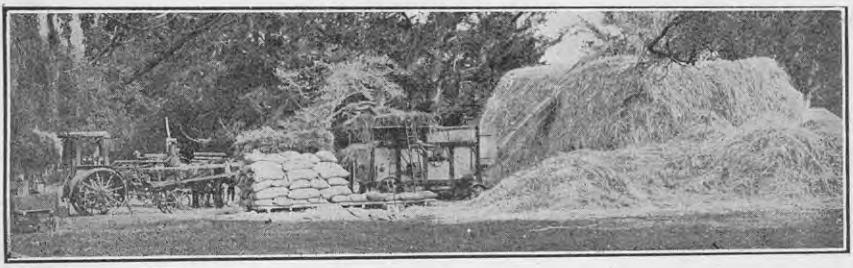

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TESTING OF PUREBRED DAIRY COWS.

REVIEW OF THE NEW ZEALAND C.O.R. SYSTEM IN 1924.

W. M. SINGLETON, Director of the Dairy Division.

CERTIFICATE-OF-RECORD testing results for the calendar year 1924 show an advance over those for the preceding twelve months in number of authenticated records. The average production for the Jersey and Milking Shorthorn breeds has increased, while for the Friesians and Ayrshires the 1923 production has not been maintained.

Climatically, the earlier months of 1924 were very dry, and in January and February some districts experienced what in New Zealand is called a drought. The autumn months compensated to a considerable degree for the inferior producing conditions of the summer months, and dairying districts experienced at that period the best grazing conditions which have obtained for a number of years. The cattle wintered in very good condition, and in the spring and early summer months, closing with the end of the calendar year, conditions were favourable to production above the average. The southern portion of the South Island was perhaps a little less favoured than the majority of the other dairying districts.

During the year another 1,000 lb. butterfat yield was recorded, and six class-leadership productions have been increased. This is very satisfactory, seeing that the leadership figures in many classes have now reached that standard where only outstanding performances can displace them.

CERTIFICATES ISSUED.

The number of cows which have received first-class certificates since the commencement of the C.O.R. system totals 4,180. During the calendar year 1924, 792 cows received certificates on first performances, and 141 cows were certificated on repeat records, making a total of 933 for the year. The following table sets out the position in detail, and figures for the previous year have been included for purposes of comparison :—

Breed.	1923.		1924.	
	Ordinary.	Repeat.	Ordinary.	Repeat.
Jersey	518	51	583	91
Friesian	129	32	148	43
Milking Shorthorn ..	24	6	32	6
Ayrshire	17	3	23	1
Red Poll	3	1	6	..
Shorthorn	1	..	..	..
Totals	692	93	792	141

REDUCTION IN C.O.R. FEES.

As notified in the *Journal* for October, 1924, the Minister of Agriculture has sanctioned a reduction in the fees for testing cows under the certificate-of-record system. The new charges are to come into effect as from the commencement of the next financial year—namely, 1st April, 1925. For all cows calving for commencement of test after that date the fee for the first cow tested each year on any one farm will be £8 8s., instead of £10 10s. as at present. The fee for subsequent entries will remain at the present amount of £3 3s. It is hoped that this new fee will result in the C.O.R. system receiving even stronger support than in the past.

C.O.R. BULLS.

It has been stated many times by the writer that one of the primary objects of a system of testing the yield of purebred dairy cows was to provide information to assist dairymen in the selection of bulls from dams of proven producing-capacity, for the improvement of ordinary-grade and crossbred dairy herds. While the demand for milk and milk-products is growing steadily, it is also true that the margin between cost of production and market values is not increasing. The main opportunity for improving our dairy industry lies in grading up the average dairy herd. Every dairy herd should have its purebred sire from a C.O.R. dam. According to the latest available statistics there are more than thirty-eight thousand dairy herds in New Zealand. On the other hand, taking the total number of purebred bulls of the recognized special-purpose dairy breeds, the latest official statistics show that there are less than nine thousand of these in New Zealand under the heading of "Bulls two years old and over for stud only." So that, despite the increase in C.O.R. testing, we are yet a considerable

distance from providing sufficient bulls of proven strains for use in our average herds. There is reason to believe, however, that dairy-farmers are fast realizing that their success lies in the intelligent use of the proven sire and of the herd-testing outfit. Undoubtedly, the C.O.R. system is gradually attaining its object.

Owing to the steadily increasing number of purebred bulls which, through the authenticated yield of their daughters, are qualifying for our C.O.R. register, it has been necessary to abandon the publication of the full list in this annual review. Under the respective breeds, however, are given the names of those bulls which have not previously appeared, and also those already qualified bulls which have added to their list of certificated daughters during the year.

JERSEYS.

Class-leaders.

During the year under review two out of the five classes into which this breed is subdivided have had the previous highest yield for the class exceeded. In the three-year-olds, Mr. A. Christie's Loo's Queen goes to the head of the list in place of Mr. E. Joyce's Zola of Rosy Creek. In the mature class the same owner's Vivandiere, with 1,036·09 lb. butterfat, displaces Mr. W. H. Miers's Pretty's Flirt, who put 1,010·49 lb. fat to her credit in 1923. Special notes and comments on Vivandiere and her performance appeared in the *Journal* for September last.

The class-leaders at the end of 1924 are shown in the following list :—

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Fat.
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Alfalfa Pansy ..	F. J. Saxby, Hamilton	2 4	240·9	365	10,898·1	690·16
Senior Two-year-old.						
Marshland's Stylish Princess	W. J. Chynoweth, Hamilton	2 353	275·8	365	9,927·7	715·75
Three-year-old.						
Loo's Queen ..	A. Christie, Tanekaha	3 332	310·2	365	13,422·3	797·32
Four-year-old.						
St. Lambert's Bell ..	A. J. Smith, Cardiff ..	4 283	341·8	365	14,423·1	780·32
Mature.						
Vivandiere ..	A. Christie, Tanekaha	6 10	350·0	365	17,282·1	1,036·09

Jersey Class-averages.

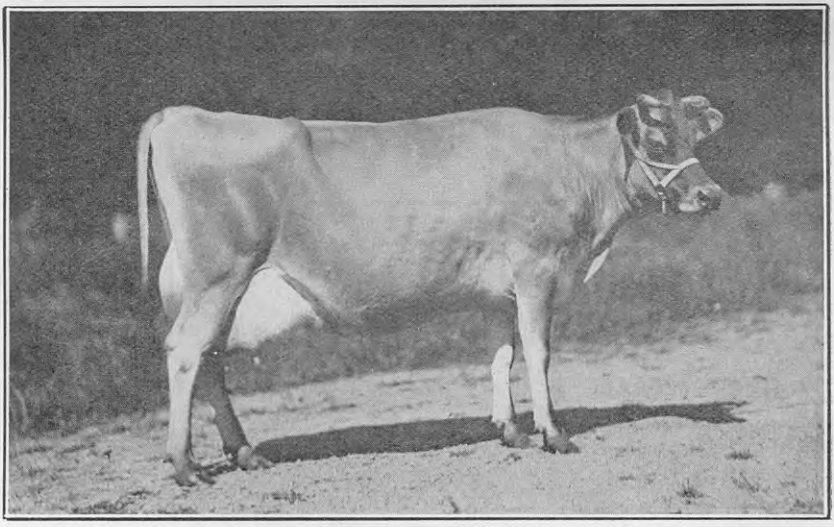
Four classes out of the five into which the Jersey breed is subdivided show an increased average production over the preceding twelve months. A total of 674 cows are represented, as against 569 for 1923. All classes have increased numerically except the three-year-olds, and the class which has fallen off in average yield is the mature.

The decrease, however, is slight—about 5 lb. butterfat—and seeing that some 75 more cows are represented this must be considered satisfactory.

For 1924 the average Jersey is credited with 8,519·9 lb. milk and 468·37 lb. butterfat in an average lactation period of 349 days. This shows an increase of 342·5 lb. milk and 13·24 lb. fat over the previous year, while the average milking-period has advanced by one day.

The class-averages for 1924 and 1923 are given in the following table :—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
	1924.		lb.	lb.
Junior two-year-old ..	253	350	7,417·0	409·80
Senior two-year-old ..	75	353	8,204·1	459·59
Three-year-old	90	348	9,026·9	498·42
Four-year-old	57	348	9,093·0	506·88
Mature	199	347	9,647·7	521·52
	1923.			
Junior two-year-old ..	238	348	7,122·8	397·82
Senior two-year-old ..	63	344	7,991·2	457·13
Three-year-old	99	350	8,636·8	482·08
Four-year-old	45	345	9,044·9	499·07
Mature	124	350	9,614·4	526·64



VIVANDIERE (A. CHRISTIE, TANEKAHA).

Leader of the Jersey mature class, and champion cow of the Jersey breed in New Zealand.

Jersey C.O.R. Bulls.

During the year the Jersey breed added no less than forty-one names to its C.O.R. bulls class, making a total of 181 to date. Of this number 104 bulls have added to their qualified daughters during the year. Their names and particulars of the numbers of their C.O.R. daughters under the various categories appear in the following list :—

Key to numbers opposite names: First number—first-class C.O.R. daughters; second—ditto, qualified on subsequent performances; third—second-class C.O.R. daughters; fourth—total of preceding three numbers. Bulls marked * qualified for C.O.R. list in 1924.

Sultan's Disdain ..	40	9	3	52
Eminent's Fontaine ..	38	4	0	42
Grannie's Knight ..	37	3	2	42
K.C.B.	30	5	3	38
Noble Twylish ..	24	2	0	26
Belvedere Sun Prince ..	19	1	1	21
Te Rapa Lad ..	17	0	0	17
Holly Bank Squire ..	16	2	1	19
Viola's Golden Laddie ..	16	6	0	22
Golden Swan ..	15	4	0	19
Mona's Ally	15	0	0	15
Neathead's Majesty ..	15	3	2	20
Soumise Tom ..	14	2	1	17
The General	14	5	1	20
Bilberry's Goddington	13	3	0	16
Sunflower's Perseus ..	13	3	0	16
Sweet Fox of Collingwood	13	1	0	14
The Owl's Victor ..	13	0	2	15
V.C.	13	0	0	13
Admiral	12	0	0	12
Belvedere Bilberry's Last	12	1	0	13
Good Luck	12	0	0	12
Lady's Duke ..	12	1	1	14
Meadowvale Conqueror	12	1	0	13
Petune's Noble ..	12	0	3	15
Renown of Meadowbrook	12	1	0	13
Charm's Lord Twylish	11	0	0	11
Farleigh Fox	11	4	1	16
Hawkesbury Emperor ..	11	1	0	12
Miro Meadows Star ..	11	0	0	11
Molina's General ..	11	3	0	14
Lord Twylish ..	10	0	0	10
Rose's Attraction's Fox	10	0	0	10
Rozel's Sultan ..	10	0	0	10
Soumise Majesty ..	10	1	0	11
Belvedere Jersey Boy ..	9	1	1	11
Charm's Lord ..	9	0	1	10
Grand Master* ..	9	2	0	11
Maid's General ..	9	1	1	11
Peggy's Campanile ..	9	0	1	10
Rainbow's King ..	9	1	1	11
Twylish Hope ..	9	1	0	10
Beachland's White Swan	8	0	0	8
Eileen's Fox ..	8	2	0	10
Maid's Noble General ..	8	1	0	9
Maori Captain ..	8	0	0	8
Masterpiece of Meadowbrook	8	0	0	8
Owler of Puketapu* ..	8	0	1	9
Cambridge Rata King*	7	0	0	7
Chief of Jersey Meadows	7	1	0	8
Flandrine's Swan ..	7	1	0	8
K. See 18th* ..	7	0	0	7
Lord Nelson	7	1	1	9
Mere's Conqueror ..	7	0	1	8
Protection of Meadowbrook	7	0	0	7
Shamrock of Beachlands	7	1	0	8
Sherry's Fox of Collingwood	7	1	1	9
Sunglow	7	1	1	9
Waipiko Masterpiece* ..	7	0	0	7
Bridge View's Magnet*	6	0	0	6
Centurian*	6	0	0	6
General Noble ..	6	0	0	6
Miro Meadows Maori Boy	6	1	0	7
Noble Sultan ..	6	1	0	7
Signor	6	0	0	6
Beachlands King Pin*	5	1	0	6
Belvedere Sun King ..	5	0	0	5
Bright Knight* ..	5	0	1	6
Fox's Top*	5	1	0	6
Golden Fox* ..	5	0	0	5
Golden Swan's Lad ..	5	0	0	5
Hawkesbury Majestic*	5	0	0	5
Napper	5	0	0	5
Oakdale Major* ..	5	1	0	6
Pecuarius*	5	0	0	5
Perfection's King* ..	5	2	0	7
Reid Park's Lord* ..	5	0	0	5
Una's Nobility ..	5	0	0	5
Vulpes of Bulls ..	5	0	0	5
Waipiko Josiah* ..	5	0	0	5
Woodstock's Lord Raleigh*	5	0	0	5
Beachland's Admiral* ..	4	0	0	4
Beachland's Leo* ..	4	0	0	4
Belvedere Bilberry's Bob*	4	1	0	5
Cherry's Squire* ..	4	1	1	6
Darkie Bill*	4	2	0	6
Darkie's Fox 2nd* ..	4	1	0	5
Dewdrop's Monarch* ..	4	0	0	4
Elf of O.K.* ..	4	0	0	4
Enigma's K.C.* ..	4	1	0	5
Gold Crown*	4	0	0	4
Hillcrest's Record* ..	4	1	0	5
Ironmaster of Meadowbrook*	4	0	1	5
King of Jersey Holme*	4	1	0	5
Majestic Duke* ..	4	0	0	4
Majesty's Squire* ..	4	0	0	4
Middlewood's Eminent*	4	0	0	4

Jersey C.O.R. Bulls—*continued.*

Miro Meadows Major* ..	4	0	0	4	Molly's Lad*	4	0	0	4
Miro Meadows Quick-shine*	4	0	0	4	Rimu*	4	2	0	6
Miro Meadows Toby* ..	4	0	0	4	Royal Tar*	4	2	0	6
					Snowshower* ..	4	0	0	4

FRIESIANS.

