (Malting) ..	Grain	..	May and June	May and June	Drilled	..	1 bus. ..	1½ bus. ..	4½ to 5 ..	..
Beans, Lima ..	Seed	Sep. to Dec.	Oct. to Dec.	Oct. to Dec.	2 6	0 9	20 to 25 lb. ..	..	3½ to 4 ..	..
Beans, Navy or Canning	Seed	Sep. to Jan.	Sep. to Jan.	Sep. to Jan.	2 4	0 4	15 to 24 lb. ..	..	3 to 3½ ..	Wider rows for fertile soils
Beet, Silver	Green feed for poultry	Mar. to June	Mar. to June	Mar. to June	2 6	1 0	4 lb. ..	..	3 to 4 ..	..
Broom Millet ..	Brushware	Sep. to Dec.	Oct. to Dec.	Oct. to Dec.	3 6	0 9	3 to 4 lb. ..	..	4½ to 5 ..	..
Buckwheat	Nectar for bees; grain for poultry	Sep. to Mar.	Sep. to Mar.	Sep. to Feb.	2 0	0 3	25 to 30 lb. ..	40 to 45 lb. ..	1½ to 2½..	Produces a valuable nectar crop within 6 to 7 weeks of planting
Cabbage	Green feed	All seasons except summer	All seasons except summer	All seasons except summer	2 6	2 0	1 lb. ..	..	4 to 5 ..	..
Canary Seed ..	Hay, green feed and grain	..	Apr. to June	Apr. to June	Drilled	..	10 to 15 lb ..	20 to 25 lb.	4½ to 5 ..	..
Carrot, Field ..	Stock food	Mar. to June	Apr. to May	Apr. to May	1 9	..	2 to 3 lb. ..	..	4 to 5 ..	..
Cassava	Pig food	Aug. to Oct.	..	..	5 0	2 0	Cuttings used	..	8 to 10 ..	Boil tubers before using; discard water
Cotton	Fibre..	Sep. to Dec.	Oct. to Dec.	Oct. to Dec.	3 6	1 6	15 to 20 lb. delinted seed	..	5 to 7 ..	..

Cowcane	Green feed	Sep. to Dec.	Sep. to Dec.	..	5 0	1 6	2 or 3-eyed setts used	..	7 to 9 ..	Suitable for several ratoons
Cowpeas*	Seed, grazing and hay	Sep. to Jan.	Oct. to Jan.	Oct. to Jan.	3 0	0 6	6 to 10 lb.	15 to 20 lb.	3½ to 4½ ..	For green manure purposes, *see* under "Leguminous cover crops"
Evening Primrose ..	Grazing	..	Feb. to Apr.	Feb. to Apr.	Drilled	..	1 to 2 lb. ..	..	6 to 8 ..	Suitable for sandy soils of low fertility; sown shallow
Garlic	Market	Mar. to May	Aug. to Sep.	..	1 6	0 6	Small bulbs ..	..	6 ..	..
Grasses (*see* Pastures)										
Kale	Green feed	Feb. to June	Feb. to June	Feb. to June	3 0	2 0	1 lb. ..	2 lb. ..	4	..
Kohl Rabi	Stock food	Mar. to Apr.	Mar. to Apr.	Mar. to Apr.	2 6	1 6	2 lb. ..	..	4 to 5 ..	..
Leguminous Cover Crops*—										
Blue Lupin ..	Green manure ..	Autumn ..	Autumn ..	Autumn ..	Drilled	..	1 bus. ..	1½ bus. ..	5 ..	Erect growth
Cowpeas	Green manure ..	Summer ..	Summer ..	Summer ..	Drilled	..	20 to 25 lb.	25 to 30 lb.	3½ to 5 ..	Creeping growth
Cusara Pea ..	Green manure ..	Summer ..	Summer ..	Summer ..	Drilled	..	5 lb. ..	10 lb. ..	5 to 6 ..	Erect growth
Field Pea	Green manure ..	Autumn ..	Autumn ..	Autumn ..	Drilled	..	1 to 1½ bus.	1½ to 2 bus.	3 to 4 ..	Creeping growth
Gambia Pea ..	Green manure ..	Summer ..	Summer ..	Summer ..	Drilled	..	5 lb. ..	10 lb. ..	5 to 6 ..	Erect growth
Mauritius (Velvet) Bean	Green manure ..	Summer ..	Summer ..	Summer ..	3 0	2 0	20 lb. ..	40 to 60 lb.	5 ..	Creeping growth
Poona Pea	Green manure ..	Summer ..	Summer ..	Summer ..	Drilled	..	20 to 25 lb.	20 to 30 lb.	3½ to 4 ..	Erect growth
Rice Bean ..	Green manure ..	Summer ..	Summer ..	Summer ..	Drilled	..	15 to 20 lb.	20 to 25 lb.	4 to 5 ..	Creeping growth
Soybean	Green manure ..	Summer ..	Summer ..	Summer ..	Drilled	..	20 to 30 lb.	25 to 35 lb.	3 to 4 ..	Semi-erect growth
Tangier Pea ..	Green manure ..	Autumn ..	Autumn ..	Autumn ..	Drilled	..	10 lb. ..	12 lb. ..	5 ..	Creeping growth
Vetches or Tares ..	Green manure ..	Autumn ..	Autumn ..	Autumn ..	Drilled	..	¾ bus. ..	1 bus. ..	3½ to 4½	Creeping growth
Linseed (Flax) ..	Seed for oil	Apr. to June	Apr. to June	Apr. to June	Drilled	..	20 to 25 lb.	..	4½ to 5 ..	..
Lucerne*	Hay and grazing ..	Apr. to May	Apr. to May	Apr. to May	Drilled	..	10 to 12 lb.	14 to 18 lb.	3 ..	For grazing in drier areas 4 to 6 lb. In grass mixtures ½ to 3 lb.
Maize	Grain and green feed	Aug. to Jan.	Sep. to Jan.	Sep. to Jan.	4 0	1 3	8 to 10 lb.	56 lb. for green feed	4 to 5 .. For green feed 3 to 4	For green feed, closer row and plant spacing and increased seed rate
Pop Corn	Grain	Sep. to Jan.	Oct. to Jan.	Oct. to Jan.	3 6	1 0	5 to 7 lb. ..	..	4 ..	..
Sweet Corn ..	Market	Sep. to Jan.	Oct. to Jan.	Oct. to Jan.	3 6	1 0	6 to 8 lb. ..	..	3 ..	..
Mangel and Sugar Beet	Stock food	Feb. to May	Mar. to June	Mar. to June	2 6	1 0	4 to 6 lb. ..	..	6 to 7 ..	..

* The use of bacterial inoculum with most leguminous plants is recommended. Supplies are obtainable free from the Department of Agriculture and Stock, Brisbane, Gympie or Warwick.

SOUTHERN DISTRICTS—*continued.*

SOWING AND PLANTING TABLE FOR FIELD CROPS.

(This Table requires to be adapted to suit individual circumstances.)

Crop.	Main Purpose for Which Grown.	When to Sow or Plant.			How Sown or Planted.				Approximate Period of Growth of Crop in Months.	Remarks.
		Coastal Districts.	Tableland Districts.	Inland Districts.	Distance Rows Apart.	Distance Between Plants.	Quantity of Seed per acre if Drilled.	Quantity of Seed per acre if Broadcast.		
					Ft. in.	Ft. in.				
Millet (French) ..	Seed	Sep. to Jan.	Oct. to Jan.	Oct. to Jan.	Drilled	..	10 to 14 lb.	20 lb. ..	2 to 2½ ..	..
Millet (Giant and Dwarf Setaria)	Seed, hay and grazing	Aug. to Feb.	Sep. to Feb.	Sep. to Feb.	Drilled	..	10 to 14 lb.	20 lb. ..	2½ to 3 ..	Can be grazed earlier if required
Millet (Japanese) ..	Hay, grazing and green feed	Aug. to Feb.	Sep. to Feb.	Sep. to Feb.	Drilled	..	10 to 14 lb.	20 lb. ..	2 to 3 ..	Can be grazed earlier if required
Millet (White Panicum)	Hay, grazing and green feed	Aug. to Feb.	Sep. to Feb.	Sep. to Feb.	Drilled	..	10 to 14 lb.	20 lb. ..	2½ to 3 ..	Can be grazed earlier if required
Oats	Grazing, hay, green feed and grain	Mar. to June	Feb. to June	Feb. to June	Drilled	..	1½ bus. ..	1½ to 2 bus.	3 to 5 ..	..
Onion	Market	Apr. to May	Mar. to Apr.	Mar. to Apr.	1 2	3 to 6 in.	1½ to 3 lb.	..	5 to 6 ..	..
Panicums (*see* Millets)										
Pasture Grasses—										
Blue Panic ..	Pasture	Sep. to Feb.	Sep. to Feb.	Sep. to Feb.	..	..	..	4 lb. ..	Perennial; summer grower	To be grazed heavily and intermittently once established
Buffel	Pasture	Sep. to Feb.	Sep. to Feb.	Sep. to Feb.	..	..	..	4 to 5 lb. ..	Perennial; summer grower	Sandy or deep soils best; lighter sowing rate in the west on sandy country
Cocksfoot	Pasture	..	Autumn ..	..	..	..	..	15 to 20 lb.	Perennial ..	Intermittent grazing spring and early summer
Couch (Green) ..	Pasture	Sep. to Feb.	Sep. to Feb.	..	..	..	..	5 to 8 lb. ..	Perennial; summer grower	Pest in cultivation
Elephant	Pasture and green feed	Sep. to Jan.	Oct. to Feb.	Oct. to Feb.	5 0	2 0	Root and stem cuttings used	..	Perennial; summer grower	Graze or cut frequently to prevent woody stems developing; ratoons vigorously
Green Panic ..	Pasture	Sep. to Mar.	Nov. to Feb.	Nov. to Feb.	7 to 28 in.	..	2 to 4 lb. ..	4 to 5 lb. ..	Perennial; summer grower	Planting rate will vary according to row width and seed germination
Italian Ryegrass ..	Pasture	Mar. to Apr.	Mar. to Apr.	..	Drilled	..	15 lb. ..	15 to 20 lb.	Annual ..	Intermittent winter and spring grazing

							tings used; or plough or disc in chopped runners		summer grower	growth; useful for pig paddocks
Mitchell	Pasture	..	..	Spring-early summer rains	..	..	..	2 to 3 lb. ..	Perennial; summer grower	Trample seed in with sheep
Molasses	Pasture	Sep. to Feb.	Oct. to Feb.	..	..	..	..	2 to 4 lb. ..	Perennial; summer grower	Used on scrub burns; needs careful grazing; suitable only in limited areas; frost susceptible
Para	Pasture	Sep. to Feb.	..	..	6 0	6 0	Runner cuttings used; or plough or disc in chopped runners	3 to 4 lb. ..	Perennial; summer grower	Use in swamps or where water supply ample or land always damp
Paspalum	Pasture	Sep. to Feb.	Oct. to Feb.	..	..	..	..	8 to 12 lb.	Perennial; summer grower	Best growth where rainfall exceeds 40"
Perennial Ryegrass	Pasture	Mar. to Apr.	Mar. to Apr.	..	..	..	..	15 to 20 lb.	Perennial; winter grower	Limited use in specially favoured areas
Prairie	Pasture	Mar. to Apr.	Mar. to Apr.	..	..	..	..	20 to 25 lb.	Annual; winter and spring grower	May regenerate if allowed to seed
Rhodes	Pasture and hay ..	Sep. to Feb.	Oct. to Feb.	Oct. to Feb.	7 to 21 in.	..	2 to 4 lb. ..	6 to 10 lb.	Perennial; summer grower	Planting rate will vary according to row width and seed germination
Phalaris	Pasture	..	Mar. to Apr.	..	..	..	4 lb. ..	..	Perennial; winter and spring grower	Can be used in other districts as irrigated pasture component
Water Couch ..	Pasture	Summer ..	..	..	..	..	Runners used; or plough or disc in chopped runners	..	Perennial; summer grower	Frost susceptible; can be used to stabilise dam banks
Pasture Legumes*—										
Alsike Clover ..	Pasture mixtures ..	Autumn ..	Autumn ..	..	..	..	..	1 lb. in mixtures	Annual in Queensland; winter and spring grower	Moist winter conditions are required
Barrel Medic ..	Pasture mixtures ..	Autumn ..	Autumn ..	Autumn ..	..	..	1 to 2 lb.	2 to 3 lb.	Annual; autumn to spring grower	..
Berseem Clover ..	Alone and in pasture mixtures	Late summer	Late summer	Late summer	..	..	..	4–5 lb. in mixtures; 8–10 lb. alone	Annual; autumn and winter grower	Requires 12" winter rainfall or irrigation

* *See* footnote on page 199.

SOUTHERN DISTRICTS—*continued.*

SOWING AND PLANTING TABLE FOR FIELD CROPS.

(This Table requires to be adapted to suit individual circumstances.)

Crop.	Main Purpose for Which Grown.	When to Sow or Plant.			How Sown or Planted.				Approximate Period of Growth of Crop in Months.	Remarks.
		Coastal Districts.	Tableland Districts.	Inland. Districts.	Distance Rows Apart.	Distance Between Plants.	Quantity of Seed per acre if Drilled.	Quantity of Seed per acre if Broadcast.		
					Ft. in.	Ft. in.				
Black Medic ..	Pasture mixtures ..	Autumn ..	Autumn ..	Autumn ..	..	..	..	2–3 lb. in mixtures	Annual or biennial	Growth extends into summer; may regenerate
Burr Medic ..	Pasture mixtures ..	Autumn ..	Autumn ..	Autumn ..	..	..	..	2 lb. ..	Annual; winter and spring grower	Regenerates; more suitable for Tableland and Inland Districts
Clustered Clover ..	Pasture mixtures ..	Autumn ..	Autumn ..	Autumn ..	..	..	..	2 to 3 lb. ..	Annual; spring grower	Shows drought resistance; regenerates
Lucerne	Pasture mixtures ..	Jan. to May	Jan. to May	Jan. to May	..	..	½ to 3 lb.	1 to 3 lb.	Perennial	Can be used with either summer or winter pasture mixtures; in some cases this may involve spring sowing
Phasey Bean ..	Pasture mixtures ..	Spring-summer	Spring-summer	Spring-summer	..	..	½ to 1 lb. ..	1–2 lb. in mixtures	Annual; summer grower	Regenerates; of promise in summer pastures
Red Clover ..	Pasture mixtures ..	Autumn ..	Autumn ..	..	..	..	..	1–2 lb. in mixtures	Short lived perennial; late winter, spring, and early summer grower	..
Strawberry Clover	Pasture mixtures ..	All seasons except winter	All seasons except winter	..	3 0	3 0	Runners used	3 lb. ..	Perennial; spring, early summer grower	Requires ample moisture; very limited experience in Queensland
Subterranean Clover	Pasture mixtures ..	Autumn ..	Autumn ..	Autumn ..	..	..	..	3 to 5 lb. ..	Annual; winter grower	Requires 12–15″ May-October rain with favourable seed setting conditions in August-September for regeneration
White Clover ..	Pasture mixtures ..	Early autumn	Early autumn	Early autumn	..	..	..	2 lb. in mixtures	Perennial; winter and spring grower	Requires 12″ May-October rain for best results
Pea, Field*	Green feed and grazing	Mar. to June	Mar. to June	Apr. to June	Drilled	..	1 to 1¼ bus.	1½ to 2 bus.	3 to 4 ..	When sown in combination with a cereal, ½ to ¾ bus. per acre. For green manure purposes, *see* under "Leguminous cover crops"