Class-leaders.

No change was made this year in the list of Friesian class-leaders as at the end of 1923. The leadership records for the breed have now reached a very high level, and only quite exceptional performances could displace the present leaders. During the year, however, some noteworthy yields have been authenticated. Messrs. C. R. Duncan and Sons' senior two-year-old Mutual Stella de Kol gained a certificate for 720·43 lb. butterfat. In the senior four-year-olds Mr. T. R. Eades's Hinemoa Beauty (see last month's *Journal*) produced 822·37 lb. fat, and in the mature class Mr. J. Hart's Lady Pauline yielded 850·66 lb., the highest Friesian production of the year.

The class-leadership list holds good for 1924, as follows :—

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Fat.
Junior Two-year-old.		Yrs. dys	lb.		lb.	lb.
Monavale Queen Bess	T. H. Richards, Cardiff	2 16	242·1	365	20,501·1	740·50
Senior Two-year-old.						
Netherland Princess 4th	John Donald, Westmere	2 341	274·6	365	19,621·6	805·77
Junior Three-year-old.						
Monavale Queen Bess	T. H. Richards, Cardiff	3 56	282·6	365	21,609·3	800·18
Senior Three-year-old.						
Manor Beets Daughter 2nd of Ashlynn	C. A. Hopping, Palmerston North	3 296	306·6	365	18,733·9	863·51
Junior Four-year-old.						
Westmere Princess Pietertje	John Donald, Westmere	4 156	329·1	365	24,199·0	939·78
Senior Four-year-old.						
Bainfield 27th ..	C. H. Potter, Pukerau	4 351	348 6	365	23,203 3	910 74
Mature.						
Alcartra Clothilde Pietje	Vernon Marx, Mangatoki	7 355	350·0	365	31,312·5	1,145·24

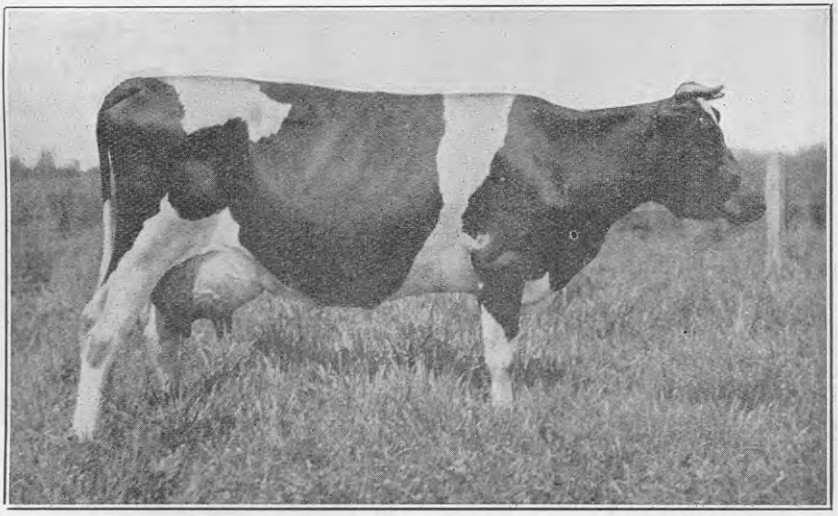
Friesian Class-averages.

With the exception of the junior three-year-olds the 1924 Friesian class-averages show decreases as compared with the figures for the previous year. There were 191 Friesians under test in 1924, so that, when divided into the seven classes which the breed recognizes, the

number of cows per class is small, and thus the averages are considerably affected by the yields of individual cows. The 191 cows on test gave an average production of 14,070·3 lb. milk, containing 486·09 lb. butterfat, the average milking-period being 346 days. This represents a decrease of 30·28 lb. fat and 688·8 lb. milk, the average lactation period having decreased by four days.

The figures for 1924 and 1923 are as follows :—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
	1924.		lb.	lb.
Junior two-year-old ..	51	355	11,516·8	400·04
Senior two-year-old ..	31	352	13,286·0	472·86
Junior three-year-old ..	24	336	13,637·3	471·33
Senior three-year-old ..	11	342	14,502·7	499·93
Junior four-year-old ..	11	347	15,293·2	541·69
Senior four-year-old ..	7	332	15,462·1	501·42
Mature	56	340	16,516·5	562·54
	1923.			
Junior two-year-old ..	50	345	11,435·4	406·27
Senior two-year-old ..	16	348	14,343·4	497·45
Junior three-year-old ..	15	347	12,572·7	445·21
Senior three-year-old ..	11	355	16,253·1	583·27
Junior four-year-old ..	11	353	16,086·6	565·28
Senior four-year-old ..	17	357	17,516·6	604·07
Mature	41	353	17,878·2	616·19



LADY PAULINE (JAMES HART, TATUANUI).

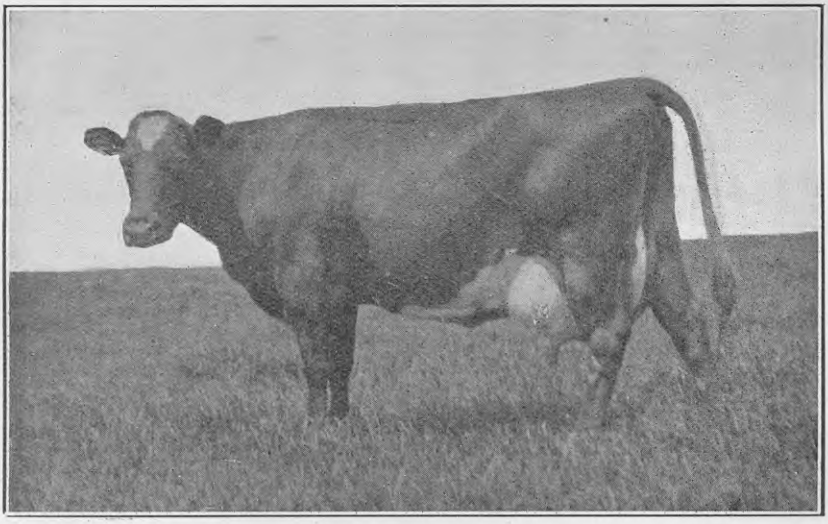
C.O.R. in Friesian mature class: 25,306·2 lb. milk, 850·66 lb. butterfat; highest Friesian record for 1924.

Friesian C.O.R. Bulls.

Up to the end of 1924 some seventy-five Friesian bulls have qualified for the C.O.R. list. During the year nine new names were added, and twenty of the bulls previously qualified increased the number of their C.O.R. daughters. The list is as follows :—

Key to numbers opposite names: First number—first-class C.O.R. daughters; second—ditto, qualified on subsequent performances; third—second-class C.O.R. daughters; fourth—total of preceding three numbers. Bulls marked * qualified for C.O.R. list in 1924.

Woodcrest Joe ..	19	10	0	29
King Fayne Segis 2nd ..	17	5	0	22
Woodcrest Hengerveld Mechtilde	16	3	2	21
Mutual Piebe of Rock ..	11	3	0	14
Royal King Champion	11	2	0	13
Woodcrest Pietje Pontiac	11	1	0	12
Woodcrest Pietje Alcartra	10	2	2	14
Dominion Woodcrest Piebe Mercedes ..	9	1	0	10
Rosevale King Sylvia ..	9	1	3	13
Rosevale Korndyke Sylvia Posch	9	9	1	19
Colantha Segis Lad* ..	8	0	0	8
Longbeach Big Patch ..	7	1	0	8
Marquis Segis Colantha	7	1	1	9
Dominion Dutchland ..	6	1	0	7
Dominion Woodcrest Lulu Champion* ..	6	1	0	7
Friesland Dirk ..	6	1	1	8
King Alcartra Rose de Kol	6	3	0	9
Rex de Kol of Sunnycroft	6	2	0	8
Salma Torohunga No. 1	6	0	0	6
Cordyline Hero ..	5	1	0	6
Dominion Woodcrest King Segis of Rock*	5	0	0	5
Friesland Park Von Bulow	5	0	0	5
Marquis Piebe de Kol ..	5	0	0	5
Royal Prince Pietertje de Kol*	5	0	0	5
Star of Canada* ..	5	0	0	5
Friesland Korndyke Segis*	4	2	0	6
King Rose de Kol* ..	4	0	1	5
Medbury Prince ..	4	1	2	7
Pietertje Netherland Paul*	4	1	1	6



GLENTHORPE LADY (A. J. MELVILLE, BUCKLAND).

Leader of the Milking Shorthorn mature class.

MILKING SHORTHORNS.

Class-leaders.

The list of Milking Shorthorn class-leaders shows three changes for the year. In the junior three-year-old class Dominion Carnation of Ruakura, with 439·20 lb. butterfat, gives way to Matangi Quality 4th, owned by Messrs. Ranstead Bros., who brings the leadership figures to 678·02 lb. fat—an increase of 239 lb. The senior four-year-old Matangi Ruth 2nd, also owned by Messrs. Ranstead Bros., defeats last year's leader—Mr. R. S. Allan's Sweet Garnett 2nd of Cornwall Park, with 514.19 lb. fat—by some 130 lb. In the mature class Mr. A. J. Melville's Glenthorpe Lady, with the fine yield of 856·85 lb. fat, defeats the long-standing champion, Maniaroa Princess, by no less than 156 lb.

The Milking Shorthorn class-leaders now stand as follows :—

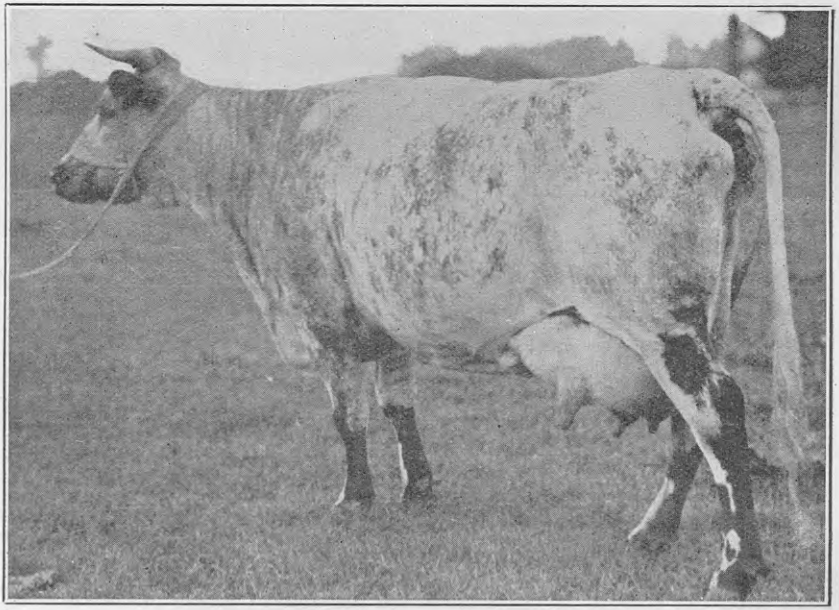
Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		Yrs. dys.	lb.		lb.	lb.
Junior Two-year-old.						
Matangi Quality 4th	Ranstead Bros., Matangi	2 109	251·4	365	14,572·8	591·89
Senior Two-year-old.						
Birkland Dainty ..	G. N. Bell, Palmerston North	2 281	268·6	365	11,616·9	459·98
Junior Three-year-old.						
Matangi Quality 4th	Ranstead Bros., Matangi	3 153	292·3	365	16,281·4	678·02
Senior Three-year-old.						
Matangi Ruth 2nd ..	Ranstead Bros., Matangi	3 304	307·4	365	14,032·7	747·86
Junior Four-year-old.						
Matangi Nancy 2nd	Ranstead Bros., Matangi	4 3	313·8	365	15,591·6	608·28
Senior Four-year-old.						
Matangi Ruth 2nd ..	Ranstead Bros., Matangi	4 355	349·0	340	11,670·3	644·90
Mature.						
Glenthorpe Lady ..	A. J. Melville, Buckland	Mature	350·0	365	20,136·2	856·85

Milking Shorthorn Class-averages.

Thirty-eight Milking Shorthorns were certificated in 1924, as against thirty for 1923. Three of the seven classes show increases in average production. The class-membership for this breed is so small, however, that the averages are too much effected by individuals to be of very great value. One class contains only two animals, two classes each have three representatives, two have four, one has six, and the remaining class—the mature—sixteen. This being so, the truest comparison is obtained by comparing the sixteen mature animals of 1924 with the sixteen in the same class for 1923. There is here shown an increase of 62 lb. butterfat, which must be considered very satisfactory. The average tested Milking Shorthorn cow of 1924 gave 11,738·8 lb. milk, containing 481·30 lb. fat, in an average milking-period of 346 days.

The class-averages for 1924, together with those for the previous year, are as follows :—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
	1924.		lb.	lb.
Junior two-year-old ..	6	344	8,372·0	337·77
Senior two-year-old ..	3	350	7,478·8	302·35
Junior three-year-old ..	3	354	12,722·7	523·81
Senior three-year-old ..	4	352	12,133·4	508·36
Junior four-year-old ..	2	365	11,179·3	435·16
Senior four-year-old ..	4	349	12,846·1	574·19
Mature	16	341	13,310·1	536·50
	1923.			
Junior two-year-old ..	6	352	12,145·8	459·69
Senior two-year-old ..	2	336	8,750·3	337·39
Junior three-year-old ..	2	301	7,945·4	309·97
Senior three-year-old ..	1	365	14,032·7	747·86
Junior four-year-old ..	2	365	12,892·0	494·14
Senior four-year-old ..	1	365	16 260·3	514·19
Mature	16	340	11,860·7	474·65



MATANGI QUALITY 4TH (RANSTEAD BROS., MATANGI.)

Leader of the Milking Shorthorn junior three-year-old class.

Milking Shorthorn C.O.R. Bulls.