Peanut	Kernels	Sep. to Jan.	Sep. to Dec.	Sep. to Dec.	3 0	1 3	25 to 30 lb. of kernels	..	4 to 5 ..	..
Potato	Market	Aug. and Feb.	Aug. and Feb.	Aug. and Feb.	2 6	1 0	6–8 cwt. of tubers	..	3 to 4 ..	..
Pumpkin	Market and stock food	Aug. to Jan.	Sep. to Jan.	Sep. to Jan.	8 to 12 ft.	3 to 4 ft.	2 to 3 lb. ..	..	5 to 6 ..	..
Rape	Green feed	Mar. to May	Mar. to May	Mar. to May	Drilled	..	5 to 6 lb. ..	6 to 8 lb. ..	2½ to 4	..
Rice, Swamp ..	Grain	Oct. to Jan.	Oct. to Jan.	Oct. to Jan.	Drilled	..	80 to 120 lb.	..	4 to 5 ..	Requires constant flooding during growing period
Rice, Upland ..	Grain	Oct. to Jan.	Oct. to Jan.	..	Drilled	..	60 to 90 lb.	..	4 to 5 ..	..
Rye	Grain and grazing ..	Mar. to June	Apr. to June	Apr. to June	Drilled	..	¾ to 1 bus.	1 to 1½ bus.	3 to 5 ..	..
Sorghum, Grain ..	Grain, stubble grazing	Sep. to Feb.	Sep. to Jan.	Sep. to Jan.	14 to 42 in.	..	4 to 12 lb.	12 to 20 lb.	3½ to 5	Immature growth of any member of this group may contain poisonous properties, and care should be exercised in grazing
Sorghum, Sweet ..	Green feed	Sep. to Feb.	Sep. to Feb.	Sep. to Jan.	3 6	0 4	5 to 6 lb. ..	12 to 15 lb.	3½ to 5	
Sudan Grass ..	Grazing and hay ..	Sep. to Feb.	Sep. to Jan.	Sep. to Jan.	Drilled	..	8 to 10 lb.	10 to 14 lb.	2 to 4	
Soybean*	Seed, grazing and hay	Sep. to Jan.	Oct. to Jan.	Oct. to Jan.	2 6	4 to 6 in.	15 to 20 lb.	25 to 35 lb.	3½ to 4½	For green manure purposes, *see* under "Leguminous cover crops"
Sunflowers	Seed for oil and bird seed	Sep. to Jan.	Sep. to Jan.	Sep. to Jan.	28 or 35 in.	1 0	4 to 6 lb. ..	..	4 to 5 ..	Wider spacing and less seed per acre where hand harvesting adopted
Sweet Potato ..	Market and stock food	Aug. to Jan.	Sep. to Jan.	Sep. to Jan.	3 to 3½ ft.	1 6	Cuttings used	..	4 to 5 ..	Useful for pig grazing
Tobacco	Leaf	Sep. to Dec.	Sep. to Dec.	Sep. to Dec.	4 0	18 to 24 in.	$\frac{1}{16}$th oz. in seed-beds	..	3 to 4 .. from trans-planting	Plants must be raised in specially prepared seed-beds and transplanted to permanent positions when strong enough
Turnip (including Swede)	Market and stock food	Feb. to May	Feb. to May	Feb. to May	2 0	1 0	1½ to 2 lb.	3 to 4 lb.	4 to 5 ..	..
Vetches or Tares* ..	Grazing	Mar. to June	Mar. to June	Mar. to June	Drilled	..	30 to 40 lb.	40 to 60 lb.	3 to 4 ..	For green manure purposes, *see* under "Leguminous cover crops"
Wheat	Grain, grazing and hay	Apr. to June	Apr. to July	Apr. to July	Drilled	..	⅝ to 1 bus.	1 to 1½ bus.	3 to 6 ..	Fodder purposes only on coast, where rust resistant varieties are recommended

* *See* footnote on page 199.

[TO BE CONTINUED.]

The Honey Flora of South-eastern Queensland

By S. T. BLAKE (Botanist) and C. ROFF (Adviser in Apiculture), Science Branch.

(*Continued from page* 160 *of the March issue.*)

Tumble-down Gum.

Botanical Name.—Eucalyptus dealbata A. Cunn. ex Schau.

Other Common Names.—Blue-leaf gum, crossed gum, hill gum, mountain gum, ridge gum, scrub gum, silver gum, smoky gum, stunted gum, mountain box, tumble-down box, leatherjack, leather jacket.

Distinguishing Features.—A tree of medium height, often very crooked, with smooth white or greyish white bark on the upper or greater part of the tree and grey persistent flaky bark on at least the lower part of the trunk, often whitish or bluish leaves that are usually not very narrow, bunches of flowers along the twigs with often very short stalks, usually blunt lids much longer than the rest of

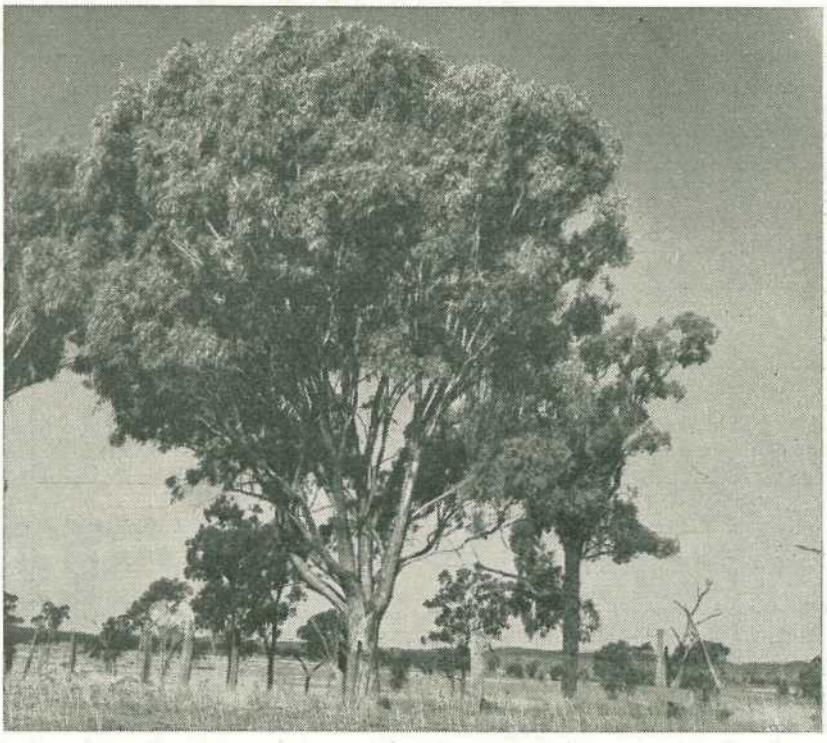

Plate 147.

Tumble-down Gum (Eucalyptus dealbata). Cobba-da-mana.

Plate 148.

Tumble-down Gum (Eucalyptus dealbata). Leaves, flower-buds and seed-capsules.

the bud, and seed-capsules that are nearly hemispherical in shape with protruding valves and a flat rim or ledge. The amount of flaky bark is quite variable and the leaves are sometimes green and narrow. Sometimes tumble-down gum is difficult to distinguish from blue gum (*Eucalyptus tereticornis*) but it is usually more crooked, the sucker leaves at least are rounder and very silvery or bluish, the lid is usually shorter and the rim of the capsule is not domed. Sometimes it resembles

river red gum, but the stalks of the flowers and capsules and the stalks of the flower-bunches are short, the lid is more evenly rounded or pointed, and the capsule usually has a narrower rim (Plates 147-148).

Description.—This is a tree up to 30 ft. or so high with usually a short and often crooked trunk. The bark on the upper part of the tree is smooth, white or nearly so and sheds each year. On the lower part of the tree it is grey, rough, coarsely flaky, persisting year after year; this rough bark may extend up the trunk. The twigs do not droop very much as a rule. The leaves vary a great deal in shape and colour; usually they are narrowly oval and greyish but sometimes are nearly round and bluish or silvery, or may be quite narrow, when they are often green. The leaves on saplings and suckers are rounded and bluish. The leaves on the tops of trees are mostly 2½-6 in. long and ½-1¼ in. wide, 2-9 times as long as wide. The flowers are white, about ½ in. wide when fully open, have short or very short stalks and are borne in shortly stalked bunches along the twigs. The lid is about twice as long as the rest of the bud, usually dome-shaped and blunt, but sometimes tapering to a point. The capsule has a hemispherical lower part, four projecting triangular valves and a narrow flat or slightly sloping platform, in all $\frac{5}{16}$-¼ in. long and wide.

Distribution.—Tumble-down gum is found on sand-ridges or loose sandy soil or sometimes stony ridges in forest country in the Darling Downs District. It is also found in the Maranoa District and in inland New South Wales.

Usual Flowering Time.—November-December.

Colour of Honey.—Medium amber.

Importance as Source of Honey.—Medium.

Importance as Source of Pollen.—Major.

General Remarks.—A large quantity of pollen is obtained from tumble-down gum and colonies working it breed freely. In the Darling Downs District this tree, which blooms more or less each year, is a useful supporting species; heavy flowering may occur at intervals of 3-4 years.

The honey from this tree has a pleasant flavour and good density. It is similar to other summer-produced honeys in that it does not granulate readily.

Soil Tilth and Root Quality in Carrots

By K. M. WARD, Senior Horticulturist.

It is essential to prepare the land well for carrots.

Although cultivation of the growing crop helps to control weeds and increase the penetration of rain or irrigation water, it is not a substitute for thorough preparatory cultivation.

Probably no vegetable crop responds more to efficient soil preparation before planting than the carrot (Plate 1).

Because the seed is small and the young plants delicate, soil conditions have a marked effect on both the initial stand and subsequent growth. The structure of the soil, its looseness or compactness and, to a lesser extent, its temperature and moisture content all influence preparatory cultivation and have a direct bearing on the shape, size and quality of the roots.

Effect of Organic Matter.

The initial step in land preparation for many vegetable crops is the incorporation of organic matter in the soil. This may be added in the form of a green manure crop grown for this purpose, animal manure, weed growth or crop residues on the land itself. Occasionally sawdust is used in this way. Such practices maintain the fertility of the soil and improve its physical structure.

With carrots, however, certain precautions must be observed. Excessive

Plate 1.

A Well Grown Carrot Crop. Variety—Red Cored Chantenay.

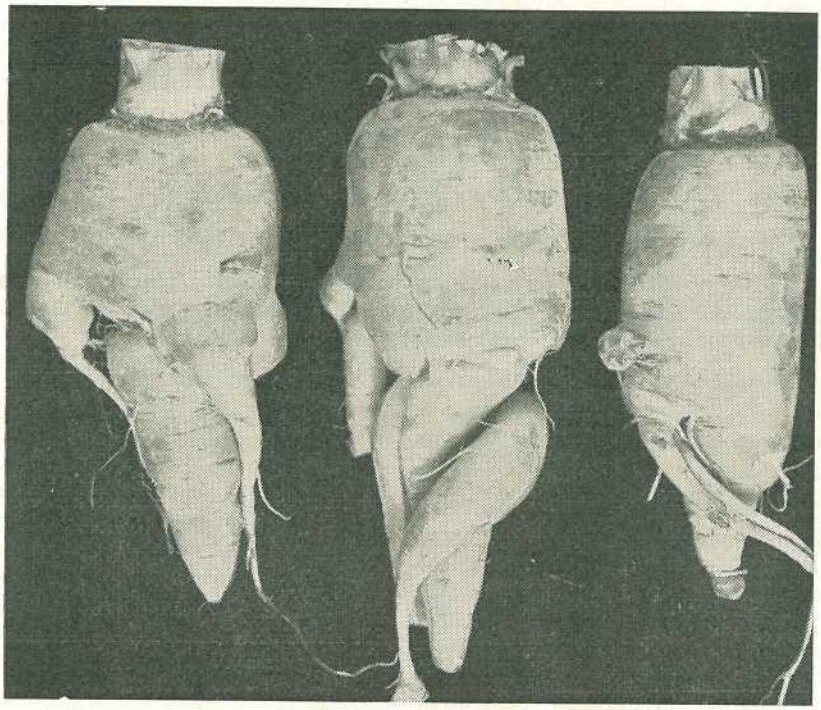

Plate 2.

Forking in Carrot Roots. Raw organic matter in the soil tends to produce malformations of this kind.

amounts of raw organic matter in the soil tend to cause forking of the roots, hairiness and other defects of this kind (Plate 2). Moreover, the presence of large quantities of incompletely decomposed material may give rise to nitrogen deficiency symptoms in the leaves and stunting of the roots. These effects are most marked in areas where sawdust has recently been applied.

It is therefore inadvisable to plant a carrot crop soon after a cover crop has been turned into the ground or after an application of a large amount of animal manure. Better results can be expected if the crop is sown on land from which a well-manured vegetable crop has just been harvested or on land in which added organic matter has had ample time to decompose.

It should not be assumed, however, that a soil devoid of humus (the decomposition product from organic matter) is the best for carrots. On the contrary, a soil containing ample amounts of well-decomposed organic matter is highly desirable; it usually has a good crumb structure and remains loose and friable during the growing period.

Seedbed Conditions.

Soil preparation aims to provide a medium not only for the development of the carrot roots but also for the quick germination of the seed and the rapid emergence of the seedlings.

If the roots are to penetrate the soil easily and attain full size without becoming misshapen, the soil must be friable for a depth of about 10 inches. Throughout this depth, it should be free from clods, stones and other obstructions, and there should be no plough sole at the bottom of the

worked layer of soil to hinder the free drainage of water and impede root penetration. If the carrot roots encounter such a plough sole, growth may be seriously hampered, and the roots badly "pinched" (Plate 3).

The initial ploughing must therefore be deep, and from the bottom of the furrow to the surface the soil should be sufficiently fine and friable to permit even growth and the development of long, smooth roots.

A sandy loam is the most suitable soil type for carrots, but deep friable loams and clay loams may produce excellent crops if seedbed preparation is adequate. In order to improve the drainage in these soils and give an adequate depth of friable soil for the crop, it is customary to form raised beds in the final stage of seedbed preparation. Raised beds are not necessary in deep sandy loams.

Method of Preparation.

The success of a carrot crop depends more on seedbed preparation than on cultivation after the plants are established. Indeed, if the preparatory work has been thorough, lack of inter-row cultivation may not have an adverse effect on the crop so long as weeds are controlled.

The first requisite is ploughing to a depth of about 10 inches provided this can be done without bringing large amounts of subsoil to the surface. If the surface soil is shallow and the subsoil compact, subsoiling may be necessary. The initial ploughing is followed by harrowing, preferably with a disc harrow, to break down the soil lumps.

In loams and clay loams, at least one more ploughing, followed by discing and other tillage operations, will be necessary to produce a fine tilth throughout the depth of the ploughed zone.

In the final stages of land preparation for carrots, a plank drag is useful for firming and levelling the surface soil before sowing. The drag may have to be dispensed with in soils which pack and form a hard surface crust after rain or irrigation.

Weed Control.

The destruction of weeds is an important objective in the preparation of land for carrots, as the young plants can quickly be smothered by weeds (Plate 4). An early setback of this kind undoubtedly has an adverse effect on root quality.

Ploughing and other cultural operations can quite often be timed to destroy weeds which germinate after rain. Deep ploughing, particularly mouldboard ploughing, is notably effective in suppressing weed growth. In the later stages of land preparation, firming the soil with a plank

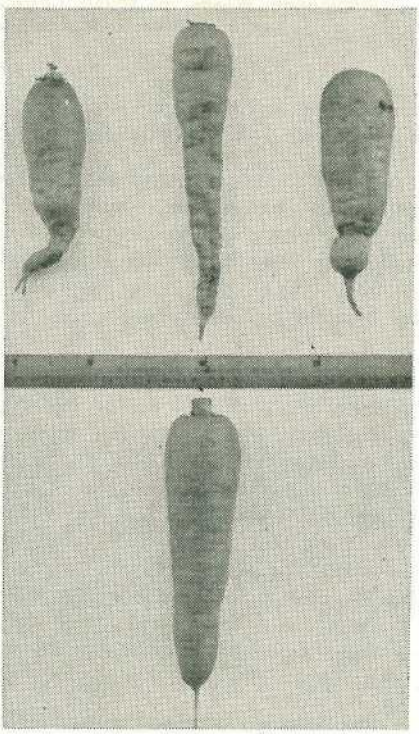

Plate 3.

"Pinching" in Carrots Due to Shallow Cultivation. "Pinched" roots above; normal root below.

Plate 4.

Germinating Weeds in Young Carrots on Land where Cultural Operations Prior to Planting were Unsatisfactory.

drag tends to encourage weed seed germination, and the young weeds can then be destroyed by light harrows.

As the soil preparation work approaches completion, cultivation should become progressively more shallow in order to avoid turning up a new batch of seed with the fresh soil brought to the surface.

Moisture Conditions.

The moisture content of the soil at each cultural operation has an important bearing on the final tilth, particularly in loams and clay loams. If the soil is worked when it is too wet, hard, persistent lumps are formed. These tend to make the soil unmanageable and a considerable amount of extra cultivation will then be necessary to make it suitable for a carrot crop.

Cultivation is easier and more effective when a handful of the soil pressed into a ball holds its shape but still crumbles quite easily. Preparation of the soil should be completed when the soil is in this condition and not when inclement weather hampers operations.