Four bulls of this breed have now qualified for the C.O.R. list, the name of Marlborough of Darbalara (Imp.) having been added during the year under review. Of the bulls previously qualified one failed to add to his list of C.O.R. daughters since our last annual review. Particulars are as follows: Dominion Esau of Ruakura, 12—1—1—14; Dilworth Baronet, 5—0—0—5; Marlborough of Darbalara, 4—0—0—4 (key to numbers as given with Jersey bulls).

AYRSHIRES.

Class-leaders.

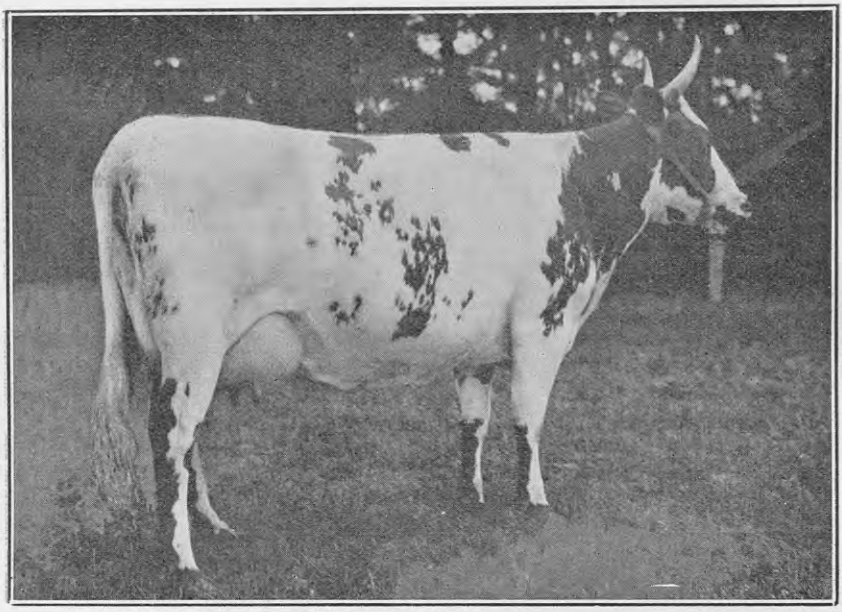
For the Ayrshire breed only one change has been made in the highest performance for each class, this falling in the three-year-olds. The previous leader was Mr. C. E. C. Webb's Greenfield's Ina, with 566·02 lb. butterfat. Mr. A. M. Weir's Ivanhoe Stylish Daisy now raises the record to 574·09 lb. The table of class-leaders is as follows:—

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Dimple of Edendale	W. Hall, Lepperton ..	2 327	273·2	365	13,063·3	529·46
Three-year-old.						
Ivanhoe Stylish Daisy	A. M. Weir, Menzies Ferry	3 312	308·2	365	12,334·2	574·09
Four-year-old.						
Ivanhoe Fancy ..	A. M. Weir, Menzies Ferry	4 308	344·3	365	14,207·7	713·93
Mature.						
Ivanhoe Fillpail ..	A. M. Weir, Menzies Ferry	..	350·0	365	16,362·7	646·31

Ayrshire Class-averages.

Twenty-four Ayrshires gained certificates during the year, as against twenty in 1923. The average production of the twenty-four was 431·58 lb. fat, from 10,419·4 lb. milk, in 354 days. The Ayrshire class-averages for 1924 and 1923 are as follows:—

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
	1924.		lb.	lb.
Two-year-old	6	354	7,025·0	297·01
Three-year-old	3	363	11,932·4	519·03
Four-year-old	3	355	11,603·6	471·87
Mature	12	353	11,442·2	466·93
	1923.			
Two-year-old	4	365	10,986·1	438·63
Three-year-old	2	365	11,036·2	458·40
Four-year-old	4	365	11,166·2	500·52
Mature	10	353	12,663·0	530·19



IVANHOE STYLISH DAISY (A. M. WEIR, MENZIES FERRY).

Leader of the Ayrshire three-year-old class.

Ayrshire C.O.R. Bulls.

The Ayrshire bulls which have qualified for the C.O.R. list now number six. The name of Hindsward Jimmie of Townhead has been added during 1924, and he is the only bull of the breed eligible for inclusion in this year's review. Hindsward Jimmie of Townhead has six first-class C.O.R. daughters to his credit, one of which has gained a certificate on a second performance. It is worthy of mention that with the exception of Dimple of Edendale, leader of the two-year-olds, all class-leaderships for the Ayrshire breed are held by daughters of this bull.

RED POLLS.

Class-leaders.

Although the Red Polls are not generally recognized as a special-purpose dairy-breed, they have nevertheless made a number of creditable butterfat yields. The only Red Polls which have been placed under C.O.R. test are from the herd of the Agriculture Department's Central Development Farm, Weraroa. Up to the end of 1924 twenty-nine cows have received certificates, and eleven of these have gained a

C.O.R. on second or subsequent performances. The highest yields for each class are shown in the following table :—

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Dominion Sylphide ..	Central Development Farm, Weraroa	1 339	240·5	341	8,651·1	430·74
Three-year-old.						
Dominion Gold Top ..	Central Development Farm, Weraroa	3 302	307·2	365	9,491·25	459·46
Four-year-old.						
Dominion Opticia ..	Central Development Farm, Weraroa	4 343	347·8	365	9,958·50	441·27
Mature.						
Dominion Sylph ..	Central Development Farm, Weraroa	5 4	350·0	365	11,009·00	505·84

Red Poll Class-averages.

Six Red Polls gained certificates last year, all being from the Central Development Farm herd at Weraroa. The number is not sufficiently large to warrant a table of class-averages, but it may be noted that the six cows averaged 7,391·2 lb. milk, containing 346·76 lb. fat, in 323 days.

SECOND-CLASS CERTIFICATES.

The second-class certificates still remain at a very small proportion of the total certificates issued. During 1924 second-class certificates were issued to thirty-two Jerseys, fifteen Friesians, and one Milking Shorthorn. The average production of these Friesians was 521·71 lb. butterfat, and of the Jerseys 510·30 lb.

EXPORT OF PUREBRED DAIRY CATTLE.

The value of purebred dairy cattle exported has been maintained. During the calendar year 1924 a total of 178 head were exported, their entered total value being some £8,635. Comparative figures for the previous year are 203 animals, and £8,650. The values therefore remain about the same, although the number decreased by twenty-five. Among those exported were several animals of high value, notably some Friesians from the stud of Mr. W. D. Hunt. The majority of the animals went to Australia and to the Pacific islands.

APPRECIATION.

The thanks of the Dairy Division are once more due to the secretaries of the various breeders' associations concerned—Messrs. W. M. Tapp (Jersey Cattle Breeders), M. J. Thomson (Friesian), William Hunter (Milking Shorthorn Breeders), and R. H. Spencer (Ayrshire Cattle Breeders)—for their cordial assistance in connection with the work of C.O.R. testing.

CLOSING LIST OF RECORDS FOR 1924.

The appended list, containing only eight names, completes the publication of particulars of certificates issued during the calendar year 1924 :—

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		JERSEYS.				
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Alfalfa Senorita ..	F. J. Saxby, Hamilton	1 247	240·5	365	11,114·1	591·68
Woodstock Free Lady	Mrs. Banks and Son, Kiwitea	1 309	240·5	365	7,729·0	427·30
Senior Two-year-old.						
Spec's Girl ..	A. J. Harris, Bombay	2 327	273·2	365	11,560·1	661·03
Three-year-old.						
Alberta's Pansy ..	R. Waterhouse, Ardmore	3 123	289·3	365	9,179·5	527·53
Four-year-old.						
Hawkesbury Ladyship	S. J. Goulter, Haumoana	4 360	349·5	328	9,450·2	450·82
Genii	C. Stevens, Maungatapere	4 46	318·1	330	6,740·9	413·69
	MILKING SHORTHORNS.					
Mature.						
Riverdale Nectarine†	T. W. Wardlaw, Waimana	..	350·0	293	11,765·2	412·62

Second-class Certificates.

	FRIESIANS.					
Junior Two-year-old.						
Fencourt Princess†..	J. H. Jamieson, Cambridge	2 2	240·7	365	11,142·5	380·23
Junior Four-year-old.						
Rosevale Princess Lassie*	H North and Sons, Omimi	4 31	316·6	365	16,237·7	600·29

* Milked three times daily during whole lactation period. † Milked three times daily during part of period.

Correction.—In the December C.O.R. list (January *Journal*) the four-year-old Jersey cow Volpe's Streamlet was shown as having been milked three times daily during part of her lactation period. This cow was milked only twice daily during the whole of her period on C.O.R. test.

Proposed Blackberry Boards.—At the meeting of the Board of Agriculture held last month the following resolution was passed for submission to the Minister of Agriculture: "That legislation be framed to enable Blackberry Boards to be formed in a similar manner to the small-area Rabbit Boards established under Part III of the Rabbit Nuisance Act, 1908. The question as to whether the operations of the Blackberry Boards, if established, should be extended to include control of all noxious weeds is also worthy of consideration."

ELECTRIC POWER TRANSMISSION POLES.

EUCALYPT SPECIES FOR NEW ZEALAND CONDITIONS.

J. H. SIMMONDS, Takanini, Auckland.

NEW ZEALAND needs increasing thousands of supports for carrying electric wires. In theory, the supports may consist of reinforced concrete, or bolted steel bars, or wood. In practice, general preference is being given, and seems likely to be given, to wood. The concrete pole is heavy and easily fractured. The steel tower may come into favour for main lines; it may be best for very steep country where material can be delivered in sections more easily than in long lengths; but for the rapidly expanding reticulations it apparently cannot compete in economy and convenience with the wood pole.

The wood poles now being distributed by our engineers for the new power-lines, though so crude and plain, bear impressive witness to the genius and progress of civilized man. They tell of learned research into the secrets of nature, and of well-instructed planning to convert the energy of falling water into light and heat and mechanical movement. They tell of forests and skilled woodmen in far-off Australia. They tell of freighted ships crossing the Tasman Sea, and of strong-limbed men and powerful appliances doing the work of landing and distribution in our own country. A hundred years ago British men were here gathering kauri spars for the masts and yards of ships; to-day we are importing hardwood poles for the transmission of electricity. As we still look at these great shafts of wood and try to estimate their cost we find ourselves asking why they are being brought from Australia instead of being grown in our own forests. The question is pertinent and must be competently answered.

The botanical genus that yields these poles has been made known to the world under the strange Greek compound *Eucalyptus*. It is a genus unique and apart in the earth's manifold flora. It belongs to the great myrtle family, but is easily distinguished from all other myrtles. In multitude of species it holds second place only to the genus *Acacia*. Though restricted in natural habitat to the island continent of Australia and adjacent islands, it is unsurpassed in climatic range by any single genus of the forests — indigenous and locally adapted species being found in every available climatic region from the southern capes of Tasmania to the tropical jungle of New Guinea, and from genial lowlands on the seaboard to alpine heights above the winter snow-line. Some of the species are humble shrubs; some are bushy mallees. At least one hundred are timber-yielders of medium to large dimensions, and of these twenty or more easily hold place in the first rank of forest giants. Many are very beautiful, and from the foliage of a large number there may be extracted fragrant and valuable essential oil.

As exotics distributed by the hand of man many of the species are showing wonderful capacity for acclimatization. Planting was begun in countries outside of Australia over sixty years ago; and, speaking generally, it has since then been continued with steadily increasing enthusiasm and success. Many countries have contributed

to useful and progressive experiment. Selecting from the long list, we may perhaps especially mention Algeria, South Africa, California, and our own New Zealand.

LIMITATION OF RANGE.

Like the now greatly appreciated *Pinus radiata* and *Cupressus macrocarpa*, the eucalypts have had to win their way against lack of knowledge and much prejudice. For a long time it was commonly assumed that there were only a few sorts of "gum-trees," as they were called, and that "gum-tree" seed collected anywhere in Australia could be propagated anywhere in New Zealand. We know now that the genus *Eucalyptus* has during its long history branched and evolved into over three hundred and fifty quite distinct specific forms. We further know to-day that each species has a climatic and geographical range within which it finds its optimum or best development, and beyond which it declines in vigour and ultimately dies out. For one species the range may be narrow, for another very wide, but for each there are limits. Even now the eucalypts are not nearly well enough understood for winning best results in cultivation on a large scale. If we are to avoid the errors of the past and to put the growing of these trees on a footing of practical certainty we must begin by competently studying the problem of climatic adaptation. No economic merits of a species will count if we plant that species where nature has predetermined that it shall not flourish.

Much the most important and restrictive factor in the limitation of the range of eucalypts is temperature. Exceptional extremes of heat or cold may inflict serious injury, but they are followed by recovery. It is the mean annual temperature that constitutes the insuperable barrier, and so imperious is nature in this matter that the cold-country tree and the warm-country tree cannot under any circumstances change places without serious loss of vigour and possible extinction to both. The number of days per annum upon which the sun shines through a clear sky, though less understood, is also very important for some of the species. The second master factor in the limitation of range is rainfall. All the large-growing species require from 30 in. to 60 in. of rain per annum for their best development. Inland species of smaller dimensions can survive and yield valuable poles, fencing-posts, and fuel with as little as 20 in. or even 15 in. of fall. Chemical constitution and physical condition of the soil and subsoil are very important, but these are repeated in different climatic zones and must be separately considered for each species.

In studying climatic conditions we must always remember how the problem is affected by both latitude and altitude. The general law is that as a species extends its range to higher latitude or away from the Equator it must descend to lower altitude, and, reversely, that as it extends its range to lower latitude or towards the Equator it must or may ascend to higher altitude. Thus, if we find a species flourishing at an altitude of 1,000 ft. to 1,500 ft. in Central North Island we shall not expect to find it in a similar condition at that altitude in Otago and Southland, but somewhere within a hundred feet of sea-level, and *vice versa*. Species that find their optimum on warm lowlands north of about latitude 38 will be barred from extending

southward at all unless at the cost of vigour and size. Apparent exceptions to the general law arise from local contour of the land. In nearly all groups of low foothills there are limited areas where at night the cold air falls to the lower levels and forces the warm air up to the knolls and small plateaux. Many such relatively warm patches may be found in both the South and the North Islands. They slightly extend the possible range of tender species, but do not negative the general law. Sea-breezes modify temperature; but, unless they are first arrested by screens of hardy conifers, they are usually too saline and too persistent for the young foliage of *Eucalyptus* trees.