Over-cultivation, particularly in the preparatory stage, may pulverise the soil and destroy its friability. The incidental loss of structure will eventually lead to packing and crust formation, which adversely affect seed germination and are often responsible for poor stands.

Conclusion.

Efficient land preparation is essential for the carrot crop.

If preparatory cultivation has been inadequate, no amount of inter-row tillage will create those soil conditions which are necessary for the production of high-grade carrots. Inter-row cultivation is of some importance, however, for weed control and as an aid to the penetration of water during rain or irrigation.

Operating the Disc Harrow

By K. FISHER-WEBSTER, Senior Adviser in Horticulture.

The disc harrow is used extensively in all horticultural areas. Implements of this type have a variety of uses but one considerable advantage of some models is their ability to cut up and incorporate surface vegetation—both weed growth and green manure crops—in the first few inches of topsoil (Plate 1).

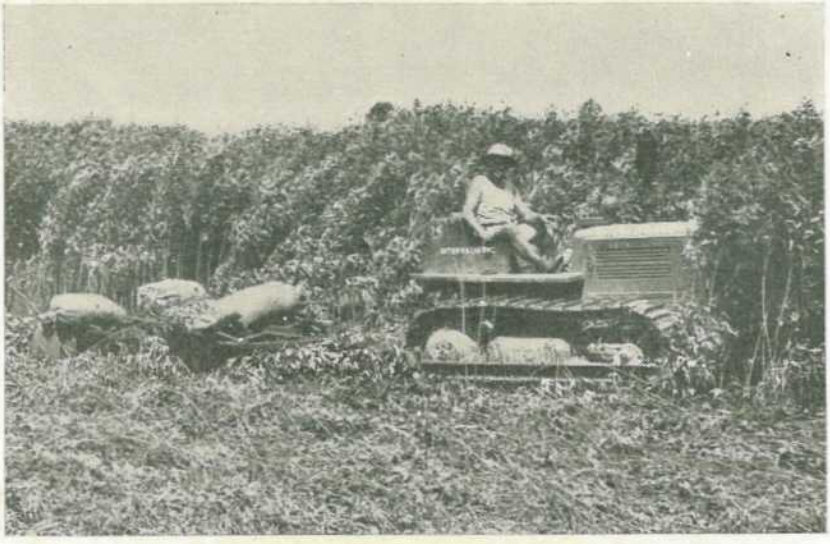

Plate 1.

Disc Harrow Operation in Pigeon Pea, a Tall, Woody, Perennial Green Manure Crop.

This practice has the advantage of increasing the organic matter in the soil and also protecting the surface from the damaging effects of hot sun and heavy rain.

Types of Disc Harrow.

Three main types of disc harrow are in general use. These are the *single gang* for light tractors, the *offset* for orchard work and the *tandem disc* for heavy work.

The single gang type has discs of small diameter and is best suited for the final stages of land preparation prior to planting and for the destruction of light weed growth (Plate 2). It is not heavy enough to handle bulky cover crops and is rather unsatisfactory on rough ground. It is designed primarily for use with small tractors.

The offset harrow is so constructed that land can be cultivated on one side of the tractor. The implement is particularly suitable for orchard work as it can be operated under the spreading branches of fruit trees. Metal guards may be fitted to protect the trees from damage by the framework of the harrow. The offset harrow is usually more expensive than the single gang type because of its heavier construction.

The tandem disc harrow is a combination of four gangs of discs which can be set at various angles for either

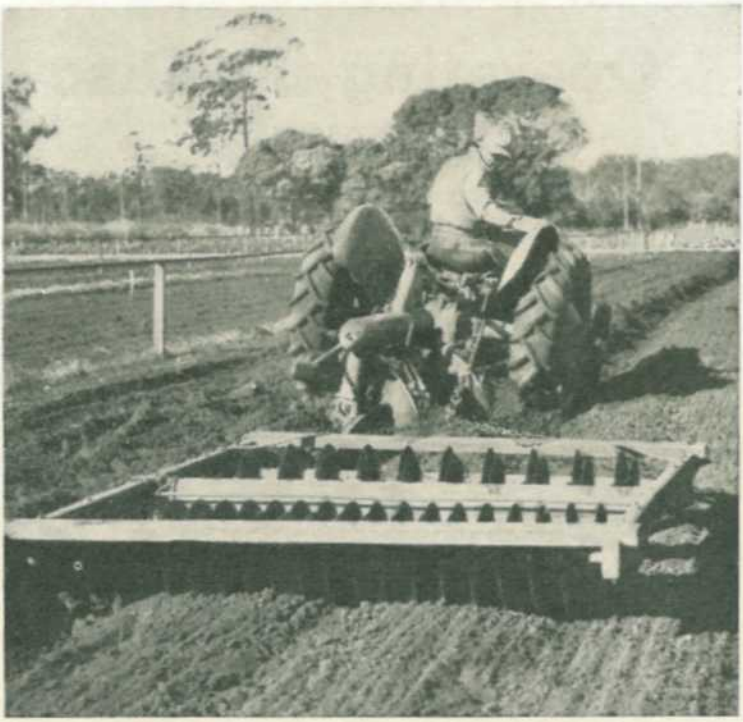

Plate 2.

The Meeker Disc Harrow. This is a light harrow used in the final stages of land preparation for vegetable crops. The implement is being operated behind a disc plough.

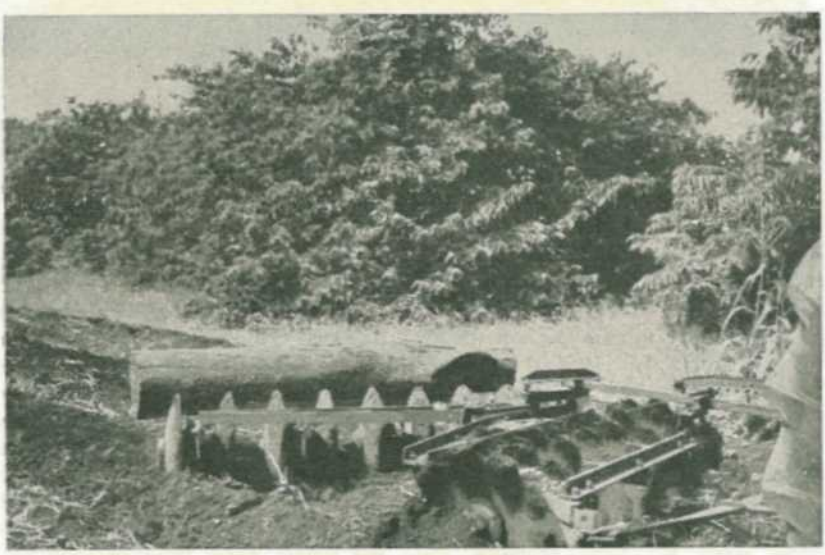

Plate 3.

The Offset Disc Harrow. This type is adapted for use in orchards.

shallow or deep cultivation. The front pair of discs cut and turn the soil over in one direction and the rear discs turn it back in the opposite direction. Effective cutting of surface vegetation and adequate tillage are thus obtained at the same time.

Pre-Planting Cultivation.

Small disc harrows are used mainly in the final stages of land preparation for small crops.

The seed of carrots, beetroot and some other vegetables is sown directly in the field and a fine surface tilth is necessary. Clods and a superficial crust which might cause uneven germination in these crops are broken up just prior to sowing and a firm shallow seedbed is thus obtained by discing.

Where the seed is broadcast, the small disc harrow will provide a reasonable soil covering but the light tine harrow is generally more effective for this purpose.

Cultivating Tree Crops.

In orchards, where low-spreading branches make it impossible for a tractor to work near the base of the tree, the offset disc harrow is very useful (Plate 3). A sloping sheet metal guard fitted over one side of the harrow frame allows the discs to work close to the trunk; low hanging branches are lifted and slide over the implement without damage.

Usually it is possible to operate the offset disc harrow both ways in the orchard and thus reduce the amount of hand chipping around the trees. The main objective in this case is to incorporate cover crops in the topsoil. The shredded organic matter remains near the surface, where it reduces evaporation from the soil, checks erosion and assists the penetration of rain and irrigation water.

Where the orchard is irrigated, the disc harrow can be used to break the surface crust, if and when necessary, after water is applied.

Care must be taken to avoid deep cultivation under the trees. Shallow cultivation tends to encourage the development of tree roots near the surface and subsequent deep cultivation may cause considerable damage. Disc harrows should therefore operate at a uniform depth. Wherever practicable, cultivation should be avoided when the trees are in bloom, as even minor root injury may reduce the fruit set.

Heavy Work.

The larger type of tandem disc harrow is designed for heavy work. When fitted with scalloped discs, it can be used to break up and turn under the larger vigorous growing cover crops such as pigeon pea and New Zealand blue lupin. For this work, the implement should be weighted. The framework is provided with steel trays to carry sand bags and other types of heavy material.

The larger tandem disc harrow is rugged in construction and capable of a wide range of work (Plate 4). It is indispensable in the pre-planting cultivation of ploughed land, particularly on the heavier types of soil.

The first run with this implement follows the line of the ploughed furrow, the steel trays being weighted and the discs set at a fairly wide angle.

The second discing is made at approximately right angles to the first run—this time without added weight and with less angling to the discs. The cut is therefore more shallow.

Where the cover crop, weed growth or crop residue is bulky, several disc harrowings may be required. As many as four are needed over a period of several months in an old pineapple crop before the land can be ploughed.

In sandy soils and sandy loams, the disc harrow can be used in place of the plough for one or more cultural operations. The initial ploughing is carried out during the drier months of the year and a short-term cover crop such as cowpea or maize is planted in spring. The crop is turned under with the disc harrow in late summer or early autumn.

This practice permits the preparation of the land for planting during the latter part of the wet season, when open plough furrows are undesirable owing to the risk of erosion.

An area of land can be cultivated in a few hours with a disc harrow, whereas ploughing may take several days. This is an advantage during the wet season, when rain is liable to interfere with tillage operations. On sloping land, the final run of the disc harrow is made on the contour, and contour drains should be opened up at intervals down the slope to give protection against possible storm damage.

Points to Remember.

Too frequent use of any implement pulverises the soil, which then tends to become dusty when dry and muddy when wet. It is therefore unwise to rely solely on disc harrows or other implements to break down the soil to the required tilth. Leave reasonable periods between successive cultivations and let Nature assist.

Soil should be cultivated only when it shatters easily. The degree of shattering depends on its moisture content and varies with the soil type. The grower who knows his land also knows when conditions are right for the use of disc harrows.

The greater the angle of the discs, the deeper the cut. Disc harrows should not be angled more than is required to do an efficient job.

A tandem disc harrow should track —that is, the rear discs should run between the tracks of the front discs. Faulty tracking can be responsible for poor work and often leaves channels where scouring takes place during heavy rain.

Discs should be sharpened regularly. Otherwise the implement makes a poor job of chopping up crop residues and operating costs are increased owing to the heavier pull on the drawbar.

The disc harrow should be serviced regularly. Nuts on the framework and the main shaft carrying the discs must be tight. All bars and moving parts require oil or grease at frequent intervals.

Plate 4.

The Tandem Disc Harrow. This is a heavy implement suitable for turning in cover crops and for pre-planting cultivation.

Control of Damping-Off in Seedbeds

By D. S. TEAKLE, Plant Pathology Section.

Damping-off of seedlings is caused by a number of fungi (including species of *Pythium* and *Rhizoctonia solani*) which are common inhabitants of soil and rotting plant debris. Under certain favourable conditions of moisture and temperature, these fungi attack seedlings, causing a girdling and collapse at ground level or a rotting of the young root.

As serious seedbed losses may occur, control measures are often essential. Those most suited to commercial application are described below.

Good Seedbed Practices.

The seedbed should be situated in a sunny place.

Stands should be thinned early and kept weeded so as to allow good circulation of air around the seedlings.

Repeated use of a seedbed for raising seedlings leads to a build-up in the number of damping-off fungi present. The seedbed site should be changed regularly.

Seedlings should be kept growing vigorously by attention to fertilizer and other cultural requirements.

Heat Treatment.

Partial sterilization of the soil by injecting steam is effective in killing damping-off organisms, but in Queensland the high cost of equipment required prevents its adoption.

Where wood is abundant, however, sterilizing by fire is a cheap and effective method. Brushwood and branches are piled over the seedbed and surrounding margins to a depth of about three feet. If the timber is cut up and closely and evenly packed, a depth of one foot is sufficient. When this is fired, steam sufficient to kill damping-off organisms is generated in the soil.

It is important to have the soil moist, and neither dry nor saturated with water, when firing takes place. Fire bakes a dry soil, while in a very wet soil the steam generated does not penetrate readily.

When available, a 4-inch layer of the woody material from termite mounds provides a slow-burning and very effective fire.

Special care should be taken to prevent unsterilized soil or implements from contaminating heat-treated soil. If damping-off starts in sterilized soil, losses may be more severe than in the original unsterilized soil. Before use in sterilized soil, implements should be cleaned of soil and should be swabbed with 2 per cent. formalin.

Soil Fumigation.

Formalin and methyl bromide fumigants each give control of damping-off. The seedbeds are prepared for sowing and should be moist, but not wet, when fumigation is carried out.

(*a*) *Formalin* should be applied as a 2 per cent. solution (that is, 1 gallon of commercial formalin in 50 gallons of water) at the rate of 2 gallons per square yard. Immediately after treatment the beds should be covered with sacking for 2 or 3 days to retain the formalin fumes in the

soil. Beds are then aired for 10 days or until the odour of formalin can no longer be detected.

(*b*) *Methyl bromide* is a poisonous, highly volatile fumigant which is very toxic to nematodes and weed seeds as well as to damping-off fungi. Therefore, it is particularly valuable for nematode-susceptible crops and/or where weeding is to be avoided.

The fumigant is supplied as a liquid under pressure in cylinders or cans. When the pressure is reduced by opening the valve on the cylinder, or by piercing the can with a special dispenser, the liquid flows through a rubber tube into an evaporating pan previously placed under airtight plastic sheets covering the seedbed. The methyl bromide quickly evaporates from the pan and penetrates the soil. The covers are left on for one day to ensure maximum penetration. One pound of methyl bromide is sufficient to treat 50 square feet of seedbed.

Most seeds require at least 2 to 3 days' airing of the bed before planting. Transplanting seedlings into treated soil should not be carried out until the beds have aired for at least a week.

Care should be taken not to re-contaminate fumigated soil, as noted under "Heat Treatment."

It is important to pay careful attention to the manufacturers' instructions for applying methyl bromide, *and to take extreme precautions against inhalation of the colourless and odourless, but very toxic, vapour*. Before commencing to use methyl bromide the operator should be quite certain he is familiar with the full procedure involved and the precautions necessary.

Seed Treatment.

Soil treatment by heat or chemicals is time-consuming and is often fairly expensive. An improved emergence of seedlings and some control of damping-off may be had by seed treatment before planting. Dusts containing thiram, chloranil and captan are effective seed-dressings for many crops, and are marketed under various proprietary names.

The method of application of seed-dressings is very simple. The recommended amount of dust is added to the seed, and the seed and dust are shaken together in a suitable container for several minutes until each grain becomes evenly coated with a protecting layer of the fungicide.

Soil Drenches.

Seed dressings may not give protection against damping-off once the seedlings have emerged, and the soil fumigants described above are toxic to growing plants. Thiram and captan drenches can be used to reduce damping-off in growing seedlings.

Where damping-off is of the type in which the root is shrivelled and rotted (that is, if species of *Pythium* are most likely to be involved), thiram drench at the rate of 1 oz. of 80 per cent. thiram in 4 gallons of water gives control.

If the seedlings are rotted at ground level, with the root remaining healthy (that is, if the fungus *Rhizoctonia solani* is the likely organism present), then captan drench at $1\frac{1}{4}$ oz. of 50 per cent. captan in 4 gallons of water may give better control than thiram.

Half to one gallon of the fungicide should be applied to each square yard of seedbed. Soil drenches should be applied as soon as damping-off appears. Delay may mean that the drenching is ineffectual. If required, the drench should be repeated a second or even a third time.

Small amounts of these drenches can be made up by mixing 1 level tablespoonful of either 80 per cent. thiram or 50 per cent captan with 5 pints of water.

The Pineapple Scale in Queensland

By A. R. BRIMBLECOMBE, Senior Entomologist.

The pineapple scale (*Diaspis bromeliae* (Kern.)) has been recorded from the pineapple and related plants in most countries of the world. In Queensland it was known from the Brisbane area in 1928 and in recent years has appeared occasionally in pest proportions in several pineapple growing districts in the south-eastern part of the State.