SUCCESSES AND FAILURES IN NEW ZEALAND.

Power Boards, local bodies, and private owners of land intending now to make plantations of eucalypts must accept the climatic conditions imposed by nature upon these and all other trees. Conflict with nature does not pay. If a Power Board wished to plant, say, 500 acres of pole-timber trees as a source of supply for its future necessities, what is to be the procedure? Choice lies between the haphazard practice of the past and a practice based upon sound deductions from all available sources of information and guidance. Two generations of people in this country have planted eucalypts or have seen them planted. In a large number of cases the results have been splendid and wonderful. The trees have grown as if by magic and have in an incredibly short period of time reached very large dimensions. In both Islands heavy crops have already been reaped and utilized. Poles, fence-posts, sawn timber, and fuel in great quantities have been derived from relatively very small areas of land. Had all the eucalypts planted in this country during the last fifty years done equally well there would have been no need now to import poles from Australia.

But in every region of the Dominion there have been failures, the total sum of which has amounted to a great national loss. If we are to put the enterprise on a sounder footing for the future the causes of failure must be candidly and fearlessly laid bare. It is an ungracious task to chide dead men, but it must be said here that in earlier years seed-collectors, seed-vendors, and nurserymen were too often not reliable in the matter of *Eucalyptus* seeds and plants. Charity will say that they lacked knowledge for this particular branch of their work, and will further excuse them by saying that in those times even botanists were not always sure of their ground. We are concerned just now with what happened to the tree-planting interest. Seeds were often collected from relatively useless trees and sold under wrong names. The enthusiast who sowed these seeds in anticipation of becoming the proud owner of a noble patch of forest found himself instead, after twenty years of waiting, in possession of a promiscuous collection of shrubs and low-branching trees with crooked stems. In other cases the seed was right, but the localities chosen for the planting were wrong. Catalogues made an eloquent story about the merits of jarrah, spotted gum, and broad-leaved ironbark, but failed altogether to inform the planter that these and some other valuable species were exceedingly exacting in respect to climatic conditions. One gentleman planted about thirty valuable but tender species at a

high altitude in Canterbury and lost them all. Had this planting been done in the Marlborough Sounds or on warm lowlands of the North Island most of the species would now have been yielding poles for carrying wires and logs for the sawmill.

SPECIES FOR WIRE-CARRYING POLES.

There are at least sixty timber-yielding species of *Eucalyptus* that can be grown somewhere and to some extent in New Zealand. To the timber list there may be added a large number of ornamental species of smaller dimensions. In a handbook which the writer hopes soon to publish all the most important of these species will be given detailed description, with notes on climatic requirements and uses of the trees. The purpose of the present article is to meet an urgent demand for information that will enable local bodies, syndicates, or private owners of land to start plantations for the production of wire-carrying poles.

The task of selection will be made easier if we place the several available species in groups. For those who are not botanists the most convenient basis for grouping is bark. The living bark of *Eucalyptus* trees, like that of many other trees, is always gradually changing into dead bark. The dead bark may cling to the tree, or it may fall away, leaving the living bark bare; it may be stringy, fibrous, sub-fibrous, or entirely non-fibrous; it may be soft or hard. On this bark basis we easily form five groups, as follows: (1) Stringy-barks, (2) gums, (3) woolly-butts, (4) ironbarks, (5) boxes. The order in which the groups are here placed is determined by value of the crop they can return to us in New Zealand. Two factors enter into the value of a timber-tree—(*a*) Quality and durability of the mature wood, (*b*) rapidity and abundance of its production. The best tree is that which most completely combines both factors, and the best group is that which includes the largest number of such trees. The stringy-barks and gums are placed first because they are the groups that can produce the largest quantity of good timber in the shortest period of time; the ironbarks and boxes come last because, although their mature wood is of exceedingly high merit, their prospective productivity is low.

STRINGY-BARKS.

The term "stringy-bark" is here used in the widest sense, so as to include all the eucalypts whose dead bark is distinctly fibrous or stringy. So numerous and so generally valuable are the members of this group that it would be easy to write a pamphlet about them. In this article on trees for electric power transmission poles we must be content to mention a few.

Eucalyptus pilularis.—This species has dead bark persistent on the stem only, fibrous but not stringy; leaves in juvenile stage sessile (without stalks), lance-shaped, richly coloured, on adult trees deep green and shiny on upper surface; seed-cups about $\frac{3}{8}$ in. in width; mature wood pale, easily worked, strong, durable in the ground. The species has its native home in warm parts of eastern Australia. It was introduced into New Zealand about fifty years ago, and is now represented by vigorous millable specimens on the Auckland Isthmus, in three separate plantations near Papakura, and in two localities in the Hawke's Bay District. The trees grow rapidly to a large size, and, if intended for power-line poles, must be matured in close stands. In the seedling stage

E. pilularis is very sensitive to frost, and it is a bad transplanter. Wherever practicable, therefore, seed should be sown on thoroughly cultivated ground where the trees are to grow, a very light sprinkling of Italian rye-grass being sown with it to protect the plants against frost in their first winter. For unploughable country the plants must be so prepared in boxes or pots that they may be transferred to the permanent ground with soil about their roots.

(2.) *E. eugenioides.*—Has dead bark distinctly stringy, persistent from ground to small branches; leaves in juvenile stage brown, hairy, creased, on older trees smooth and somewhat shiny; seed-cups $\frac{1}{4}$ in. to $\frac{5}{16}$ in. in diameter, on short stalklets, in crowded heads; mature wood pale or pinkish, straight in grain, easily split, excellent for sawing into boards, much valued for posts and poles, resistant to fire. The species has its native habitat in eastern Australia, from south to north through Victoria, New South Wales, and southern Queensland; from east to west over the lowlands, tablelands, and mountains. It has found a congenial home in New Zealand, as witnessed by numerous specimens of millable size in the Papakura-Clevedon district near Auckland, in the State forests at Whakarewarewa, in the Waikato near Cambridge, and in the Wairau Valley, Marlborough. Many trees have been felled and utilized with results that well sustain the Australian reputation of the timber for durability in the ground. Grown in close stands *E. eugenioides* sheds its side branches and forms long, straight stems in every way suited for carrying electric wires. Seed for future plantings should be obtained either from our own acclimatized trees or from certified and approved trees in cold parts of the natural habitat. The species is one of those that give their best results when seed is sown on quite clean, well-cultivated land where the trees are to grow. For propagation by transplanting the plants must be prepared as recommended for *E. pilularis.* In the young stage seedlings of these species require especial care to prevent overtopping and suppression by weeds and grass. A little blood-and-bone manure mixed with the soil near each plant will promote a rapid start and greatly reduce the risk of failure.

(3.) *E. Muelleriana* and *E. laevopinea* are two species similar in botanical characters and in economic merits to *E. eugenioides. E. Muelleriana* is represented by vigorous specimens of pole-timber size in the State plantations near Rotorua, and by younger specimens in a few localities. *E. laevopinea* has only recently been introduced. Both species are worthy of experimental plantings in medium climatic conditions, but, until further tested, neither can be recommended for cultivation on a very large scale in this country.

(4.) *E. gigantea* (syn. *E. delegatensis*) is a mountain stringy-bark that should be given trial in small plantings where climatic conditions become too severe for *E. eugenioides.*

GUMS.

Eucalypts were first called "gums" in reference to the gum-like kino that exudes from the stems and large branches of many species. Later the term was restricted by Australian woodmen to those species that shed their dead bark and present a more or less smooth surface.

(1.) *E. corynocalyx* (syn. *E. cladocalyx*).—The dead bark comes off in scales; leaves in juvenile stage round or oval, on adult trees narrow

with oily lustre; seed-cups about ½ in. long by ⅜ in. wide, barrel-shaped, striped; mature wood brown to dull yellow, hard, and very lasting. The species is cultivated as a pole-yielder in South Australia and Victoria. Many scattered specimens are doing well in warm parts of New Zealand. At a place called Fern Glen, near the coast in northern Wairarapa, there is a stand of about 9 acres, many units of which are now large enough for carrying wires. The species merits persistent experiment in similar situations. Sowings should be made *in situ* on well-prepared land with seed from best acclimatized trees.

(2.) *E. saligna.*—The dead bark is deciduous from branches and stem, newly exposed living bark greenish or bluish; leaves deep green, shiny on upper surface; seed-cups about ¼ in. long, much narrower at the base than at rim; mature wood red, clean in grain, easily worked, excellent for building-construction, durable in contact with the ground. The natural habitat is the coastal belt and gullies of the tablelands in New South Wales and Queensland. As an exotic in our country *E. saligna* is proving hardier than the conditions of its native home would have led us to expect. Healthy and vigorous specimens have been noted by the writer in many North Island plantations. In the Waikato, near Cambridge, and Upper Tutaenui, near Marton, there are large millable trees. Seedlings are now reported to have survived their first winter at Taihape. It is a fair inference to assume that this beautiful and valuable tree would flourish in sheltered parts of the Marlborough Sounds and in Nelson. Grown in close plantations it rapidly develops long clean poles that will be fit for cutting in thirty years.

(3.) *E. globulus.*—This is the Tasmanian "blue-gum," and is too familiar in New Zealand to need description. It is a tree that has suffered in reputation through bad treatment and consequent prejudice. Properly understood and in its proper place it is very valuable. It requires a climate that is cold without alpine severity, and a soil that is deep and moist without being wet. We erred when we planted this tree on warm lowlands of the North Island; we also erred when we planted it on dry uplands. Our error exposed the tree to disease; and then, instead of blaming ourselves, we discredited the tree. The optimum of the species in New Zealand has been found at low altitudes on alluvial flats in the South Island. Planted there in close stands it grows with great vigour, and soon develops heavy crops of tall, straight poles of great value. When quite mature, felled in the winter, and properly seasoned the poles may be expected to last sixteen years; treated with preservatives they should last much longer. But there are good and bad strains of *E. globulus*. The best trees have large single flowers, vigorous foliage, and straight smooth-barked stems. Seed should be collected only from the best and most blight-resistant trees; and in no case should the species be further planted where it has already failed. *E. globulus* has the merit of being able to grow and flourish in southern localities where the number of eucalypts available for cultivation is greatly reduced by climatic conditions.

(4.) *E. viminalis.*—The dead bark is usually deciduous from branches and stem, but may persist for a few feet near the ground; leaves in juvenile stage sessile, lance-shaped, on adult trees rather narrow and long; seed-cups up to ¼ in. in diameter, usually in threes; mature wood pale, rather coarse in texture, strong, known to have lasted

twenty years in the ground. For New Zealand the species has the immense advantage of being adapted to a climate with cold winters. It is easily propagated and a great cropper. Splendid plantations of it may be seen in the Waikato, at Rotorua, in Marlborough, and in northern Canterbury. For poles it must be matured in close stands to prevent excess in diameter. A noble species closely similar to *E. viminalis*, and believed to be still more resistant to cold, has recently been made known to science under the name of *E. Dalrympleana*. Both are inland trees, and must be protected by screens of pines when planted near the sea. *E. Dalrympleana* should be introduced and tested in cold localities without delay.

(5.) *E. Gunnii.*—The dead bark is scaly and deciduous; leaves in juvenile stage round, sessile, on adult trees narrow, short; seed-cups in threes, long, narrow; mature wood pale, hard, said to be durable in the ground. The native home of the species is in the mountains of Tasmania. Away from the reach of frost and snow *E. Gunnii* remains small and feeble; at altitudes between 1,000 ft. and 2,000 ft. in the North Island, and on the lowlands of Southland, it becomes a vigorous and beautiful tree of medium dimensions. We cannot yet say that this tree will yield satisfactory poles; but the promise is fair and experiments well worth while.

WOOLLY-BUTTS.

The dead bark in this group is sub-fibrous or wholly non-fibrous; usually thick; on some species spongy, on others hard. It clings to the stem and in some cases also to the large branches.

(1.) *E. botryoides.*—The dead bark on old trees is very coarse and thick; leaves broad, shiny on upper surface; seed-cups $\frac{1}{4}$ in. to $\frac{1}{2}$ in. long, angular at base, sessile; mature wood red, coarse in texture, very durable in ground. In its native home—eastern Australia—it is a warm-country species, and at its best in localities not very remote from the sea. As an exotic in our North Island it is showing wonderful capacity for acclimatization. Near the coast and as far inland as Piako and Cambridge it has endured the frosts and attained a good pole-timber size in twenty-five to thirty-five years. It is a very beautiful tree and strongly resistant to insect enemies.

(2.) *E. longifolia.*—The dead bark on saplings is finely divided, on older trees coarse and thick; leaves on vigorous young trees long, on old trees medium; seed-cups in threes, up to $\frac{1}{2}$ in. long and $\frac{5}{8}$ in wide; mature wood dark red, very durable. The species comes from coastal regions in south-eastern Australia. From Auckland southward as far as Papakura it has grown to a pole-timber size in about thirty years.

(3.) *E. Macarthuri.*—The dead bark is thick and brittle; leaves in juvenile stage sessile and lance-shaped, on adult trees narrow; seed-cups very small, less than $\frac{1}{4}$ in. in diameter; mature wood pale, coarse in grain, liable to crack radially, very strong, long-lasting in ground. The native home of the species extends from eastern New South Wales westwards up the mountains. It is strongly resistant to frost and easily propagated. In the Waikato it has yielded very heavy crops and supplied many thousands of lasting fence-posts. It is a fair inference to expect that it will do well in Nelson, Marlborough, and

parts of northern Canterbury. For poles it must be planted close to check diameter growth, and near the sea it requires protection against the saline winds.