This insect normally occurs in colonies within the protection of the lower leaf bases on pineapple plants and from dense colonies may spread along the leaves (Plate 1) and to the fruit and suckers. Both smooth and rough-leaved varieties of pineapples are affected, and in Queensland the insect also infests some ornamental Billbergia.

The female insect is covered by a greyish-white flat circular scale about one-sixteenth of an inch in diameter. The male scale covering is much smaller and is elongate in shape.

The female lays minute yellowish eggs under its body. The crawlers, on hatching, leave the parent's protection and settle down in some suitable feeding site. Feeding is by sucking. The secreted scale soon appears and the female individuals never leave the site where they have settled. Development to the adult stage may be completed in two months during summer and several germinations may occur in a year.

Infestations vary considerably in intensity within plantations and from season to season. This is due partly to weather conditions and partly to natural enemies, especially a small wasp parasite and ladybirds.

Usually, infestations are light and under normal plantation cultural practices have little effect on crop production. Heavy infestations, however, may occur in small scattered areas through the plantations. The dense colonies give the leaves a grey scurf-like appearance, and the plants show lack of vigour, resulting in stunted growth, small fruit and useless suckers. These areas often have to be destroyed and the gaps become unsightly and unprofitable.

Results with materials which might be expected to check the pest, such as white oil and nicotine sulphate, parathion, BHC and chlordane, have been disappointing. No sound insecticidal control recommendation therefore can be made at present.

Although the pineapple scale is not regarded as a potential pest of major importance, quarantine restrictions are maintained over the movement and growing of pineapples in the areas where it occurs.

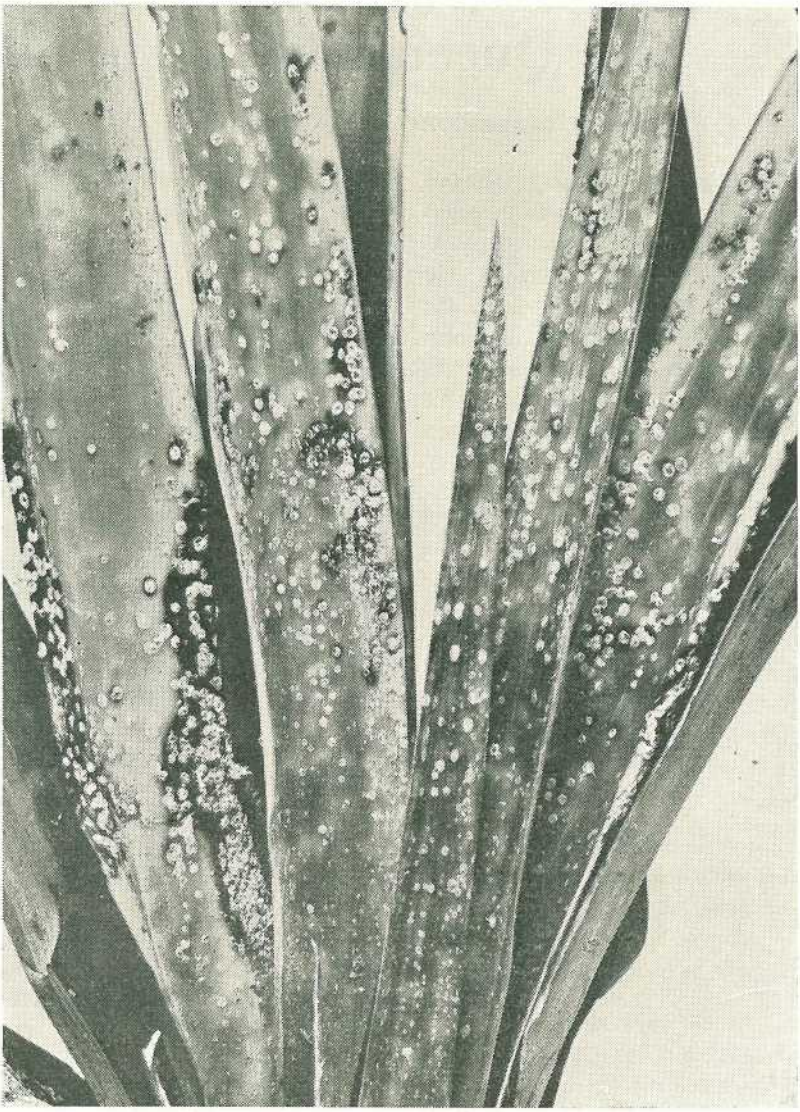

Plate 1.
Pineapple Leaves Infested with the Pineapple Scale.

Root-Knot Nematodes and Their Control

By R. C. COLBRAN, Entomologist.

The root-knot nematodes (species of *Meloidogyne*) are the most important of the eelworms attacking plants in Queensland.

Their activity is recognised by the production of abnormal swellings or galls on the underground parts of many plants, notably tomato, strawberry, sugar cane, tobacco, papaw, pineapple, passion fruit, peach, French bean, pumpkin, potato, banana, carrot, beetroot, cucumber and watermelon.

When these galls are opened, the female nematodes are visible to the naked eye as small white bodies embedded in the plant tissue. This character serves to distinguish nematode galls from galls due to the activity of other organisms.

As a result of heavy nematode infestations, the aboveground parts of the plants show typical symptoms of starvation, namely, stunting, yellowing, reduced yields and a proneness to wilt in hot weather. In severe cases death may result.

Although root-knot occurs in all soil types, infestations are most serious in the lighter soils, particularly during hot, dry seasons.

LIFE HISTORY AND HABITS.

At soil temperatures exceeding 68°F., nematode eggs hatch soon after being laid and give rise to the active eel-shaped larvae, which are too small to be seen in the soil with the naked eye. These move short distances and can live for 12-18 months when no host plants are available.

In the event of their locating a growing root, the larvae enter at the root tip and, if the plant is a suitable host, undergo a series of moults, eventually becoming either motile eel-shaped males approximately 1/25 inch in length, or shorter pear-shaped females visible to the naked eye as small white specks.

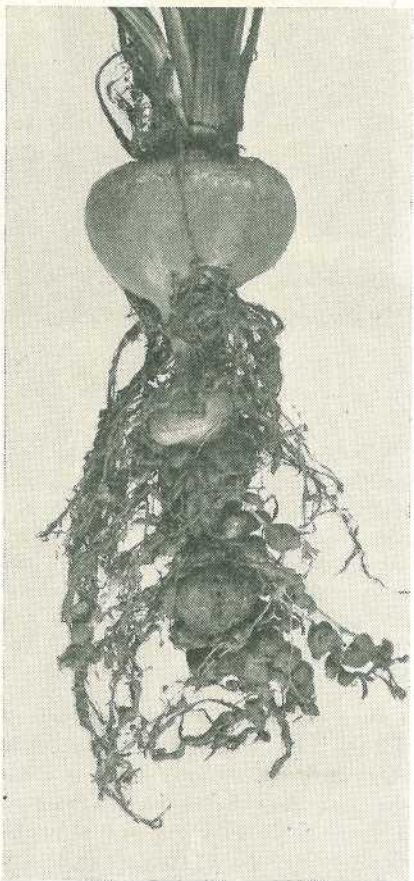

Plate 1.
Severe Galling of Beetroot Caused by Root-Knot Nematodes.

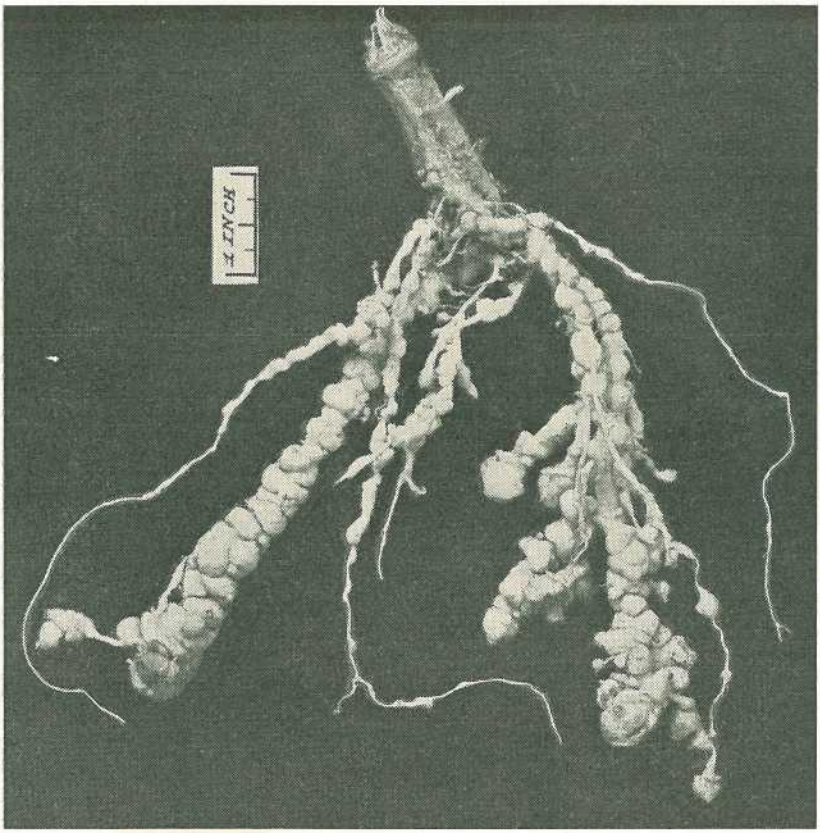

Plate 2.
Nematode Galls on Cucumber Roots.

The developing female loses her motility and the surrounding plant tissue is stimulated to produce the characteristic swelling. The size of the galls is determined by such factors as the species of root-knot nematode, the degree of infestation and the nature and rate of growth of the plant.

The mature female excretes a globule of jelly-like material into which up to 1,000 eggs are laid. The egg mass may be visible at the root surface or it may be entirely surrounded by plant tissue, when the majority of larvae undergo further development within the same gall as the parent.

The duration of the life cycle is dependent on several factors, principally the nature of the host plant and the soil temperature, and varies from 3 weeks to 3 months. The rate of development is at a minimum during the winter months.

SPREAD.

The movement of larvae within the soil is of minor importance. Undoubtedly the most extensive distribution occurs in soil wash following storm rains and through the agency of man in the use of infested planting material—strawberry runners, banana suckers, seedlings, seed potatoes, etc. By this means, nematodes are carried over considerable

distances and may be introduced into areas where the particular species was previously non-existent. There is also a certain amount of distribution in soil adhering to humans, animals, and farm equipment and by irrigation from some water supplies.

CONTROL.

There is as yet no economical method of destroying nematodes in the roots of growing plants without causing injury to the host plant. Control measures are therefore aimed at reducing the soil populations prior to planting susceptible crops. This is accomplished by sound cultural practices and by soil sterilization. The latter is only warranted with crops yielding relatively high monetary returns per acre, so that cultural methods are frequently the only ones available to the farmer.

Land and Crop Management.

As soon as possible after harvesting, nematode-infested plants should be hand-pulled or ploughed to expose the roots to drying winds. The ground then should be cultivated monthly to maintain it as free as possible of indiscriminate plant growth. Root-knot nematodes reproduce freely on many common weeds, for example, nut grass, crowsfoot grass, sow thistle and chickweed. When cover cropping, susceptible plants such as cowpea and pigeon pea should be avoided as these serve to increase the nematode population. Resistant cover crops include Sudan grass, Rhodes grass and Gambia pea and other species of Crotalaria. Crops which may be grown successfully on land in the presence of nematodes are cereals, cotton, peanuts and winter-growing vegetables.

Soil Treatments.

High nematode populations may be reduced by treatment with soil fumigants, or by heat. Preplanting treatment is always advisable on small areas when susceptible plants are involved. In the field, soil fumigants should be used when experience has shown that nematodes seriously affect crop production on the area, or, in new areas, where root examination indicates both a wide distribution and a high population of the pest. Two chemicals are available, namely, DD (a mixture of dichloropropane and dichloropropene) and EDB (ethylene dibromide).

Before either DD or EDB is applied, infested root material should be removed or allowed ample time to decay. The soil is then reduced to the tilth of a fine seedbed and all clods broken down, as their presence

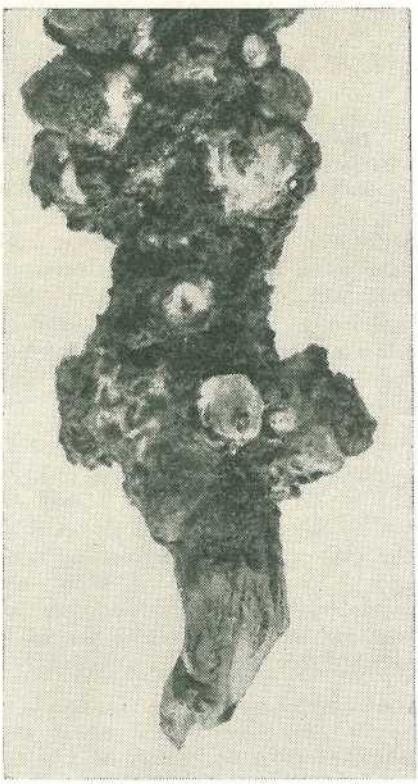

Plate 3.

Severe Root-Knot Nematode Infestation on the Root of a Citrus Tree.

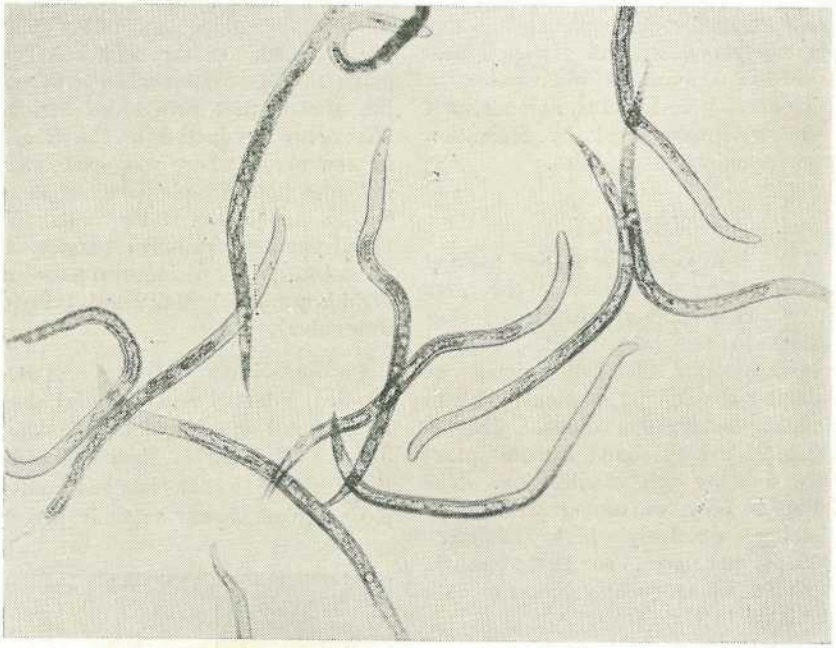

Plate 4.

Larvae of a Root-Knot Nematode. This illustration is very much enlarged, the larvae not being visible to the naked eye when in the soil. The larvae enter plant roots and there undergo further development. (Magnified 130 times.)

seriously reduces the efficacy of fumigation. At the time of treatment, the soil should be warm and sufficiently moist to hold together when pressed in the hand. Overcast weather with the likelihood of light showers is ideal for the purpose.

For small areas, the fumigant is applied at a depth of 6 inches in holes 1 ft. apart at the rate of 1 fluid oz. per 14 holes or in rows 1 ft. apart at the rate of 1 fluid oz. per 14 ft. of row. Special hand injectors are available, but a screw-top glass jar with two opposite holes in the lid is suitable for pouring the fumigant.

In large areas, the fumigant is applied in rows 1 foot apart and 6 inches deep by means of tractor-driven injectors, or by gravity feed equipment attached to a mouldboard plough. Twenty gallons of fumigant are required to treat 1 acre of ground. With row crops such as tobacco, the cost of treatment can be reduced with little loss of efficiency by applying the fumigant in a single row under the intended planting line at the rate of ½ pint per chain, or in two rows each 6 inches from the planting line, using ¼ pint per chain in each row. Every effort should be made to prevent untreated soil being thrown or washed on to the treated rows.

The land should not be planted until 2-3 weeks after treatment; a longer period is necessary in heavy soils and in cool weather. It is also important to use nematode-free seedlings.