(4.) *E. acervula* (syn. *E. ovata*).—This species is not recommended for extensive planting, but where stands of it already exist they will supply strong poles of good medium durability. The species grows rapidly to pole-timber size up to altitudes of about 1,000 ft. all over the North Island.

IRONBARKS.

The dead bark in this group persists on stem and large branches; it is very firm, entirely non-fibrous, and on older specimens deeply furrowed. The ironbarks known to the timber trade are as follows:—

(1.) *E. crebra.*—The dead bark on young trees is pale, on older trees dark; leaves very narrow; seed-cups very small, about $\frac{1}{8}$ in. in diameter; mature wood dark with tinge of red, hard, strong, and very lasting.

(2.) *E. paniculata.*—Dead bark pale; leaves rather narrow, bright green; seed-cups small, under $\frac{1}{4}$ in. in diameter; mature wood pale, unsurpassed for strength and durability, much in demand for railway-sleepers, posts, and wire-poles.

(3.) *E. siderophloia.*—Dead bark at first flaky, later very hard, with deep furrows and wide ridges; leaves broad, especially in seedling and sapling stages; seed-cups up to $\frac{3}{8}$ in. in length; mature wood dull red, dense, strong, in first grade for wire-poles and other work in contact with the ground.

(4.) *E. sideroxylon.*—Dead bark very dark and hard; leaves rather narrow, leathery, dull green; seed-cups often over $\frac{3}{8}$ in. in depth, urn-shaped; mature wood red, very durable in any situation.

These four ironbarks are all indigenous to eastern Australia. All are warm-country trees, though *E. crebra* and *E. sideroxylon* extend their range westward over the cooler uplands. In New Zealand scattered specimens of *E. sideroxylon* have grown in forty years to a large pole-timber diameter in the North Island as far inland as Cambridge and as far south as Hawke's Bay; but their stems are neither very long nor quite straight. *E. paniculata*, favourably situated on the Auckland Isthmus, has grown to a small pole-timber size in thirty years; in other localities it has not done so well. *E. crebra* and *E. siderophloia* are represented by a few trees in genial situations, all still under pole-timber size. There is nothing yet in our New Zealand experience to warrant extensive planting of ironbarks; but there is good reason to make small experimental plantings of all the species in warm northern localities.

BOXES.

The name "box" came to be applied to the trees of this group because their bark somewhat resembled that of the European box-tree (*Buxus sempervirens*). The two most important eucalypts of the box group are *E. Bosistoana* and *E. hemiphloia.* They may be briefly described as follows:—

(1.) *E. Bosistoana.*—Dead bark short-fibred (or, as the botanists say, sub-fibrous), deciduous from branches, persistent on stem to a less or greater height; leaves in juvenile stage round or oval, on adult trees rather narrow; ripe seed-cups $\frac{1}{4}$ in. or more in diameter; mature wood

reddish-yellow, strong, and very durable in any situation. The species appears to be at its best on limestone formations in Gippsland, Victoria, where the trees present long branchless boles of the type required for carrying wires. *E. Bosistoana* has not yet been successively cultivated in New Zealand, but, reasoning from natural habitat, we might expect it to flourish on limestone country a little inland from our northern coasts.

(2.) *E. hemiphloia.* — Dead bark flaky, sub-fibrous; leaves very broad on seedlings and saplings, oval to very narrow on older trees; ripe seed-cups $\frac{5}{16}$ in. long by $\frac{3}{16}$ in. wide, or sometimes much smaller; mature wood pale, dense, strong, and very lasting. The species has a wide distribution on lowlands and uplands in eastern Australia. The trees as the traveller usually see them in Victoria and New South Wales are short, with spreading branches, and valuable only for fence-posts and fuel. In sheltered valleys they run up to a good pole-height. The best specimens known to the writer in New Zealand grew at "Trecarne," near Cambridge. They belonged to a small-fruited variety of the species. When first noted by the writer they were about thirty years old. In diameter they were then large enough for telegraph-poles, but some of them were deficient in length. *E. eugenioides* in the same plantation and of the same age more than equalled them in diameter and greatly exceeded them in length of clean stem. *E. Macarthuri,* also in the same plantation and of the same age, had already been yielding posts and poles of quite good durability. The boxes are thus in a similar position to the ironbarks. They must be still treated experimentally. *E. hemiphloia* varies greatly in merit under natural conditions in Australia. If we are to succeed with it as a cultivated timber-yielder in New Zealand competent steps must be taken to obtain supplies of seed from certified and approved parent trees where the species is at its best in cool parts of its native home. We have wasted much time and money in this country through breeding from inferior parent trees.

SPECIES IN ORDER OF RESISTANCE TO LOW TEMPERATURES.

It will further help the planter in selection of species for his particular district if our list is now presented in the order of resistance to low temperatures, as follows:—

Climatic Conditions.	Species.
Winters with severe and prolonged frosts and heavy falls of snow	*E. Gunnii, E. gigantea, E. Dalrympleana* (probably).
Winters with frequent severe frosts and occasional falls of snow	*E. viminalis, E. gigantea.*
Winters with many frosty nights usually followed by clear days	*E. globulus* (seaboard), *E. Macarthuri* (inland), *E. acervula, E. eugenioides.*
Winters with mild frosts usually followed by clear days	*E. eugenioides, E. saligna, E. botryoides, E. hemiphloia, E. Muelleriana, E. sideroxylon, E. laevopinea* (probably), *E. Bosistoana* (probably), *E. pilularis.*
Winters without or almost without frost, with many hot days in summer	*E. longifolia, E. corynocalyx, E. crebra, E. paniculata, E. siderophloia.*

In all cases where practicable information conveyed in printed articles should be supplemented by inspection of the planting-ground by some one who knows the species and has studied their behaviour in various localities.

GENERAL CONSIDERATIONS.

The demand generally will be for heavy crops in short rotation. Very few people will be found who will be content to plant slow-growing and light-cropping trees for the sake of greater durability in the timber. Choice will fall upon the best and most adapted of the rapid growers. We must look at the question in the light of what is happening in Australia. The natural forests of ironbark and box are heavily depleted. Regeneration is good in many localities, but insufficient for prospective requirements. Timbers of less durability are coming increasingly into use. Power Boards are having their poles treated with creosote and tar or other preservatives. In ten to twenty years' time poles imported from Australia may be no better than those we can abundantly produce in our own country. Preservative methods will have to be adopted here as elsewhere. Properly and efficiently treated, our own best poles may thus be expected to last quite as long as those we shall ultimately be able to obtain from our neighbours across the water, and when our home-grown poles decay the cheapest remedy will be renewal from adjacent plantations.

The importance of insect enemies as a factor in the selection of eucalypt species for New Zealand conditions is well recognized by the writer. It is proposed to treat this aspect of the subject more specifically in a later article.

PROLONGED GESTATION PERIOD IN COW.

A CASE of extraordinarily prolonged gestation in a cow has been reported by Mr. W. J. Price, of Hawera. The cow, an aged animal belonging to Mr. Price, was served on 14th November, 1923, and was milked right through the season, never returning to the bull. Mr. Price does not allow his bull to run with the cows until the winter months and after he has culled his herd. In the ordinary course this cow should have calved about 25th August, 1924. On 26th November of that year, states Mr. Price, he noticed her in trouble with calving, and yarded her for assistance. The calf—a heifer—was got away, but it died in the process. It had an extremely large frame and was very thin; it weighed 108 lb., the skin alone scaling 14 lb. The average weight of a calf at birth is about 70 lb. According to "Fleming's Obstetrics," the longest known period for which a cow has carried her calf is 353 days. Mr. Price's cow, it will be seen, exceeded this record by twenty-four days. The facts as given by Mr. Price are supported by his neighbour, Mr. H. Steffert.

—*E. E. Elphick, M.R.C.V.S., D.V.H., Live-stock Division.*

Noxious Weeds Orders.—Woolly nightshade has been declared by Bay of Islands County; broom, foxglove, and gorse by Waitomo County; and hemlock by Greytown Borough.

LOOSE SMUT OF WHEAT.

II. FIELD EXPERIMENTS ON SEED-DISINFECTION BY HOT WATER.

J. C. NEILL, Assistant Mycologist, Biological Laboratory, Wellington.

THE following article presents the results of field experiments for the 1924–25 season on the hot-water method for the control of loose smut in wheat (*Ustilago tritici* Jens.). These experiments are the direct continuation of the laboratory experiments the results of which appeared in the *Journal* for September, 1924.

METHOD EMPLOYED.

Small samples of seed wheat, taken from the same bulk sample of Major used in the previous work, were treated on 25th to 28th July, 1924, dried quickly in an air-current at 90°–100°,* and stored in paper packets in the laboratory. From each sample 300 seeds were taken for germination in the laboratory, and 400 seeds were sown in the field 2 in. apart, in rows each 5½ yards long, with 12 in. between rows. Between each four rows of treated seed two rows of untreated seed from the same bulk sample were sown to act as controls. The sowing took place at the Ashburton Experimental Farm on 9th to 12th September, the soil being in good tilth but very dry. No wheat had been grown on this portion of the farm for at least five years. The plots were covered with wire netting until sufficiently advanced to be safe from birds. A first count of germination was made on 14th to 17th October, the seedlings being then about 4 in. high, and the plants were finally pulled and counted on 6th to 16th January, 1925.

RESULTS OF EXPERIMENTS.

The results of the experiments are set out in the appended tabular statements. The main data and general conclusions may be summarized as follows:—

(1.) A three-minute dip, following a presoaking of five to six hours in water at a temperature of 63°, gave complete control of loose smut at 131° and 133°, though a single smutted plant appeared in the sample treated at 135°. With a presoaking of five to six hours in water maintained at 84° the three-minute dip gave complete control from 129° to 135°.

(2.) A five-minute dip, following a presoaking of five to six hours at 63°, gave complete control from 127° to 133°, but again a single smutted plant appeared at 135°. With a presoaking of five to six hours at 84° the five-minute dip gave complete control from 125° to 135°.

(3.) A ten-minute dip, following presoaking at 63°, gave complete control from 123° to 131°, and, with presoaking at 84°, from 123° to 131°.

* All temperatures are given in the Fahrenheit scale.

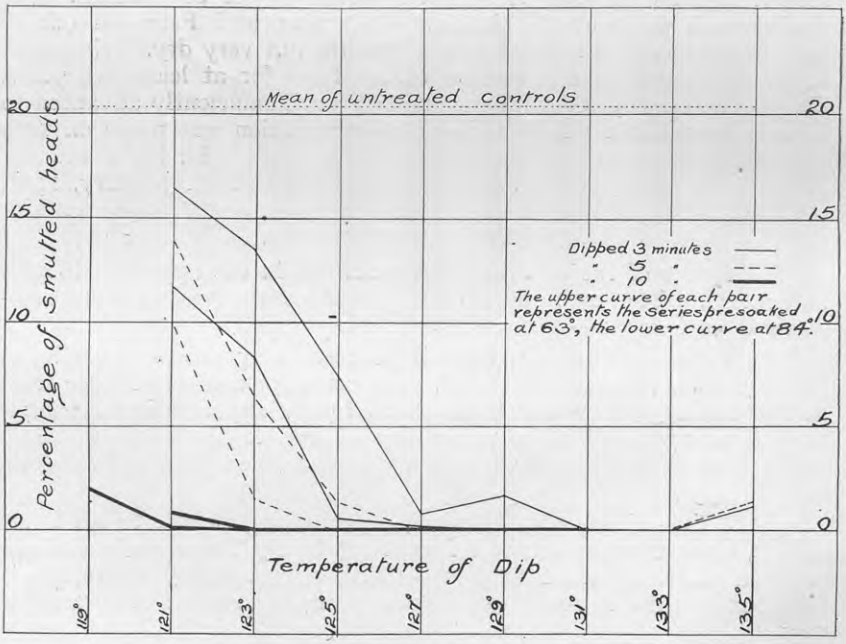
(4.) Without previous soaking only partial control was obtained by dipping for ten minutes up to 135°.

(5.) A soaking for twelve hours in water maintained at 104° gave complete control of the smut, with a loss of 8·2 per cent. of mature plants as compared with adjacent untreated controls.

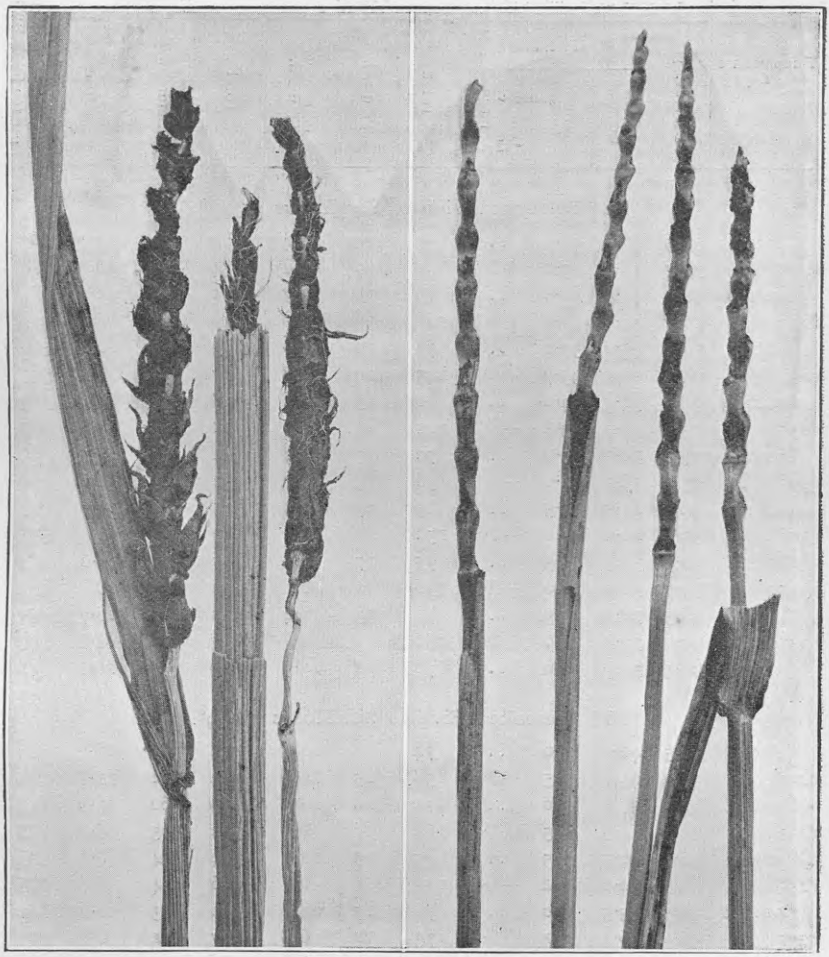
(6.) The effects of the treatments on germination of the seed are not so clearly defined as are the effects on the smut, owing, in all probability, to the generally low and irregular germination due to the dry period following sowing (see Table 7). A certain improvement in germination over controls is apparent at temperatures of dip below the critical point for complete killing of the smut, but above that point there is a loss in germination which increases with both the time and temperature of dip. All the experiments show, however, that it is possible to obtain, within practicable temperature limits, complete freedom from infection, with a loss in germination of less than 10 per cent.