For the preplanting treatment of areas where widely separated plants are grown (for example, passion fruit), an area at least 4-6 feet square should be fumigated at each planting site. This allows the plants to become established before the roots are heavily infested with nematodes.

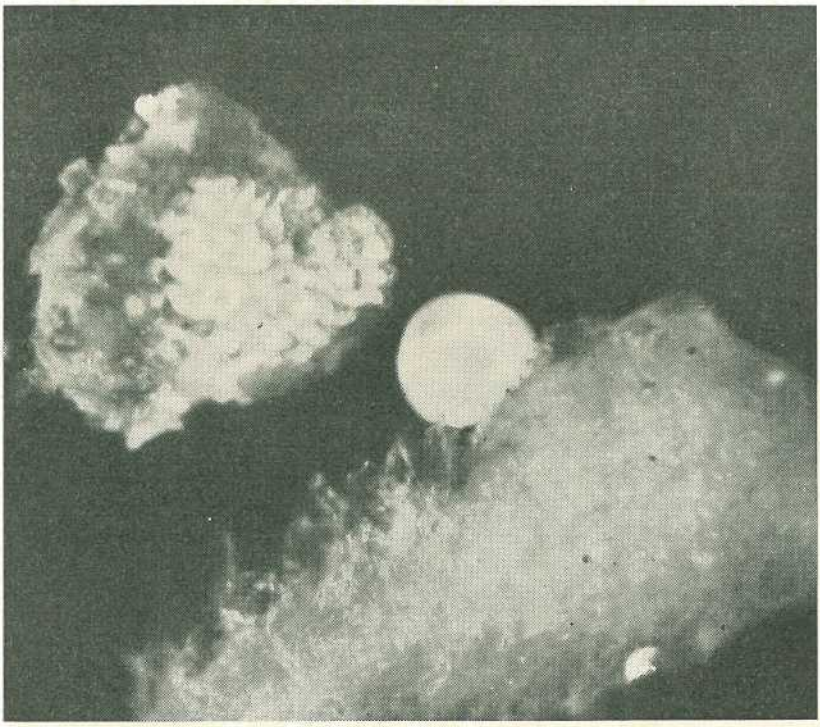

Plate 5.

A Small Root-Knot Gall on a Cucumber Root. The egg mass has been dislodged to expose the mature female nematode. (Magnified 40 times.)

Where root-knot nematodes are prevalent, soil fumigation may be necessary every season before planting. Fumigation as now practised does not eliminate nematodes, but reduces the population to a level which allows the profitable growing of susceptible crops.

Warning.

DD and EDB are inflammable liquids, poisonous to humans and animals, but are not dangerous when properly handled. Any unnecessary breathing of the fumes, and contact with the skin, should be avoided. After use, applicators should be thoroughly flushed with a mixture of kerosene and lubricating oil.

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Crush and Walk-Through Bail Unit

By J. J. SULLIVAN (Senior Adviser) and T. A. ALDERDICE (Assistant Adviser), Cattle Husbandry Branch.

The cattle yard is the hub of the practical cattle management on a beef-cattle property and the appointments and design of the yard are generally a fair indication of the standard of cattle husbandry practised.

A dual-purpose unit which will meet the full requirements of restraint in a mixed herd is the combination dipping and operating crush which features a walk-through slide bail and front and rear operating panels.

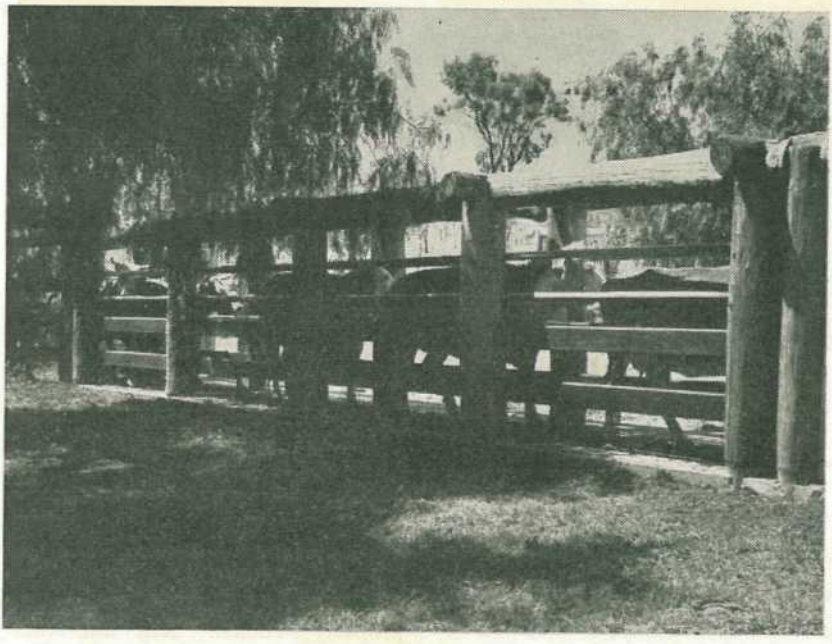

Plate 1.
View of Crush containing Cattle.

This is most evident in the facilities provided for the close handling and restraint of animals. These are centred in the crush and bail, and unless they provide for absolute control of the animal and facility of operation, the result will be bad handling and neglect of work which calls for the restraint of the animal. This has a very unfavourable effect on both the patient and the working staff.

THE CRUSH.

(See Plate 1.)

General Features.

Length.—42 ft. This will hold 7-8 adult beasts, a sufficient number to provide a "lead" and "follow-through" effect which tends to keep the cattle moving steadily forward under the attention of one man.

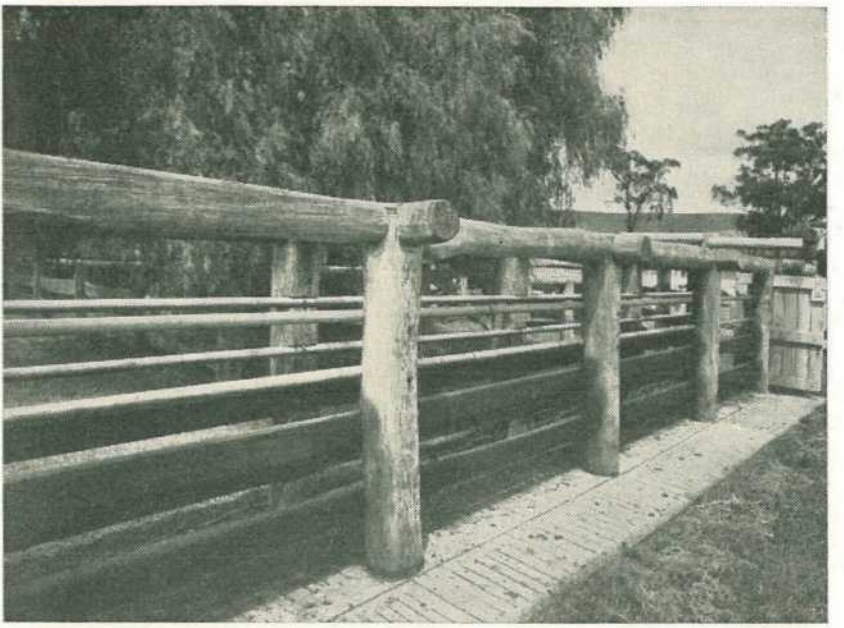

Plate 2.
Concrete Walk Extension of Crush Floor.

Width.—26 in. This is best for general purposes. The wider the crush the more attempts there will be at turning. A beast has a surprisingly small "turning radius".

Flooring.—6 in. concrete on rock base with non-slip surface, designed with parallel recesses for trapping dirt. The concrete has been extended beyond the crush to form a 2 ft. walk (Plate 2), which is increased to 6 ft. width at the operating panels.

Rail Gauge.—This incorporates a "working-section" having the third and fourth rails of 2 in. galvanised iron piping with 12 in. spacing situated 3 ft. 9 in. to 4 ft. 9 in. above ground level (Plate 1). This enables the carrying out of the crush operations, such as tick-fever inoculation and cross-branding, with maximum facility.

"Screen" Roller Gates.—The crush section is screened by "closed-construction" type roller gates from the

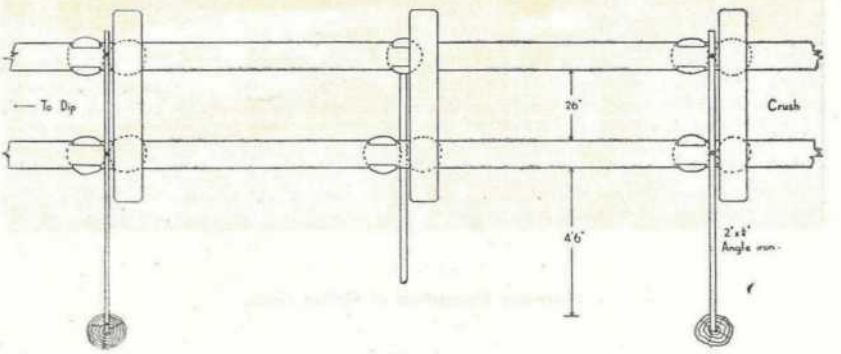

Fig. 1.
Plan of Slide Bail Crush Unit.

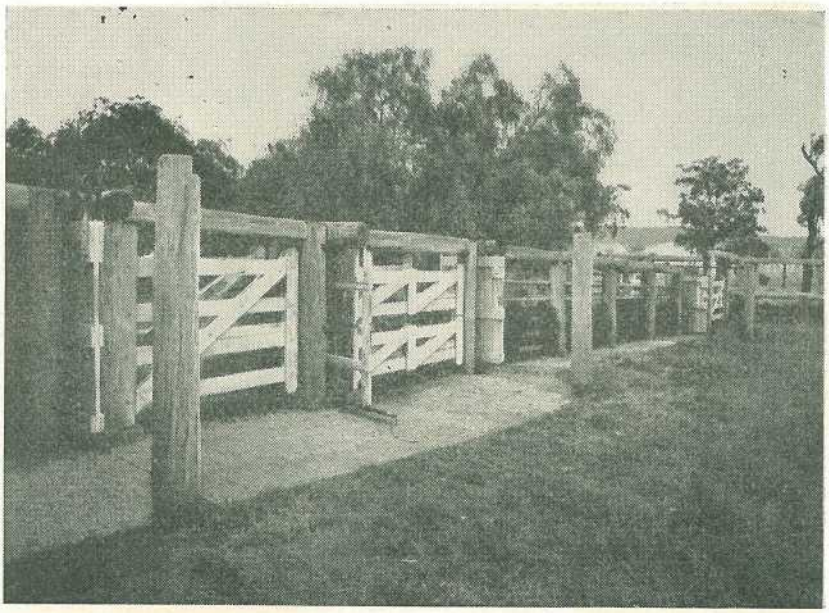

Plate 3.
Roller Gates Screening Crush Section From Forcing Pen and Bail Unit.

Plate 4.
Showing Operation of Roller Gate.

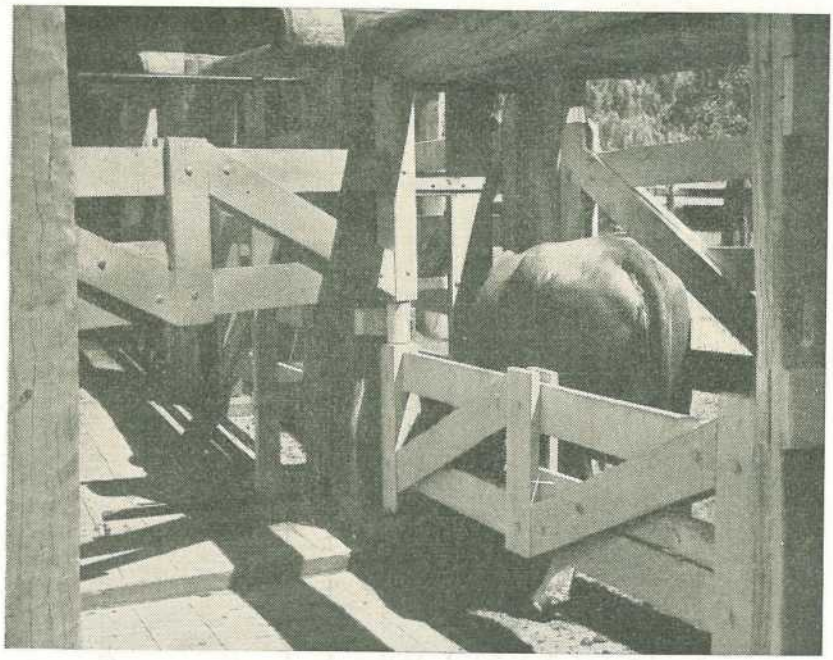

Plate 5.
Beast in Bail Unit, With Half of Access Gate Open.

forcing pen at the rear and the bail unit in front (Plate 3 and Fig. 7). This ensures that the work being carried out is not visible to the general herd, and they rest quietly, in contrast to the restlessness and alarm engendered by the sight of operations upon their fellows.

Specifications.

Construction.—4 rails and cap, with cross caps.

Posts.—9 ft. 6 in. long, 3 ft. 6 in. in ground, 6 ft. above ground. Diameter not less than 9 in. clear of sap at the small end. Sap trimmed off below ground level and creosote treatment given. Dressed square on inside. Running caps and cross caps of suitable bush timber, not less than 5 in. diameter, clear of sap. All caps slotted into posts.

Rails.—2 sawn timber rails (6 x 2).
2 G.I. pipes (2 in.).
1 cap, 5-6 in. bush timber.

Rail Gauge.—Height from ground level to bottom of successive rails:—

1st rail (6 x 2)—11 in.
2nd rail (6 x 2)—27 in.
3rd rail (2 in. pipe)—43 in.
4th rail (2 in. pipe)—57 in.
5th cap (5-6 in. bush timber)—72 in. (approx.).

Rail Spaces.—From ground level to cap, 11 in., 10 in., 12 in., 16 in. Rails set in flush with the dressed surface of the posts, held by $\frac{3}{8}$ in. bolts. G.I. pipes slotted flush into posts, and held by $\frac{3}{8}$ in. hook bolts.

Roller Gates.—Constructed of 6 x $1\frac{1}{4}$ sawn timber. Overall measurements 5 ft. by 3 ft. 7 in. Fitted with $1\frac{1}{2}$ x $\frac{3}{8}$ suspension straps supporting 5 in. diameter solid cast wheels. Suspended from 2 x 2 x $\frac{1}{4}$ angle iron runner. Runner supported by outside post allowing 6 ft. clearance for side and head.

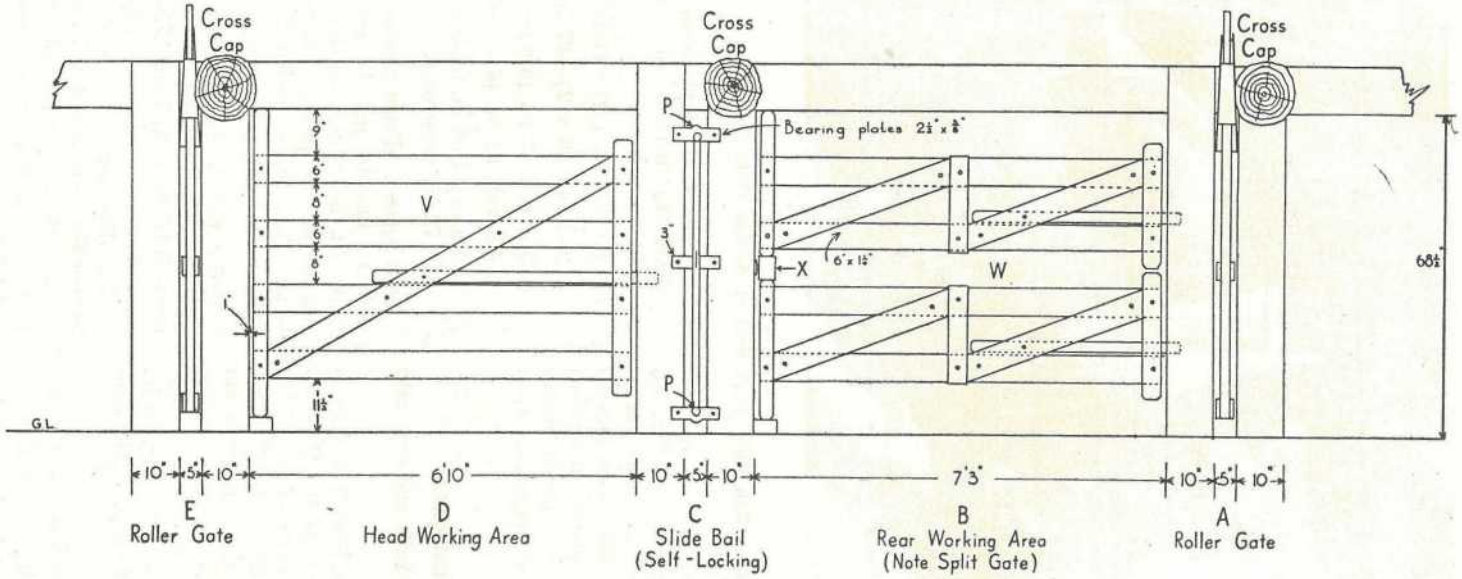

Fig. 2.

Elevation of Slide Bail Crush Unit.

Operating Panel Side Gates.

All gates constructed of 6 x 1¼ hardwood.

The near side and off-side forward panel gates, and the off-side rear panel gates, are constructed as shown at V in Fig. 2.

The access gate W on the near side of the rear operating panel is of similar construction to V but is made in two longitudinally split sections, each operating independently from a common central cup hinge (X, Fig. 1). This hinge can be made from a 6 in. length of 3½ in. G.I. pipe to which an iron plate 7 x 2 x ⅜ is welded. This is bolted to a 4 x 2 hardwood block, which in turn is bolted to the gatepost (Fig. 3).

The double section gate allows ease of access and freedom for working. In carrying out operations such as speying, the upper section is opened and the operator steps over the lower section. This gives him and his assistants the greatest freedom for working while at the same time the bailed cow has full crush restraint. In work involving the lower portions of the animals such as the brisket, belly, legs and feet, the lower section gives access while the upper section restrains the beast.

When casting of the animal is necessary, both sections of the access gate and the off-side panel gate are opened to give a clean concrete-floored space which allows the operation to be carried out under hygienic conditions.

THE BAIL UNIT.

(See Plate 5 and Figs. 1 and 2.)

General Features.

Self-locking slide-gate bail.

Forward operating panel.

Rear operating panel.

Forward roller gate.

Rear roller gate.

2 forward panel side gates.

Rear panel off-side gate.

Rear panel near-side 2-piece access gate.

Specifications.

Posts and caps as for crush.

Self-locking slide-gate bail.

Roller gates as for crush.

Concrete floor as for crush.

Self-Locking Slide-gate Bail.

This is essentially a modified slide-gate, designed for strength and lightness, equipped with a ratchet device, and moving on upper and lower runner bars of 1½ in. diameter iron, the connection being made by 1½ x ⅜ iron suspension straps.

The runner bars are secured by locking collars (K, Fig. 5) behind the bearing plates (P, Fig. 1).

Strength and rigidity are obtained by means of 2 x ¼ iron strapping around joints.

The ratchet bar (C, Fig. 4) moves on ⅜ bolt and bush at E on bail-head, and working in the slot F, morticed through the bail upright. The ratchet locking-plate is shown at M, Fig. 1.

The ratchet pitch is shown in Fig. 6.

The bail-head (H, Fig. 4) is of 8 x 2 hardwood with concave section as shown. It is attached to top and bottom runner bars by double straps. The maximum amount of stress is taken by the bail-head and ratchet assembly.

The upright I and the two cross-members J (Fig. 4) are constructed of 3 x 2 hardwood.

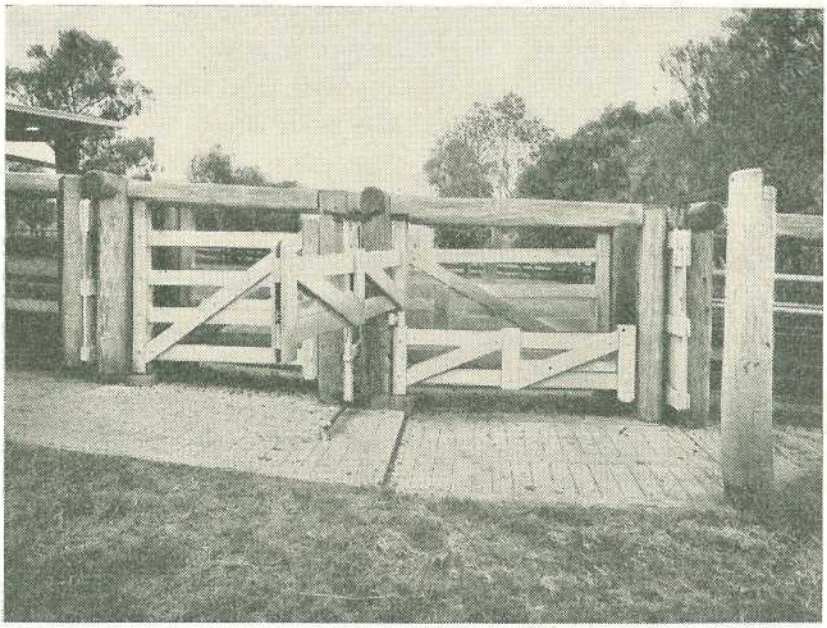

Plate 6.
General View of Bail Unit.

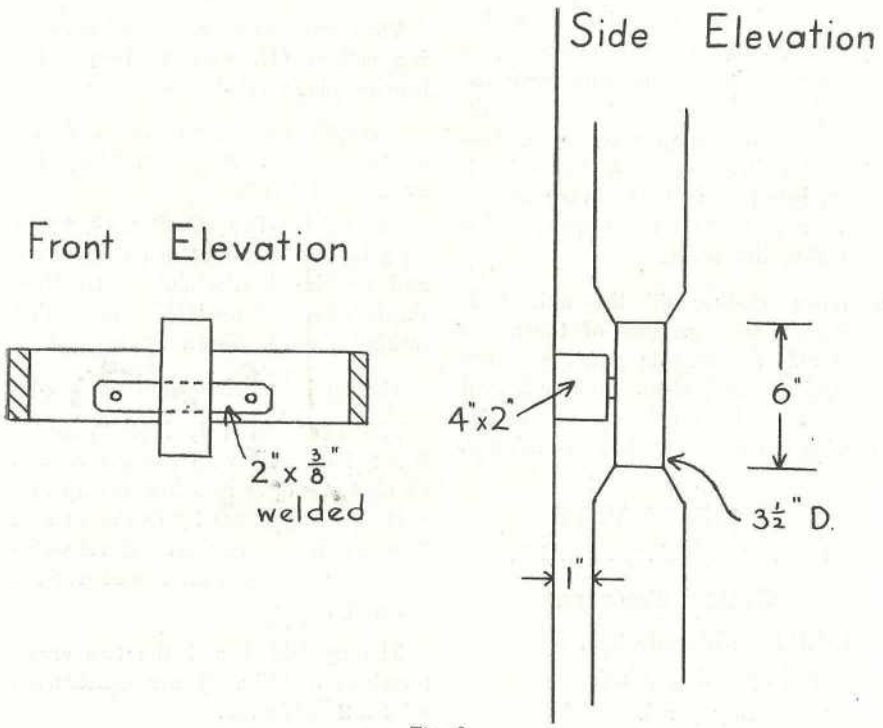

Fig. 3.
Common Central Hinge for Split Gate.

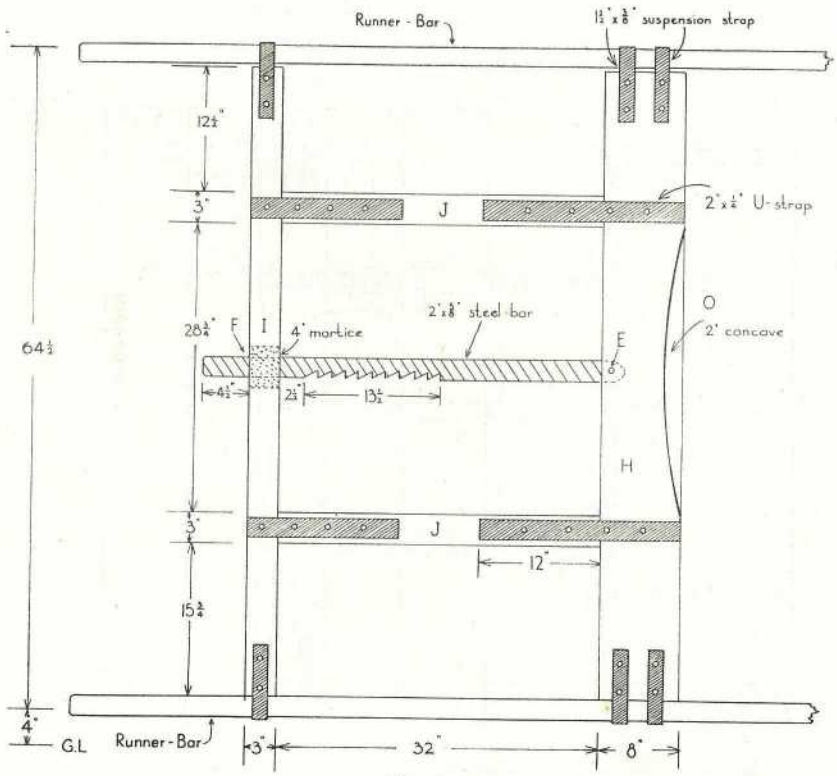

Fig. 4.

Slide Gate Bail.

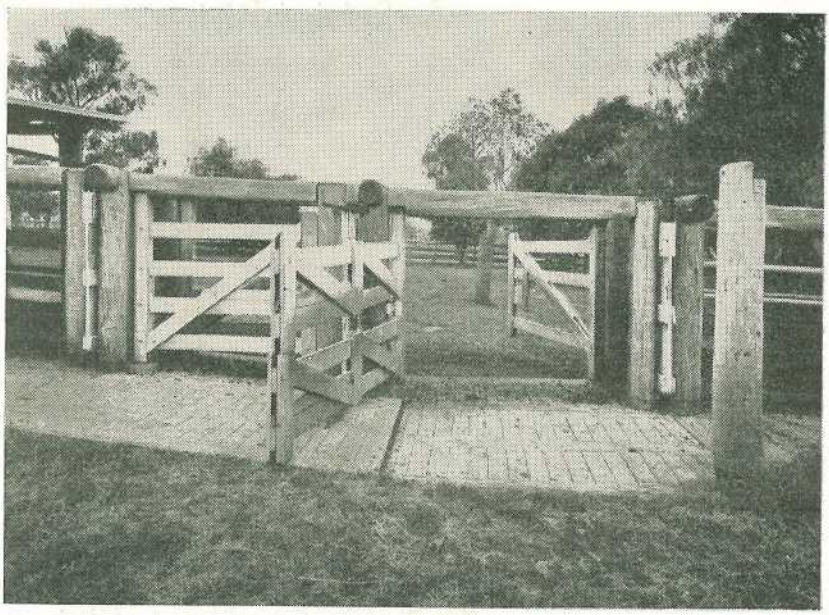

Plate 7.

Bail With Both Side Gates Open.

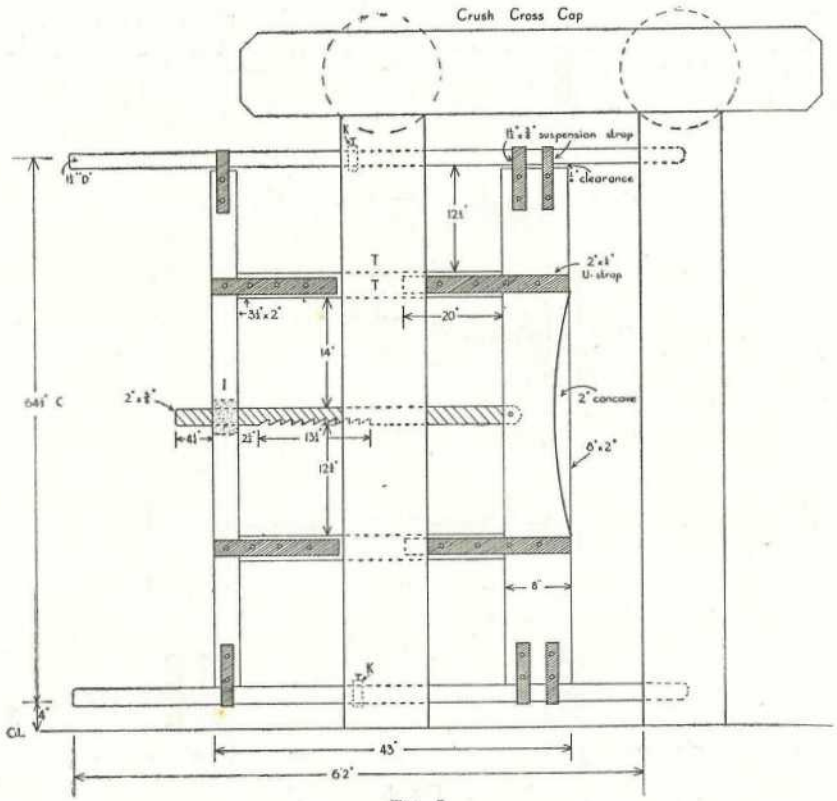

Fig. 5.
Relation of Slide Gate Bail to Crush.

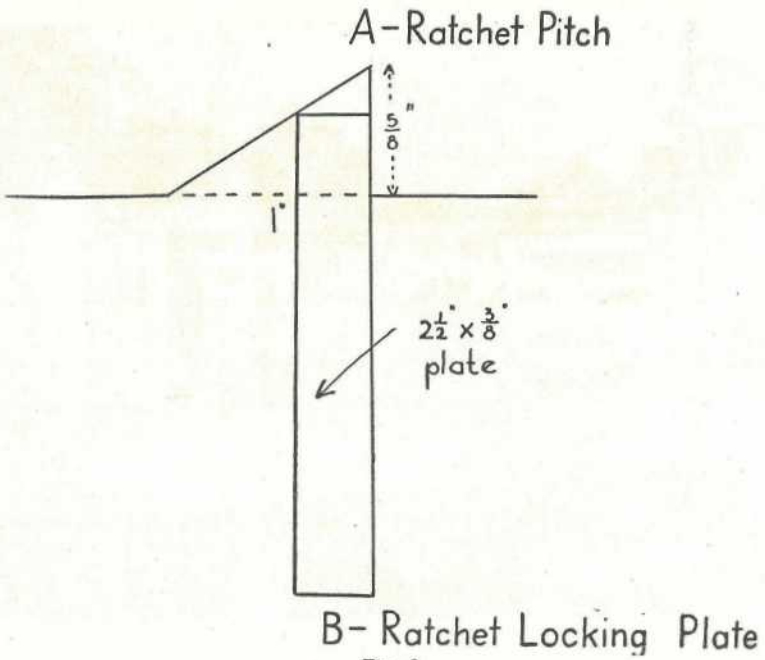

Fig. 6.
Ratchet Pitch and Ratchet Locking Plate.