(7.) The field germination of wheat is not materially affected by delaying sowing up to at least four months after treatment and drying.

(8.) The amount of loose smut present in the wheat stand appears to have no correlation with external conditions such as temperature, rainfall, or date of sowing, but to depend solely on the amount of infection present in the seed.



GRAPH SHOWING EFFECT ON LOOSE SMUT OF TEMPERATURE OF PRESOAK, AND TEMPERATURE AND DURATION OF DIP.



LOOSE SMUT OF WHEAT (USTILAGO TRITICI JENS.). NATURAL SIZE.

Left: At blossoming-time of wheat-plant. In centre stem shot-blade dissected away to show inflorescence converted to mass of smut-spores before emergence.

Right: Same at harvest-time. Smut-spores all blown away, bare rachis alone remaining.

(Material from Ashburton Experimental Farm.)

[*Photos by H. Drake.*

Table 1. Seed Wheat dipped Three Minutes.

Temperature of Dip.	Percentage Germination.				Plants.			Heads.			Sound Heads harvested per 100 Seeds sown.
	Laboratory.	Field.			Total.	Smutted.	Percentage Smutted.	Total.	Smutted.	Percentage smutted.	
		First Count.	Mature Plants.	Gain or Loss over Adjacent Controls.							
(*a.*) Presoaked Five to Six Hours at 63°.											
Control	98·5	47·5	47·5	..	95	25	26·4	562	122	21·7	220
121° ..	97·7	48·5	45·2	+2·5	181	37	**20·4**	1,034	170	**16·4**	**216**
Control	98·5	44·5	38·0	..	76	18	23·7	471	106	22·5	182
123° ..	96·7	44·5	32·0	−5·5	128	33	**25·8**	1,017	137	**13·4**	**220**
Control	98·5	40·0	37·0	..	74	16	21·6	493	83	16·8	205
125° ..	99·3	39·7	35·7	+0·2	143	19	**13·3**	807	60	**7·4**	**187**
Control	98·5	37·0	34·0	..	68	15	22·1	518	94	18·2	212
127° ..	95·3	38·7	35·2	+0·7	141	2	**1·4**	978	8	**0·8**	**242**
Control	98·5	38·0	35·0	..	70	17	24·3	462	86	18·7	188
129° ..	93·7	36·5	34·0	−4·2	136	3	**2·2**	952	16	**1·7**	**234**
Control	98·5	43·5	41·5	..	83	27	32·5	545	156	28·7	194
131° ..	95·0	42·0	38·0	−1·5	152	0	**0**	933	0	**0**	**233**
Control	98·5	39·5	37·5	..	75	17	22·7	407	78	19·2	164
133° ..	94·7	36·7	34·0	−2·5	136	0	**0**	794	0	**0**	**198**
Control	98·5	37·0	35·5	..	71	13	18·4	402	67	16·7	167
135° ..	90·0	36·2	34·0	−2·7	136	1	**0·7**	847	10	**1·2**	**209**
Control	98·5	38·0	38·0	..	76	18	23·7	469	97	20·6	186
(*b.*) Presoaked Five to Six Hours at 84°.											
Control	98·5	42·0	37·0	..	74	18	24·3	351	66	18·8	142
121° ..	97·3	45·7	39·5	+3·5	158	25	**15·8**	694	81	**11·7**	**153**
Control	98·5	39·0	35·0	..	70	20	28·6	295	62	21·0	116
123° ..	98·7	44·5	40·5	+1·3	162	16	**9·9**	762	63	**8·3**	**175**
Control	98·5	46·5	43·5	..	87	9	10·3	394	34	8·6	180
125° ..	99·3	42·0	36·2	−4·5	145	1	**0·7**	696	4	**0·6**	**173**
Control	98·5	45·5	38·0	..	76	17	22·4	390	63	16·2	163
127° ..	98·0	46·2	43·2	+2·7	173	1	**0·6**	807	2	**0·2**	**201**
Control	98·5	44·5	41·0	..	82	22	26·8	382	95	24·9	143
129° ..	96·7	44·7	41·7	−0·3	167	0	**0**	815	0	**0**	**204**
Control	98·5	45·5	43·0	..	86	24	28·0	471	96	20·4	187
131° ..	97·7	45·6	40·7	−4·8	163	0	**0**	771	0	**0**	**193**
Control	98·5	51·0	48·0	..	96	17	17·7	441	58	13·2	191
133° ..	95·3	39·5	38·2	−9·0	153	0	**0**	807	0	**0**	**201**
Control	98·5	47·0	46·5	..	93	18	19·4	481	72	15·0	204
135° ..	93·0	45·0	42·0	−1·2	168	0	**0**	909	0	**0**	**227**
Control	98·5	41·0	40·0	..	80	14	17·5	436	56	12·8	190

Table 2. Seed dipped Five Minutes.

Temperature of Dip.	Percentage Germination.				Plants.			Heads.			Sound Heads harvested per 100 Seeds sown.
	Laboratory.	Field.			Total.	Smutted.	Percentage Smutted.	Total.	Smutted.	Percentage smutted.	
		First Count.	Mature Plants.	Gain or Loss over Adjacent Controls.							
				(*a.*) Presoaked Five to Six Hours at 63°.							
Control	98·5	38·0	38·0	..	76	18	23·7	469	97	20·6	186
121° ..	96·3	36·5	34·2	**—0·3**	137	26	**19·1**	760	106	**13·9**	**163**
Control	98·5	31·5	31·0	..	62	19	30·7	393	103	26·3	145
123° ..	97·3	39·7	35·0	**—3·7**	140	15	**10·7**	859	54	**6·3**	**201**
Control	98·5	50·5	46·5	..	93	27	29·0	540	160	29·7	190
125° ..	97·3	46·5	40·2	**—2·5**	161	6	**3·7**	980	13	**1·4**	**242**
Control	98·5	40·5	39·0	..	78	18	23·1	419	82	19·6	168
127° ..	97·0	34·0	30·2	**—8·8**	121	0	**0**	694	0	**0**	**173**
Control	98·5	41·5	39·0	..	78	23	29·5	429	114	26·5	157
129° ..	93·3	41·0	37·7	**—3·9**	151	0	**0**	881	0	**0**	**220**
Control	98·5	47·5	44·2	..	89	22	24·7	476	124	26·0	176
131° ..	92·3	39·7	37·0	**—8·3**	148	0	**0**	702	0	**0**	**175**
Control	98·5	50·0	46·5	..	93	19	20·5	406	75	18·5	165
133° ..	85·3	44·2	42·2	**—10·3**	169	0	**0**	686	0	**0**	**171**
Control	98·5	64·5	58·5	..	117	30	25·6	532	125	23·5	203
135° ..	50·7	10·2	10·7	**—33·8**	43	1	**2·3**	213	3	**1·4**	**52**
Control	98·5	35·0	30·5	..	61	11	18·0	326	35	10·8	145
				(*b.*) Presoaked Five to Six Hours at 84°.							
Control	98·5	41·0	40·0	..	80	14	17·5	436	56	12·8	190
121° ..	96·3	41·0	38·5	**+0·3**	154	20	**13·0**	851	84	**9·9**	**192**
Control	98·5	39·5	36·5	..	73	17	23·3	424	87	20·5	168
123° ..	95·7	43·2	40·0	**+4·3**	160	5	**3·1**	869	13	**1·5**	**214**
Control	98·5	39·0	35·0	..	70	18	25·7	397	83	20·8	157
125° ..	98·0	33·0	30·5	**—3·0**	122	0	**0**	737	0	**0**	**184**
Control	98·5	36·0	32·0	..	64	12	18·8	366	47	12·9	159
127° ..	98·3	44·2	40·7	**—7·0**	163	0	**0**	800	0	**0**	**200**
Control	98·5	66·0	63·5	..	127	25	19·7	646	107	16·3	269
129° ..	95·3	49·2	43·5	**—13·0**	174	0	**0**	889	0	**0**	**222**
Control	98·5	56·5	49·5	..	99	22	22·2	548	117	21·4	215
131° ..	95·0	47·7	42·2	**—10·3**	169	0	**0**	778	0	**0**	**194**
Control	98·5	56·0	55·5	..	111	26	23·4	543	104	19·2	219
133° ..	87·7	31·2	29·0	**—19·5**	116	0	**0**	601	0	**0**	**150**
Control	98·5	43·0	41·5	..	83	25	30·1	403	109	27·2	147
135° ..	68·0	11·2	10·7	**—28·8**	43	0	**0**	267	0	**0**	**67**
Control	98·5	41·5	37·5	..	75	17	22·7	422	85	20·2	168

Table 3. Seed dipped Ten Minutes.

Temperature of Dip.	Percentage Germination.				Plants.			Heads.			Sound Heads harvested per 100 Seeds sown.
	Laboratory.	Field.			Total.	Smutted.	Percentage Smutted.	Total.	Smutted.	Percentage smutted.	
		First Count.	Mature Plants.	Gain or Loss over Adjacent Controls.							
				(*a.*) Presoaked Five to Six Hours at 63°.							
Control	98·5	35·0	30·5	..	61	11	18·0	326	35	10·8	145
121° ..	98·0	33·2	26·0	**−4·2**	104	2	**1·9**	488	4	**0·8**	**121**
Control	98·5	34·0	30·0	..	60	17	28·3	252	55	21·8	98
123° ..	97·7	32·5	29·2	**−3·3**	117	0	**0**	516	0	**0**	**129**
Control	98·5	45·5	35·0	..	70	19	27·1	318	69	21·7	124
125° ..	95·7	35·2	30·0	**−7·2**	120	0	**0**	638	0	**0**	**159**
Control	98·5	44·0	39·5	..	79	23	29·1	384	90	23·5	147
127° ..	94·3	41·5	35·5	**−5·0**	142	0	**0**	654	0	**0**	**163**
Control	98·5	43·0	41·5	..	83	18	21·7	392	69	17·6	161
129° ..	93·7	35·2	33·2	**−12·0**	133	0	**0**	573	0	**0**	**143**
Control	98·5	52·0	49·0	..	98	26	26·6	424	86	20·3	169
131° ..	87·7	42·0	37·5	**−5·5**	150	0	**0**	637	0	**0**	**159**
Control	98·5	42·0	37·0	..	74	18	24·3	351	66	18·8	142
				(*b.*) Presoaked Five to Six Hours at 84°.							
Control	98·5	41·5	37·5	..	75	17	22·7	422	85	20·2	168
119° ..	98·0	40·0	35·0	**−5·7**	140	5	**3·6**	801	15	**1·9**	**196**
Control	98·5	47·5	44·0	..	88	25	28·5	463	126	27·2	168
121° ..	96·7	57·0	53·5	**+1·3**	214	1	**0·5**	1,038	1	**0·1**	**259**
Control	98·5	65·5	60·5	..	121	31	25·6	567	136	24·0	215
123° ..	96·0	62·7	57·7	**0**	231	0	**0**	1,098	0	**0**	**274**
Control	98·5	58·0	55·0	..	110	25	22·8	555	106	19·1	224
125° ..	98·3	49·5	44·2	**−6·5**	177	0	**0**	845	0	**0**	**211**
Control	98·5	49·5	46·5	..	93	24	25·8	487	117	24·0	185
127° ..	97·0	48·5	43·7	**−7·5**	175	0	**0**	848	0	**0**	**212**
Control	98·5	58·0	56·0	..	112	34	30·4	567	151	26·6	208
129° ..	94·3	41·0	37·2	**−16·3**	149	0	**0**	781	0	**0**	**195**
Control	98·5	55·5	51·0	..	102	27	26·5	571	129	22·5	221
131° ..	74·3	26·0	24·7	**−24·5**	99	0	**0**	550	0	**0**	**137**
Control	98·5	55·5	47·5	..	95	16	16·9	469	77	16·4	196

Table 4. Seed dipped Ten Minutes. No Presoak.

Temperature of Dip.	Percentage Germination.				Plants.			Heads.			Sound Heads harvested per 100 Seeds sown.
	Laboratory.	Field.			Total.	Smutted.	Percentage Smutted.	Total.	Smutted.	Percentage smutted.	
		First Count.	Mature Plants.	Gain or Loss over Adjacent Controls.							
Control	98·5	34·0	29·0	..	58	12	20·7	498	76	15·3	211
123° ..	98·3	34·5	33·2	+4·0	133	29	**21·8**	1,115	188	**16·9**	**231**
Control	98·5	32·5	29·5	..	59	21	35·6	572	157	27·4	207
127° ..	96·7	38·5	36·7	+6·7	147	31	**21·1**	1,236	194	**15·7**	**260**
Control	98·5	30·5	30·5	..	61	16	26·3	526	135	25·6	195
131° ..	95·3	30·2	28·7	−3·3	115	22	**19·1**	1,019	162	**15·9**	**214**
Control	98·5	36·0	33·5	..	67	10	14·9	513	60	11·7	226
133° ..	96·0	38·0	37·0	−0·2	148	20	**13·5**	1,010	112	**11·1**	**224**
Control	98·5	42·0	41·0	..	82	21	25·6	512	122	23·6	195
135° ..	67·3	23·5	21·5	−22·7	86	14	**16·3**	617	99	**16·0**	**129**
Control	98·5	47·5	47·5	..	95	25	26·4	562	122	21·7	220

Table 5. Test of Deterioration of Seed after Storage (treated 8th May, sown 11th September): Presoaked Six Hours at 63°; dipped Ten Minutes at 127°.