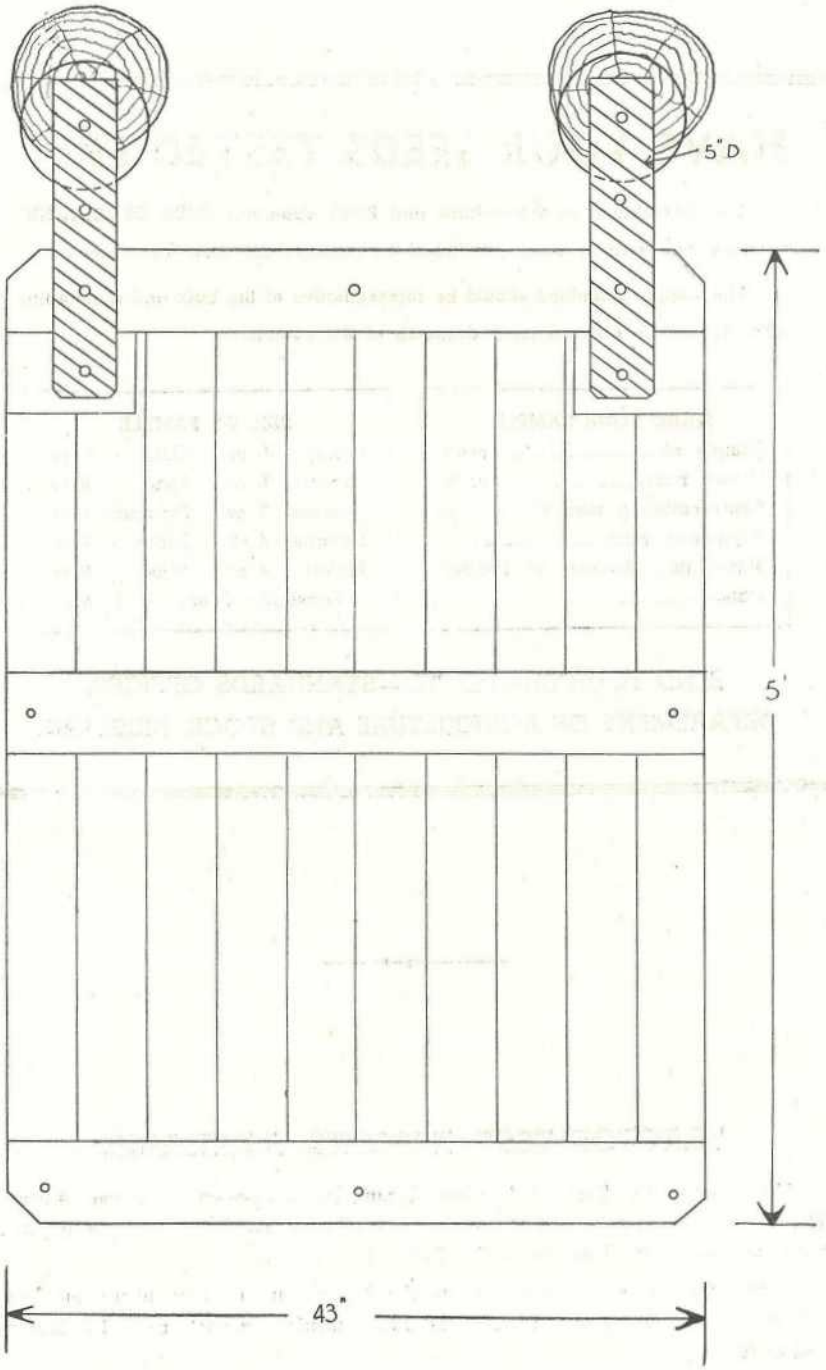

Fig. 7.

Roller Gate.

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Sample of ..... seed
Drawn from ..... bags
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Lucerne	4 oz.	Sudan	4 oz.
Millets	4 oz.	Wheat	8 oz.
Vegetable Seeds			½ oz.

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TRACTOR TEST REPORTS AVAILABLE.

The Australian Tractor Testing Committee has recently issued Farmers' Editions of its technical reports on tests conducted on the New Fordson Major Diesel and the New Fordson Major Kerosene tractors.

Copies may be obtained free from the Department of Agriculture and Stock, William Street, Brisbane, where the full technical report may be inspected if desired.

Fleece Measurement for Queensland Stud Masters

Part 4. Using the Results of Fleece Measurement

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

Every stud master has an ideal; each strives to breed the sheep that appeals to him most. But not all stud masters like the same kind of sheep; not all sheep are suited by the same kind of country. Fashions in sheep change too; this is part of the normal evolution of any improved breed of livestock.

It is important that stud masters back their own judgment in selecting the type of sheep they like and that suit their country best. There are many differences between the districts used for sheep raising and wool production in Queensland. The studs have to meet them all. Some districts need larger sheep, some smaller; some grow stronger wools, some finer. Some grow plain-bodied sheep; in some districts the sheep carry more development.

These requirements can be met only if the different stud masters select from the families that produce best in their own districts. This, incidentally, is an important aspect of fleece measurement. There is no need to break up families or any special flocks you have. Fleece measurement can help you select sheep within those families or flocks. Fleece measurement will also help you find out the strong points of any family.

You will know the extent to which any particular family meets the requirements you wrote down when you described the type of sheep you aimed at breeding. You will also be able to calculate the cost of the faults most common in the different families that make up your stud.

Before we see how this can be done, it is as well to recall that there are two kinds of selection—selection FOR the characters you require in your sheep and selection AGAINST the characters you do not want. You practise the latter when you take off the culls; the former when you choose the reserves. Fleece measurement will give you more details on which to make your final choice—though once again it will be on a FOR and AGAINST basis.

The results of fleece measurement will be returned to you in the form shown in Table 1. If you look at the headings carefully you will see that clean scoured fleece weight is recorded first after the sheep's ear tag number. This is followed by the greasy fleece weight, the percentage yield on a dry wool basis and the staple length in inches. This is followed by the average fibre thickness in microns (one micron = $\frac{1}{25400}$ of an inch), the count based on the fibre diameter measurement, and the trade count based on the crimping. The count based on measurement is then compared with the count based on trade type. The coefficient of variation is shown as a percentage. It indicates the extent to which the thickness of the stronger and finer fibres in any one staple of wool varies from the average. This means,

TABLE 1

RESULTS OF FLEECE MEASUREMENT

Mundoonen Merino Stud
Reserve Rams from Emu Paddock
Shorn 24.11.55

Sheep No.	Clean Scoured Fleece Wt.(lb)	Greasy Fleece Wt.(lb)	% Yield on Dry Wool Basis	Staple Length (inches)	Average Fibre Thickness (microns)	Count Based on Fibre Diameter	Count Based on Trade Type	By Comparison With Trade Type	Coefficient of Variation (%)	Allocation of Rams
Average	8.3	15.0	55.2	4½	20.1				21.8	
215	+1.2	+1.1	+4.1	+¼	+2.3	60-64	64	Stronger	+0.2	
87	+1.0	+0.8	+3.7	+½	-	64	64	Agree	-1.9	
109	+0.9	+1.3	+1.2	-	-1.9	70	64	Finer	+0.5	
124	+0.8	+1.8	-0.9	-½	-0.3	66	64	Finer	+2.8	
256	+0.7	+1.5	-0.6	+¼	-	64	64	Agree	+0.6	
93	+0.6	+1.7	-1.9	+¼	-1.0	66	58	Much finer	+3.3	
315	+0.4	-0.1	+3.2	+¼	+1.2	64	58	Finer	+0.3	
133	+0.4	+0.5	+0.9	+¼	-0.8	66	64	Finer	-2.1	
288	+0.4	+0.9	-0.5	-	+1.2	64	64	Agree	-0.2	
197	+0.3	+0.1	+1.8	-¼	-1.0	66	64	Finer	+3.5	
264	+0.3	+0.2	+1.3	-	+0.3	64	60	Finer	+3.5	
86	+0.3	+0.4	+0.6	+¼	-1.4	70	64	Finer	-3.4	
259	+0.2	-0.9	+5.1	+¼	+0.4	64	60	Finer	-3.0	
376	+0.2	-0.4	+3.0	-	-1.4	70	66	Finer	-	

of course, that the coefficient of variation expresses the evenness of the wool in any one staple. If the wool is even the coefficient of variation is small; if the fibres are uneven it is large. A coefficient of variation of 25 per cent. is about as large as is acceptable.

There are several scales linking crimps per inch with fibre thickness and spinning qualities. One of the best known of these is the Duerden scale developed in South Africa from hand-fed Merino sheep. For Queensland conditions the differences between the diameters of the fibres in the various trade counts are a little too small. However, as the Duerden scale is fairly well known to Queensland woolgrowers it is presented in Table 2.

TABLE 2.

THE DUERDEN SCALE, SHOWING RELATIONSHIP BETWEEN CRIMPS PER INCH, SPINNING QUALITY, AND FIBRE DIAMETER.

Crimps/Inch.	Spinning Quality.*	Fibre Diameter in Microns.†
22–24 ..	100's	15–16
20–21 ..	90's	16–17
18–19 ..	80's	17–18
16–17 ..	70's	18–19
14–15 ..	66's	19–20
12–13 ..	64's	20–22
10–11 ..	60's	22–24
8–9 ..	58's	24–26
6–7 ..	56's	26–28

* Spinning quality is based on the trade definition, that is, the number of hanks of yarn each 560 yd. long that can be spun from 1 lb. of combed tops from wool of that type.

† 1 micron = $\frac{1}{25{,}400}$ of an inch.

Generally speaking, fibres with fewer crimps per inch are coarser than those with many crimps per inch, and provided they are the same length the coarser fibres will weigh more than the fine ones. However, the Queensland clip consists essentially of Merino wools known in the trade as having a 60, 64 or 70's count. Wool of this type meets keen demand on the open market. Fleeces whose fibres are smaller in diameter than the trade count requires sell quite well. They are usually extremely soft and are sought after for this reason. However, they may also be light, so you have comparatively little to sell. On the other hand, fleeces with fibres whose diameters are coarser than the trade count indicates may tend to become a little harsh, although they will be heavy.

In selecting for fibre diameter, therefore, you have to try to keep between certain tolerances. When selecting rams most stud masters like to choose sires whose wools measure between 20 and 24 microns. This means the rams' wool measures between a 64's and 60's count. It is preferable, though not essential, for the trade count as indicated by the crimp to correspond with that indicated by measurement. If they do not agree exactly it does not matter very much; if the differences are great it may be as well to consider carefully before making your final selection.

Making Your Final Choice.

The average of all sheep for each measured character is shown immediately below the headings across the page in Table 1. For convenience, the ear tag numbers of the sheep are then listed in descending order of clean fleece weight. The fleece weights are shown according to the extent and way they vary from the average of all those measured. Therefore, sheep 215 has a clean fleece weight of 8.3 lb. (the average for the group measured) + 1.2 lb. = 9.5 lb. Similarly, sheep 87 has a clean fleece weight of 8.3 lb. + 1.0 lb. = 9.3 lb.

The sheep you require are those cutting the heaviest clean scoured fleece weights that meet your requirements in all other characters, including breed type. You will find the following procedure an easy one to follow when the fleece measurement results are returned to you.

Go through the results for each ram, starting with the first one on sheet No. 1 (that is, with the ram that cut the heaviest clean scoured fleece weight). Check him for greasy fleece weight and percentage yield. It is more than likely he will be above average for each of these characters. Then check him for staple length. He should be on or above the average for staple length for the measured group. It is doubtful if a sheep whose staple length is below average will be acceptable.

Next check on the fibre thickness and decide if it falls between the tolerances you have set—if it does not, do not accept the sheep as a possible "first". Consider the "count on crimp" in relation to the tolerances you have set. If the sheep measured a 58's but looks a 66's count when the rest of the rams do not show such a big difference, you may not choose him as a likely "first".

Next check on the coefficient of variation. Ram 215 has a coefficient of variation of 21.8 + 0.2 = 22.0 per cent. If you had set 20.0 per cent. as your upper limit for coefficient of variation you might decide against ram 215. On the other hand, you might feel that this ram has cut such a heavy fleece that he is worthy of further examination. If your upper limit for coefficient of variation is 25 per cent. you have no problem.

On checking over the results shown in Table 1 you will notice that the first three rams (215, 87 and 109) all appear to be reasonably acceptable. However, ram 124 has a couple of features that may not be very desirable. Staple length is shorter than that of the average and the coefficient of variation is a little high. Similarly, ram 93 is much finer on measurement than the crimp indicates; his wool is inclined to be variable and the percentage yield of clean scoured wool is lower than the average of the group. Rams 197 and 264 are also inclined to have a larger variation in fibre diameter than is desirable, while 197 is deficient in staple length as well. You will find it helpful to place a ring around any figure that is not acceptable and around the ear tag number of the particular ram.

On paper, then, the rams you finally select are most likely to come from 215, 87, 109, 256, 315, 133, 288, 86, 259 and 376. Having agreed upon this, the next step is to examine the sheep.

In doing this you would be well advised to look at the sheep in descending order of fleece weight (that is, in the order they appear on the result sheet after you have removed those with a ring around their numbers).

Suppose you need to select 4 top rams and 4 seconds. You would be inclined to give your first preferences to 215, 87, 109 and 256. Therefore, you would examine them carefully to be certain they had grown out nicely and fulfilled your requirements for breed type. If they did you would be safe in selecting them. However, you might find ram 256 was suffering from epididymitis and therefore was unlikely to be highly fertile. You would then examine 315, but his covering might prove to be a little uneven.

In these circumstances you could afford to pass on to 133 or 288. Both these sheep cut the same clean fleece weight as 315.

However, you would probably prefer 133 to 288 on account of his greater staple length. Your final choice of top rams would therefore be 215, 87, 109, 133. On the other hand, you might consider passing 109 on account of the fineness of his fibre diameter. By doing so you would

have to accept 288. If you wished to select for both greater staple length and fibre diameter, you might have to fall back upon 259, as 86 has the same fault as 109. The cost of doing so in terms of the smaller amount of clean scoured wool likely to be passed on to the offspring is easily calculated.

Let us compare the progress you are likely to make as the result of selecting different groups of rams. Suppose your choice lay between 215, 87, 109 and 315 as one group of 4 top sires, and 215, 87, 133 and 259 as the other group. The selection differentials from your selection of rams are compared in Table 3.

When the difference of 0.18 lb. (0.88 — 0.70) clean scoured wool is halved to give the breed average and then multiplied by the heritability of clean scoured wool, it is obvious that selecting rams 133 and 259 instead of 109 and 315 is not likely to make a very great difference to the rate the cut per head is increased. On the other hand, selecting 133 and 259 may help to eliminate the faults fleece measurement has shown up in 109 and 315.

When you had decided on your 4 top rams you could proceed to choose the 4 seconds. If you chose 215, 87, 133 and 159 as your tops, you will probably take 109, 315, 288 and 86 as your seconds, although 124 might rate further consideration if he showed no evidence of unevenness. However, you will not be able to make your final choice until you have the sheep before you and until you have considered the results in the light of your particular requirements.

Be careful, however, not to let any particular requirement, such as staple length or evenness of fibre diameter, dictate your final choice. Clean scoured wool weight is the most important single character to consider in selection—the other characters contribute to fleece weight and/or to price per pound.

Don't forget to write down the final allocation of your rams, so the page shown in Table 1 would probably look something like Table 4 when you had finished working through it.

TABLE 3.

Comparing the Selection Differentials Obtained from Choosing Different Groups of Rams as 4 Top Sires.

Group A.		Group B.	
Ram No.	Extent to which rams cut per head of C.S.W. is above the group average.	Ram No.	Extent to which rams cut per head of C.S.W. is above group average.
215	+1·2 lb.	215	+1·2 lb.
87	+1·0 lb.	87	+1·0 lb.
109	+0·9 lb.	133	+0·4 lb.
315	+0·4 lb.	259	+0·2 lb.
Average increase from selecting rams (that is, selection differential for C.S.W. from ram side)	0·88 lb. clean scoured wool	..	0·70 lb. clean scoured wool

TABLE 4

RESULTS OF FLEECE MEASUREMENT

Mundoonen Merino Stud
Reserve Rams from Emu Paddock
Shorn 24.11.55

Sheep No.	Clean Scoured Fleece Wt.(lb)	Greasy Fleece Wt.(lb)	% Yield on Dry Wool Basis	Staple Length (inches)	Average Fibre Thickness (microns)	Count Based on Fibre Diameter	Count Based on Trade Type	By Comparison With Trade Type	Coefficient of Variation (%)	Allocation of Rams
Average	8.3	15.0	55.2	4½	20.1				21.8	
215	+1.2	+1.1	+4.1	+¼	+2.3	60-64	64	Stronger	+0.2	1st.
87	+1.0	+0.8	+3.7	+½	-	64	64	Agree	-1.9	1st.
109	+0.9	+1.3	+1.2	-	-1.9	70	64	Finer	+0.5	1st.
(124)	+0.8	+1.8	-0.9	(-½)	-0.3	66	64	Finer	(+2.8)	2nd. (bit doggy)
256	+0.7	+1.5	-0.6	+¼	-	64	64	Agree	+0.6	missing
93	+0.6	+1.7	(-1.9)	+¼	-1.0	(66)	58	(Much finer)	(+3.3)	missing
315	+0.4	-0.1	+3.2	+¼	+1.2	64	58	Finer	+0.3	2nd (bit variable)
133	+0.4	+0.5	+0.9	+½	-0.8	66	64	Finer	-2.1	1st.
288	+0.4	+0.9	-0.5	-	+1.2	64	64	Agree	-0.2	Reserve (little variable)
(197)	+0.3	+0.1	+1.8	(-¼)	-1.0	66	64	Finer	(+3.5)	Cull (epididymitis)
(264)	+0.3	+0.2	+1.3	-	+0.3	64	60	Finer	(+3.5)	Reserve (variable)
(86)	+0.3	+0.4	+0.6	+¼	-1.4	70	64	Finer	-3.4	}
259	+0.2	-0.9	+5.1	+¼	+0.4	64	60	Finer	-3.0	} 2nds.
376	+0.2	-0.4	+3.0	-	-1.4	70	66	Finer	-	}

Report on Group Herd Recording for the Year up to 30th September, 1955

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

The 12 months to September 30, 1955, was a favourable one for dairying, although floods during February, March and May caused severe damage in some areas.