Temperature of Dip.	Percentage Germination.				Plants.			Heads.			Sound Heads harvested per 100 Seeds sown.
	Laboratory.	Field.			Total.	Smutted.	Percentage smutted.	Total.	Smutted.	Percentage smutted.	
		First Count.	Mature Plants.	Loss compared with Controls.							
Control	98·5	47·0	43·5	..	87	23	26·5	560	120	21·4	220
Treated	94·0	40·2	35·2	−10·0	141	0	**0**	947	0	**0**	**237**
Control	98·5	47·5	47·0	..	94	20	21·3	522	98	18·8	212

Table 6. Seed soaked for Twelve Hours at 104°.

Control	98·5	55·5	47·5	..	95	16	16·9	469	77	16·4	196
Treated	95·7	48·0	41·5	−8·2	166	0	**0**	797	0	**0**	**199**
Control	98·5	55·0	52·0	..	104	33	31·7	479	139	29·3	168

Table 7. Incidence of Loose Smut in relation to Date of Sowing.

Date of Sowing.	Percentage of Plants matured.	Plants.			Heads.			Ashburton Meteorological Records.		
		Total.	Smutted.	Percentage smutted.	Total.	Smutted.	Percentage smutted.	Week ending.	Mean Temperature.	Total Rainfall.
1924.								1924.		Inches.
								10 May ..	49·1	0·62
								17 ,, ..	50·7	0·04
17 May ..	90·0	180	33	18·3	1038	126	12·1	24 ,, ..	47·3	0·40
24 ,, ..	79·5	159	43	27·0	970	153	15·8	31 ,, ..	47·5	0·84
31 ,, ..	74·5	149	30	20·1	862	112	13·0	7 June ..	41·6	0·69
9 June ..	76·0	152	37	24·4	862	140	16·3	14 ,, ..	45·0	0·61
14 ,, ..	59·0	118	27	23·0	681	111	16·3	21 ,, ..	39·9	0·24
21 ,, ..	35·0	70	17	24·3	508	92	18·1	28 ,, ..	40·5	0·31
28 ,, ..	28·0	56	8	14·3	454	41	9·0	5 July ..	42·1	0·06
5 July ..	33·0	66	18	27·2	462	85	18·5	12 ,, ..	41·9	0·06
12 ,, ..	53·5	107	26	24·3	711	104	14·6	19 ,, ..	43·9	0·00
19 ,, ..	50·5	101	22	21·8	649	103	15·9	26 ,, ..	37·9	0·24
26 ,, ..	68·5	137	32	23·4	748	130	17·4	2 Aug. ..	44·9	0·25
2 Aug. ..	64·5	129	30	23·2	707	127	17·8	9 ,, ..	41·0	0·37
9 ,, ..	57·0	114	25	22·0	697	140	20·0	16 ,, ..	46·1	0·33
16 ,, * ..	44·2	177	37	21·0	784	152	19·4	23 ,, ..	42·9	0·09
23 ,, * ..	46·7	187	57	30·5	805	194	24·1	30 ,, ..	48·5	0·01
30 ,, ..	53·5	107	25	23·4	648	116	17·0	6 Sept. ..	46·7	0·21
9 Sept. ..	48·0	96	25	26·0	594	114	19·2	13 ,, ..	47·6	0·00
13 ,, ..	35·0	70	19	27·2	315	85	27·0	20 ,, ..	54·3	0·00
20 ,, ..	88·0	176	36	20·5	674	121	17·9	27 ,, ..	53·3	1·04
27 ,, ..	89·0	178	49	27·5	608	152	25·0	4 Oct. ..	56·8	0·02
4 Oct. ..	92·5	185	43	23·3	635	116	18·3	11 ,, ..	53·0	0·62
General Mean of Controls in Tables 1–6.										
9–12 Sept.	42·0	..	..	24·2	..	..	20·4	..	..	..

* In these two sowings the seeds were planted 1 in. apart, 400 seeds being sown instead of 200 as in the other sowings of the series.

The meteorological records were kindly supplied by Mr. H. P. Clayton, Curator of the Ashburton Botanical Gardens and Meteorological Station. The records were taken two miles from the site of the experiments. The figures given under "Mean Temperature" are the arithmetical mean for the week of the daily maxima and minima.

The writer wishes to acknowledge gratefully the help rendered in this work by Mr. J. G. McKay, Overseer of the Ashburton Experimental Farm, who carried out the weekly sowings recorded in Table 7, and whose practical assistance has proved invaluable throughout the whole of the experiments. The writer's thanks are also due to Mr. N. R. Foy, Seed Analyst, and his assistants, who carried out the laboratory germinations here recorded.; and to Mr. F. E. Ward, Instructor in Agriculture, for co-operation in providing facilities for the work.

IRON-HUNGER IN RUMINANT STOCK.*

THE SEASON'S WORK AT MAMAKU DEMONSTRATION FARM.

B. C. ASTON, F.I.C., F.N.Z.Inst., Chemist to the Agriculture Department.

In summarizing the work of the Mamaku Demonstration Farm during the season now closing one has to record an unfortunate visitation of mammitis, which is liable to attack any milking-herd. This has to a considerable extent interfered with the scheme of medicinal and other treatment which had been decided upon. Data of a most interesting and valuable character have been acquired, however, in spite of the outbreak. In the following pages is set down the history of the cows belonging to the experimental herd and their offspring. The April, 1924, *Journal* should be consulted for previous details of their history.

The salient features of this record are a complete confirmation of the curative properties of iron and ammonium citrate, the preventive effect of the concentrated foodstuff molasses, and the beneficial effect of a winter ration of hay made from grass grown on land cultivated and top-dressed, together with swede turnips, coincident with a grazing on pastures top-dressed with phosphates. The novel features of this season's work are the successful use of the double citrate of iron and ammonium in conjunction with hay. The method of using this drug, which may prove to be a most valuable one in farming practice, is the idea of the Farm Overseer, Mr R. A. Jackson. He first suggested the method of mixing the drug with the hay when it was being built into the stack. Feeding this treated hay has given excellent results on the few animals upon which it has been tried. The idea commends itself as a practicable one in the administration of the curative medicine, and surpasses the other methods tried—*i.e.*, by drenches and by licks—in being automatically taken by the animal, while at the same time being only consumed in small repeated doses. This improved method removes the two great objections to the use of drenches and licks which the hardworking farmer will urge—the time taken to give drenches, and the difficulty in controlling the amount given automatically as licks. With drenches the labour of dosing a herd of cows is great. With sugar-iron bricks the animals are so greedy for the stuff that there is difficulty in controlling the consumption, and calves are apparently stunted in their growth by an overdose (see Fig. 3). There is the additional difficulty that such licks in a moist climate like that of Mamaku absorb water very rapidly and soon deteriorate. The cost of the sugar is an additional item of expense. Salt-iron bricks for some reason are not efficacious. When, on the other hand, the iron compound, either as scales or in solution, is sprinkled on the hay, the iron is fed out to the stock suitably diluted by the hay, and no animal can consume too much.

* A very general response having been made to the suggestion that the misleading term "bush sickness" should be abandoned in favour of one more in keeping with the known facts, the term "iron starvation" or "iron-hunger" will in future be used by the present writer to denote what is locally known as "bush sickness" or "the skinnies."

This season Mr. Jackson has made some 20 tons of excellent hay treated in the following manner: The iron and ammonium citrate (23 lb.) was dissolved in 8 gallons of water; when all dissolved 45 lb. of sugar was mixed in, and the whole was then mixed with 4 gallons of molasses. The liquid was sprayed on to the layers of hay by means of a Vermorel knapsack sprayer, and was sufficient for 15 tons of hay. The solution is absorbed and dries at once on the freshly made hay. Another method which is being tried on a smaller scale consists in merely sprinkling the solid scales of the iron compound on to the layers of hay without the addition of water, sugar, or molasses.

The writer considers that the outlook for the future of these iron-hungry lands was never more promising. To succeed in combating the trouble in a practicable manner at Mamaku, where the climate is severe in winter, argues for a much more favourable result in districts which are situated at lower elevations under less rigorous conditions. In this connection the Department would welcome assistance from farmers in demonstrating the effective use of iron ammonium citrate as a preventive and cure of iron-hunger, and for this purpose will supply at cost price (3s. 9d. per pound, postage free) a limited quantity of the drug. An amount of 1 lb. will be sufficient to drench for two months one cow, which should then, if the trouble is not too advanced, show an improvement.

TREATMENT OF COWS OF THE DAIRY HERD.

It was resolved that as certain cows which had been on the farm for two or three years (see April, 1924, *Journal*) were due to calve in winter — a most trying season at Mamaku — they should be given exceptional treatment in the shape of a change to the Tirau paddock. The cows thus treated were "Te Kuiti" (who was in good condition when she went to Tirau on 1st February, 1924), "Roanie" (also in good condition when she went there on 21st February), and "Ginger" (in very good condition when she went on the same date).

"*Te Kuiti*" came back from Tirau in first-rate condition on 8th May. She did well, and was springing on 30th June. She was then getting hay and turnips, and calved on 11th July; the strong, healthy bull calf was destroyed. At 31st July she was giving 18 lb. milk daily; condition good: 31st August, 22 lb. milk, being in good condition and getting hay and turnips: 7th September, 25 lb. milk; went to bull in good condition: 30th September, 25 lb.: 1st November, 27 lb.: 1st December, 22 lb.: 1st January, 1925, 17 lb.: 23rd February, 17 lb. milk; condition good.

"*Roanie*" came back from Tirau on 8th May, and on 13th gave birth to a dead calf, but was in good condition herself, milking well, and giving 20 lb. milk daily; 9th June, still giving 20 lb. and in good condition, getting hay and turnips, also 1 lb. molasses in a little chaff once a day; 30th June, still giving 20 lb., and treatment being continued; 1st August, molasses treatment discontinued, condition being good; 31st August, giving 2½ gallons milk, still getting hay and turnips; 6th September, all turnips finished, condition good, giving 26 lb.; 1st October, 23 lb.; 1st December, 20 lb.; 1st January, 16 lb., her condition being good throughout; at 23rd February was a little dull about the eye and hair rough, but animal in good condition; 12 lb. milk daily.

"*Ginger*" came back from Tirau looking well, but must have slipped her calf there. After getting hay and turnips she was sold for beef on 25th September as she was not in calf.

"Brindle" and "Cherry," two cows, the former of which never had any exceptional treatment except molasses, are an outstanding

testimonial to its efficacy in keeping both themselves and their offspring healthy. (The ash of molasses contains up to 7 per cent. of iron oxide.) "Maud" had the advantage of a recent change to Tirau, but is also a testimonial to molasses. The previous records of these cows can be seen in the April, 1924, *Journal*. "Cherry" and "Maud" have previously gone "sick," but "Brindle," whose sole treatment has been molasses, has never been sick. Like the other two, she lost her first calf, but subsequently raised three healthy calves in succession, all now alive and doing well at the farm. The success of these cows and their offspring can only be attributed to the treatment.

"*Brindle.*"—At 10th May, 1924, this cow was milked once a day—condition being good—up to 9th June, when she was dry, and was running on swedes with a good run-off; on 30th July she was given hay with the swedes; on 7th September the swedes were finished, and the treatment of giving 1½ lb. of molasses once a day was commenced. The treatment was discontinued on 30th October, the condition

FIG. 1. SOME OF THE CURRENT SEASON'S CALVES AT MAMAKU DEMONSTRATION FARM (BORN IN 1924).

From left to right: Maggie's, Lily's, Brindle's, Cherry's, Molly's.

of the cow being good all through the winter. She calved 4th November—a roan bull calf, strong and healthy. Cow in first-rate condition, and giving 56 lb. milk daily till 1st December. At 1st January, 1925, she was giving 44 lb. milk, her condition being first rate; on 23rd February, condition first rate, 40 lb. milk.

"*Cherry*" was giving on 3rd March, 1924, 30 lb. milk; 10th April, 24 lb., test 3·4 per cent.; 30th April, 18 lb. On 30th May was in good condition and milking once a day. On 1st June commenced to receive 1 lb. molasses once a day in local chaff; weight of milk, 10 lb.; feeding on hay and turnips. She was dry on 1st July, and the molasses were discontinued; condition good. On 31st August she was still on swedes and getting a little hay with a good run-off. On 7th September the swedes were finished, and the molasses treatment was recommenced as on 5th June. On 5th October she calved, the calf being strong and healthy and the cow in good condition. On 31st October was giving 43 lb. milk and was in good condition. On 16th November the molasses treatment was discontinued. She has continued in good condition, and was giving at 1st December 42 lb.; 1st January, 1925, 40 lb.; 23rd February, 35 lb. milk; condition good.

"*Maud*," on 10th April, 1924, was giving 9 lb. of milk, testing 3 per cent., once a day, and was in good condition. She was dry on 10th May, and was put on soft turnips on 16th May. She was turned on to the swedes on 9th June, but hay was not given until 7th September, when all the roots were finished, the cow being in good condition and springing. She calved on 10th October, the calf being strong and healthy, but as the cow was affected with mammitis she was turned out with her calf. Both were well on 1st January, 1925.