Herd recording has become a routine practice with many dairymen and the demand for the service is continuing. During the first five years of herd recording many herds were submitted for recording for a year and then withdrawn, but it is pleasing to note that in the longer established groups the membership is now stable.

During the period under review there were 65 herd recording groups operating, of which 10 commenced during the period.

Lactations were completed by 45,734 cows in 1,266 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.	Number of Herds.	Number of Lactations.	Average Production per Cow.		
			Milk (Lb.).	Test Per cent.	Butterfat (Lb.).
1948–49 ..	507	17,216	3,289	4·3	144
1949–50 ..	715	22,392	3,523	4·3	152
1950–51 ..	814	26,798	3,312	4·4	146
1951–52* ..	818	23,123	2,657	4·2	112
1952–53 ..	1,073	34,304	3,467	4·3	150
1953–54 ..	1,202	41,378	3,143	4·3	134
1954–55 ..	1,266	45,734	3,486	4·3	150

* Drought year.

It might have been expected that the average production of 3,486 lb. milk and 150 lb. butterfat would have been higher in view of the favourable conditions which prevailed, but the large number of herds being recorded for the first time reduced the average.

It has been noted that members of herd recording groups are showing great interest in improved pastures and pasture management. These improved practices, allied to breeding from production recorded animals, must result eventually in improved production and decreased production costs.

Although the interest shown in improved pastures is commendable and necessary, dairymen should not neglect the conservation of sufficient fodder to carry the herd over a lengthy drought. Even the best pastures are of little value unless they are watered either naturally

or artificially. Unless sufficient fodder is available to carry the herd through a drought, not only is the farmer's income affected by the loss of production during the dry period, but the loss of cattle can nullify the effects gained by years of constructive breeding.

It therefore behoves all dairymen to take action to accumulate sufficient stores of conserved fodder to maintain the herd during drought periods.

Table 2 gives, according to age groups, the number of cows which completed lactation periods of 300 days or less and their average production of milk and butterfat.

TABLE 2.

AVERAGE PRODUCTION IN AGE GROUPS OF COWS WHICH COMPLETED LACTATION PERIODS OF 300 DAYS OR LESS.

Age Group.	Number of Cows.	Average Production per Cow.		
		Milk (Lb.).	Test (Per cent.).	Butterfat (Lb.).
2-year-old	5,032	2,813	4·5	125
3-year-old	5,263	3,263	4·4	143
4-year-old	4,988	3,440	4·4	151
Mature	21,808	3,671	4·3	157
Unknown Ages ..	8,643	3,571	4·3	152
Total	45,734	3,486	4·3	150

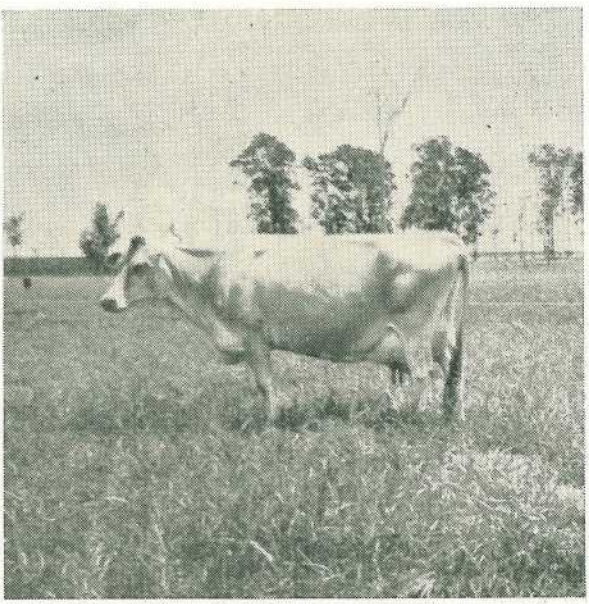

Plate 1.

A Productive Jersey — "Bonny" — Owned by Mr. R. N. Burrows, Wondai.
Here is her record:—

488 lb. of butterfat in 300 days in 1952-53.
506 lb. of butterfat in 300 days in 1953-54.
550 lb. of butterfat in 300 days in 1954-55.

Her daughter "Bonzer" produced 355 lb. butterfat in 300 days in 1953-54 and 486 lb. butterfat in 300 days in 1954-55.

Plate 2.

Part of the Highest Producing Herd in the 21-50 Cow Class in 1954-55. These cows are owned by Mr. R. N. Burrows, Wondai, and are grazing on improved pasture.

TABLE 3.

AVERAGE LENGTH OF COMPLETED LACTATIONS.

Year.	Days.
1948–49	220
1949–50	223
1950–51	203
1951–52	209
1952–53	210
1953–54	211
1954–55	224

The average length of lactation was 224 days (7½ months). This is the longest average length of lactation since the inception of herd recording in Queensland and is attributable mainly to favourable seasonal conditions. Even so, it still falls very short of the desirable period of 300 days.

The average length of lactation for each year since 1948 is given in Table 3, and the average length of lactation for each district for the year 1954-55 is given in Table 4.

TABLE 4.

AVERAGE LENGTH OF LACTATION ACCORDING TO DISTRICT.

District.	Length of Lactation. (days.)
Atherton Tableland	235
Central Coast	214
Upper and Central Burnett	220
South Burnett	223
South-eastern Queensland	227
Eastern Downs	224
Western Downs	219
All Queensland	224

Table 5 shows the average production per cow in each of the herd recording groups. The groups are placed according to district. The average production for each district is shown on the same table.

TABLE 5.

GROUP AND DISTRICT STATISTICS FOR 1954–55.

District/Group.	Herds.	Cows.	Average Length of Lactation.	Average Milk.	Average Test.	Average Butterfat 1954–55.
			Days.	Lb.	%	Lb.
Atherton Tableland—						
Malanda No. 1	21	778	235	4,524	3·9	178
Malanda No. 2	16	719	237	3,958	3·9	156
Malanda No. 3	23	716	221	3,546	4·3	151
Millaa Millaa	21	656	246	3,590	4·5	163
District	81	3,925	235	3,925	4·1	162
Mackay—						
Mackay No. 1	18	698	209	2,666	4·8	127
Port Curtis—						
Mount Larcom No. 1 ..	20	743	193	2,530	4·6	117
Raglan-Marmor	17	687	229	3,216	4·0	132
Ridgelands	18	501	199	2,529	4·5	114
Rosedale	13	281	212	2,665	4·5	119
The Caves	18	670	237	3,385	4·6	157
Wallaville	20	587	199	2,303	4·5	103
District	106	3,469	212	2,796	4·5	125
Dawson-Callide—						
Biloela	20	1,158	229	3,184	4·4	141
Wowan	20	860	205	2,736	4·3	117
District	40	2,018	219	2,993	4·4	131
Upper Burnett—						
Monto No. 1	19	895	226	3,824	4·0	154
Monto No. 2	21	862	217	2,978	4·5	133
District	40	1,757	222	3,409	4·2	143
Central Burnett—						
Biggenden	16	677	233	3,234	4·3	140
Mundubbera No. 1 ..	21	723	203	3,067	4·2	130
District	37	1,400	218	3,148	4·3	134
South Burnett—						
Goomeri	23	854	219	3,322	4·1	136
Kilkivan	17	548	212	3,390	4·0	135
Kingaroy No. 1	22	851	231	4,134	4·2	174
Kingaroy No. 2	21	805	223	4,308	3·9	166
Nanango No. 1	23	809	234	3,867	4·0	156
Proston No. 1	21	939	219	3,255	4·4	143
Tansey	20	713	220	3,264	4·3	140
District	147	5,522	223	3,654	4·1	151
South-East Queensland—						
Beaudesert No. 1 ..	22	993	224	3,715	4·0	148
Beenleigh	20	547	209	2,783	4·0	112
Boonah	21	748	238	3,784	4·3	164
Brisbane	23	533	224	3,532	4·0	142
Cedar Pocket	18	754	233	3,343	5·0	169
Coomera	19	787	232	3,435	4·2	143
Cooroy No. 1	17	674	222	2,808	4·4	123
Cooroy No. 2	21	905	223	3,180	4·3	138
Esk No. 1	23	937	226	3,239	4·4	143
Esk No. 2	20	560	227	3,653	4·3	157
Gatton	19	382	208	2,536	3·9	137
Gympie No. 1	20	906	234	3,475	4·6	160
Gympie No. 2	18	770	229	3,037	4·9	148
Ipswich	23	475	239	3,835	4·4	170
Kenilworth	19	653	224	3,511	4·7	164
Kilcoy	20	739	211	2,902	4·5	130

TABLE 5—*continued.*

District/Group.	Herds.	Cows.	Average Length of Lactation.	Average Milk.	Average Test.	Average Butterfat 1954–55.
			Days.	Lb.	%	Lb.
South-East Queensland—*continued*						
Laidley	18	439	229	3,357	4·2	142
Landsborough-Caboolture	23	968	227	3,157	4·5	141
Maleny No. 1	19	602	238	3,767	4·7	178
Maleny No. 2	24	908	248	4,094	4·7	194
Mapleton-Kureelpa ..	21	657	246	3,403	4·5	154
Maryborough	24	433	212	2,845	4·3	123
Merrimac-Mudgeeraba ..	19	949	237	3,583	4·1	148
Mudgeeraba-Currumbin ..	17	586	203	2,679	4·2	112
Miva-Theebine	17	859	233	2,896	4·9	141
Mount Tamborine ..	21	694	215	3,065	4·2	128
Pomona No. 1	19	582	222	2,951	4·6	135
Pomona No. 2	20	1,000	217	2,848	4·7	135
District	565	20,040	227	3,305	4·4	147
Eastern Downs—						
Crow's Nest	25	518	212	3,354	4·5	152
Goombungee	24	600	218	4,472	4·2	189
Oakey	21	753	221	4,134	4·3	177
Pittsworth No. 1 ..	21	642	233	5,526	4·2	231
Toowoomba	23	651	228	4,788	4·3	205
Warwick	21	646	228	4,402	4·0	176
District	135	3,810	224	4,473	4·2	189
Western Downs—						
Chinchilla No. 1	21	724	223	4,019	4·0	160
Chinchilla No. 2	17	893	222	4,197	4·1	174
Dalby	21	810	213	3,656	4·3	156
Jandowae	22	1,048	217	4,163	4·3	183
Miles	16	675	217	4,030	3·9	158
District	97	4,150	219	4,025	4·2	168

The number of cows in the various production ranges is shown in Table 6.

The following facts are significant:—

Ten thousand two hundred and ninety-one (22·5%) of the cows produced less than 100 lb. butterfat, compared with 12,334 (29·8%) in the previous year.

One hundred and ten (0·24%) of the cows produced more than 400 lb. butterfat compared with 26 (0·06%) in the previous year. Of those tested this year, 13 produced more than 500 lb.

TABLE 6.

Number of Cows in Various Production Ranges of Butterfat.

Ranges of Butterfat (Lb.).	Number of Cows.	Percentage.
Under 100	10,291	22·5
100–149	13,734	30·0
150–199	11,958	26·1
200–249	6,269	13·7
250–299	2,316	5·1
300–349	774	1·7
350–399	282	·6
400–449	72	·16
450–499	25	·05
Over 500	13	·03

Table 7 shows the number and percentage of herds in various ranges according to average production.

TABLE 7.

NUMBER AND PERCENTAGE OF HERDS IN VARIOUS PRODUCTION RANGES.

Butterfat Production Range (Lb.).	Number of Herds.	Percentage of Total Herds.
Under 100	197	15·6
100–149	522	41·2
150–199	392	31·0
200–249	122	9·6
250–299	25	2·0
Over 300	8	·6

The percentage of herds which averaged under 100 lb. butterfat dropped from 24·0 last year to 15·6 this year, while the number over 200 lb. rose from 7·0 to 10·6. However, it would be much more satisfactory if all herds averaged more than 100 lb. butterfat.

These average productions are not impressive when compared with herd averages in some dairying countries but it is encouraging to see that, despite the conditions which exist in this State, increased production is being achieved.

This year there were eight herds which averaged over 300 lb. butterfat.

Highest Producing Herds.

The highest producing herds according to the number of cows which completed lactations are given in Table 8. Herds in which less than 10 cows completed lactations are not included.

The herd which had the highest average production belongs to Mr. P. W. N. Sippel, Lowood. This herd is recorded in the Esk No. 2 herd recording group, and consists of registered Jerseys. The average production of this herd over the last three years has been as follows:—1952-53—291 lb.; 1953-54—281 lb.; and 1954-55—349 lb. butterfat.

The herds shown in Table 8 afford excellent examples of what can be accomplished by men who realise that breeding and feeding go hand in hand.

Most of these herds are comprised of registered purebred animals. The owners have realised the advantages to be gained by using the information supplied by herd recording to improve their breeding and farming methods.

In the unregistered herds the owners have used purebred bulls from production recorded dams and have established grade herds which are purebred in all but name.

Members of the herd recording groups are realising more than ever the need to introduce herd sires from production recorded dams.

Improved breeding methods allied to improved farm practices result in greater and cheaper production, which leads to greater contentment in the lives of the dairyfarmer's family.

TABLE 8.

HIGHEST PRODUCING HERDS.

Herd Owner.	Group.	Breed.	Number of Cows.	Average Production.			
				Milk (Lb.).	Test (Per cent.).	B.F. (Lb.).	Average Lactation (Days).
		11 to 20 Cows.					
P. W. N. Sippel	Esk No. 2	Jersey	15	7,201	4·8	349	278
F. G. Broadfoot	Pittsworth No. 1	A.I.S.	18	5,713	4·4	249	238
E. Mathie & Sons	Maleny No. 2	Ayrshire	18	5,423	4·5	243	278
		21 to 50 Cows.					
R. N. Burrows	Kingaroy No. 1	Jersey	30	6,790	4·9	336	295
E. D. Lawley & Sons	Maleny No. 1	A.I.S.	41	7,586	4·4	332	262
G. I. Holmes	Pittsworth No. 1	A.I.S.	41	7,845	4·1	325	278
		51 to 100 Cows.					
F. Porter	Maleny No. 2	Jersey	59	5,086	6·3	319	236
J. Ahern	Maleny No. 2	Jersey	85	5,228	5·8	303	277
P. J. Murphy	Oakey No. 2	Jersey	55	5,811	4·7	275	246
		101 Cows and Over.					
Est. T. T. Curtis	Jandowae	Jersey	112	4,591	5·6	259	254
Haselwood Bros.	Jandowae	A.I.S.	137	5,107	4·0	204	241
R. James	Landsborough-Caboolture	A.I.S.	102	5,383	3·8	204	264

POULTRY FLOCK IMPROVEMENT SCHEME.

A poultry flock improvement scheme, aimed at increasing egg production per bird and the livability of flocks, is to be established in Queensland under the supervision of the Department of Agriculture and Stock.

Announcing this recently, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said it was hoped the breeding programme would be implemented this year.

The urgent need for flock improvement has been recognised both in this State and on a national level. This year almost £9,000 has been made available to the Queensland poultry industry from the Commonwealth Extension Services Grant. The finance will be largely used to provide permanent facilities for random sample testing, because such testing is an integral part of any improvement plan. Money will also be available to assist breeders who are willing to undertake flock improvement, for it is realised that the establishment of a breeding programme on a farm calls for extra labour and expense. Some pens must be subdivided and some additions made.

The plan has been approved in principle by the Poultry Advisory Board and details are now being worked out. These will shortly be given to the industry.

Mr. Collins explained that prosperity in the poultry industry depends largely on the number of eggs each bird lays and whether that bird lives for a full laying year. Production per bird cannot be improved simply by selecting birds on looks alone. A permanent and substantially increased production can only be obtained by employing a long-term breeding programme based on production records of families. Where a genetically sound breeding plan is in operation it is expected that for some years the egg production in a flock will rise by four to five eggs per bird a year.

A recent survey of egg production in Australia by the Bureau of Agricultural Economics shows that Queensland has the highest production per bird in the Commonwealth. Although the Queensland figure is 158 eggs per bird, the need for improvement is apparent when this is compared with production in other leading poultry raising countries. In Holland, for example, average production is 22 eggs per bird higher than in Queensland.

The flock improvement scheme will be voluntary and is open to hatcherymen and suppliers of fertile eggs to hatcheries who are prepared to develop a breeding plan based on sound genetic lines on their farms. These men may rest assured that they will receive the fullest co-operation from the Department.