"*Polly*."—This cow had been brought back to health by the iron-ammonium-citrate treatment last year, giving 19 lb. milk, testing 3·6, on 10th April, 1924. She was dry on 16th May, 1924, and not in calf. She was grazed on swedes and given hay and a good run-off in June, July, and August. She was in first-rate condition at 31st August, and was sold for beef on 25th September.

"*Daisy*" was a cow which in the past had no special treatment, but a good supply of hay and turnips. On 10th April, 1924, she was giving 19 lb. milk, testing 3 per cent., and was in good condition. At 30th April she was giving 10 lb.; on 10th May she was in good condition and giving 7 lb.; on 30th May, 4 lb. Badly affected with mammitis, she was turned on to soft turnips, and on to swedes on 9th June. Thence till 31st August she had swedes with hay, and her condition was first rate. She was springing on 1st October and calved on 30th November, the calf strong and healthy, but the cow no good to milk owing to mammitis. At 1st December the cow was looking well, but the calf was not doing well, not getting enough milk. This was also the condition of things at 1st January, 1925. At 23rd February cow was fit for beef; calf destroyed, as not enough milk from cow.

"*Lily*" had in the past failed to be kept healthy on turnips and had lost her first calf, and had to be sent to Tirau, so rapid was her decline through bush sickness after calving. After her return the iron treatment was given and a healthy calf was born. In April, 1924, she was giving 26 lb. milk, testing 3·8 per cent., and her condition was good. At 30th May, milking once daily, 12 lb. milk; 30th June, 7 lb. milk, on hay and turnips; condition good. On 1st August the iron treatment was commenced; getting 2½ oz. home-made iron ammonium citrate made from commercial lime-juice, in local chaff, twice a day, the cow being dry. On 7th September the turnips were all finished. The iron treatment was terminated on 1st October, her condition being first rate. Calved on 14th October, the calf being strong and healthy and the cow in first-rate condition. On 1st December was giving 43 lb. milk daily, and on 1st January, 1925, 38 lb., condition continuing first rate; 23rd February, condition first rate, 34 lb. milk.

"*Darkie*."—On 10th May, 1924, commenced to milk this cow once daily; 30th May, condition good, milking once daily; 1st June, commenced on hay and turnips, and getting citrate sugar brick; 30th June, milking once daily, and on same feed and treatment. Cow did not take the brick well, so it was given crushed up with chaff, which she took well. On 31st July finished giving iron sugar brick, cow not taking it well. (The composition of the sugar brick was 8 lb. raw sugar and 4 oz. or 8 oz. iron ammonium citrate scales.) Cow then on swedes, condition good. On 5th August she seemed to be getting abnormal in size, although chewing cud and eating well. On 17th August she died of dropsy of the womb. A *post-mortem* examination showed seven-months-old twins and 15 gallons of fluid.

Cows which arrived at Farm in 1923.

The cows which arrived at the farm in 1923 will now be discussed.

"*Spot*" (arrived July, 1923), a six-year-old Shorthorn, white and yellow, was in good condition on 20th May, 1924, and was getting soft turnips and grass. From 7th July to 6th September she grazed on turnips and got hay. The calf was born dead on 22nd September, but the cow was in good condition, though bad with mammitis, and it not being possible to milk her she was turned out to fatten. At 1st November her condition was not good, and on 10th December she was obviously going bush-sick. On 15th December a new method of treatment, the subcutaneous administration of sodium iron citrate, was commenced. Treatment was finished on 7th January, 1925, but no improvement except a brighter eye was noticeable after twenty-five days' treatment. On 1st February, going bush-sick quickly; commenced to drench twice daily with home-made iron ammonium citrate. On 23rd February, improvement marked; treatment continued.

"*Mona*," a Shorthorn six-year-old roan, arrived 2nd July, 1923, and calved 5th August. At 9th June, 1924, she was getting swedes and hay, and milking once daily. At 30th June she was dry and in good condition. She was given 2½ bricks during three weeks (iron ammonium citrate and sugar). She was turned into swede-paddock on 31st July, and by 6th September they were all finished. Cow was then in first-rate condition and treatment with sugar brick was recommenced. On 17th November she calved. On 1st December was giving 42 lb. milk, and on 1st January, 1925, 40 lb., having been in first-rate condition since 5th November; 23rd February, condition first rate, and giving 40 lb. milk.

"*Buttercup*," a six-year-old Shorthorn, arrived 2nd July, 1923, and calved 7th August. On 10th May, 1924, she was dry and in fair condition, and grazing on No. 1 paddock, soft turnips and grass. On 9th June she was transferred from No. 1 to the first break of swedes. On 30th June, when still on the swedes, she had gone back in condition, and on 5th July was given molasses in local chaff, a treatment to which she did not take. On 31st July, as she was evidently not a suitable subject for the molasses treatment, she was given the drenching treatment with the home-made iron ammonium citrate, 2½ fl. oz. twice a day. On 31st August a little improvement was noticeable; the cow was still getting hay and turnips. On 3rd September cow calved a little prematurely; calf dead; was poorly nourished. On 8th September cow just a little better, but weak; drenching continued. On 30th September decided improvement; milking better; weight of milk, 24 lb.; drenching continued. On 1st November drenching continued; improvement in milk-yield, 44 lb. On 15th November still improving; drenching discontinued. In December was in good condition, quite recovered; weight of milk, 44 lb. On 1st January, 1925, condition good; milk, 38 lb. On 23rd February, condition good; 30 lb. milk.

"*Maggie*," a light-roan Shorthorn six-year-old, arrived on 2nd July, 1923, and calved 8th August. On 30th May, 1924, was grazing in No. 1 paddock; if anything, better in condition. On 5th June was put into No. 4 paddock and given hay containing commercial iron ammonium citrate scales and molasses put into stack at time of building, and was still getting turnips daily. On 30th June her condition was fair, with same treatment continued. On 31st July treatment continued; condition, if anything, better. On 31st August continuing to improve, condition good, treatment continued. On 30th September treated hay all finished. On 20th September cow calved; calf strong and healthy; cow in first-rate condition. Calf was put on to "Molly," and subsequently fed "on the bucket." On 5th October weight of milk 45 lb.; 5th November, 44 lb.; cow in good condition. On 1st December, 40 lb. milk; cow in good condition. On 1st January, 1925, milk 31 lb.; cow in good condition. On 23rd February condition fair; 29 lb. milk.

"*Peggy*," a light-roan Shorthorn six-year-old, arrived on 2nd July, 1923; calved 9th August. On 10th May, 1924, she was dry; grazing on No. 1 paddock on soft turnips and young grass; condition good. On 30th May still on soft turnips. On 9th June put on to swede turnips with no hay. On 30th June still grazing on turnips; condition fair. On 31st July still on swedes and getting hay; condition improved. On 31st August continued to run on swedes with a little hay and a good run-off; condition good. On 6th September finished all swedes. 30th September, in first-rate condition. 5th October calved; calf strong and healthy. 5th November, cow in good condition; milk, 35 lb. 1st December, weight of milk 34 lb. 1st January, cow losing condition, but as she was giving a high-testing milk this was perhaps natural; milk, 31 lb. 23rd February, condition good; 23 lb. milk.

"*Fanny*," a roan Shorthorn six-year-old, arrived 2nd July, 1923; calved 10th August. On 10th May, 1924, grazing in No. 1 paddock on soft turnips and young grass; condition good. 9th June, put on to swedes but no hay, as she had a good run-off; remained on swedes to 31st August. 7th September, finished swedes. 26th September calved, but no good as milker, being affected with mammitis; calf dead at birth; put two calves on to cow ("Jean's" and "Maggie's"); did not take to the calves, which had to be killed; milking the cow to dry her off. 5th November, milking much better—35 lb.—and cow in good condition. 1st December, condition still good; 33 lb. milk. 1st January, 1925, condition good; 26 lb. milk. 23rd February, condition good; 23 lb. milk.

"*Jean*," a red Shorthorn six-year-old, arrived 2nd July, 1923, and calved on 10th August. On 10th May, 1924, was dry and grazing in No. 1 paddock on soft turnips and young grass, where she continued in good condition until 9th June, when she was put into the swede-paddock. Continued with this treatment until 31st August, when the swedes were finished. Calved on 25th September, the calf being strong and healthy and the cow in first-rate condition. On 5th October was giving 35 lb. milk. On 1st November she was losing condition and not milking so well as in the previous year; milk, 27 lb. 1st December, decided improvement; milk, 39 lb. 1st January, 1925, condition good; weight of milk, 34 lb. 23rd February, condition first-rate; 34 lb. milk. This cow had no special treatment, the maintenance in health being due to the good rations.

"*Judy*," a red-and-white Shorthorn eight-year-old, arrived 22nd July, 1923, and calved 12th August, 1923. On 30th May, 1924, was in No. 1 paddock and condition good. 9th June, put into first break of turnips; turnips continued, but no hay; condition good. From 31st July to 31st August feeding as on 9th June continued; condition good until 7th September, when the swedes were finished. 30th September, caught a bad chill, and though covered and given hot drink, died of pneumonia on 6th October.

"*Molly*," a red Shorthorn seven-year-old, arrived 2nd July, 1923, and calved 12th August. On 30th May, 1924, continued in No. 1 paddock; condition good. 9th June, put in first break of swedes and hay. 30th June, still on swedes, but no hay; a good run-off available; condition good. This feeding was continued till 7th September, when swedes were finished. She calved on 25th September, the calf being strong and healthy, but, although cow's condition was good, she was unsuitable for milking owing to mammitis. She would not take to a strange calf tried on 30th September. On 1st November she was losing condition rapidly, and the strange calf died. On 15th December she was still going bush-sick rapidly, so was drenched with iron ammonium citrate made from commercial lime-juice, 1 fl. oz. twice daily. On 1st January, 1925, quite a marked improvement was noticeable. 23rd February, drenching continued; cow now in very fair condition.

"*Pansy*," a red Shorthorn six-year-old, arrived 2nd July, 1923; calved 14th August. 30th April, 1924, was dry, and from then to 30th May was grazed in No. 1 paddock, her condition being first rate. On 9th June was put on to first break of swedes, where she continued in first-rate condition till 30th June, with a good run-off but no hay. On 24th July she calved, the calf being strong and healthy. "Beauty's" calf was also given to her, but it died on 28th July. "Pansy's" calf remained in good condition, and cow continued on swedes until 7th September, when swedes were all finished. Since this date to 23rd February, 1925, both have done well. This cow developed mammitis, and was not milked.

"*Beauty*," a roan Shorthorn seven-year-old, arrived 2nd July, 1923, and calved 30th August. On 30th April, 1924, she was dry and grazing in No. 1 paddock till 30th May; in good condition. On 3rd June she was put into the first break of swedes, where she continued until 30th June, without hay but with a good run-off. Her condition was good, but not improving as she should. On 5th July commenced to give her 3 lb. molasses daily, which she took well. Calved on 25th July, the calf being weakly, and cow with dry, rough coat and signs of going bush-sick. On 31st July she was not taking molasses well. Calf died 28th July, having been put on to "Pansy." On 2nd August commenced to drench cow with home-made iron ammonium citrate made from commercial lime-juice, giving 2½ fl. oz. night and morning. The treatment was continued with hay and turnips, with no improvement noticeable. On 7th September swedes were finished. The medicinal treatment was continued twice daily; milk-yield, 23 lb. on 30th September. On 1st November weight of milk 27 lb.; a little improvement noticeable in cow. On 15th November quite an improvement; weight of milk 29 lb.; finished medicinal treatment by drenching. On 1st December much better milk-yield—29 lb.—but not as much as in previous year. On 1st January, 1925, condition good; milk, 24 lb. On 23rd February condition good; milk, 22 lb.

"*Blossom*," a red Shorthorn six-year-old, arrived 2nd July, 1923, and calved 11th September. On 30th April, 1924, she was dry and grazing in No. 1 paddock. On 31st May she was still in No. 1, and condition was no worse. On 9th June she was put on first break of swedes, with no hay but a good run-off. As she was

not improving on 5th July she was put on molasses and chaff treatment—3 lb. molasses daily, and turnips and hay carted to her. At 31st August she was looking a little better. On 7th September the swedes were finished, but she continued getting a little hay. At 30th September was looking better and springing, the molasses treatment being continued. On 8th October she calved, the calf being strong and healthy, but the cow was affected with mammitis, so was turned out with calf. Treatment finished. From November to 1st January, 1925, cow and calf did well. 23rd February, condition fair, calf doing well.

"*Blot*," a red Shorthorn, which arrived on 2nd July, 1923, slipped her calf. On 8th May, 1924, she returned from Tirau in good condition. On 30th June was springing and in good condition. On 10th July she calved—a bull calf, which was destroyed. Cow getting hay and turnips. On 31st July was giving 2½ gallons milk per day, her condition being good. On 3rd August giving 2½ gallons milk daily, getting hay and turnips, her condition still good. On 7th August finished feeding swedes. On 30th September was losing condition a little; giving 23 lb. milk. 1st November, looking better; giving 30 lb. milk. 1st December, picking up in condition quickly and giving 30 lb. milk. On 1st January, 1925, was in good condition and giving 27 lb. milk. 23rd February, condition good; milk, 23 lb.

FIG. 2. BRINDLE'S 1922 CALF—NOW FIT FOR BEEF.

HISTORY OF THE CALVES BORN AT MAMAKU FARM.

The following notes should be read in connection with and subsequent to the details given in the *Journal* for April, 1924, pp. 231–34.

Dam "Brindle."

This cow's second calf was born on 1st September, 1922—a white-faced Hereford bull (see Fig. 4, p. 233, *Journal*, April, 1924). On 30th May, 1924, he was turned on to turnips and young grass. On 15th June was running on swedes, where he continued up to 7th September, also getting hay. On 30th September he was turned on to the back part of the farm, his condition being good. He continued to remain in good condition until last noticed on 1st January, 1925, when he was fit for the butcher and in first-rate condition (Fig. 2 above).

Third calf, born 4th November, 1923—a brindle bull (see Fig. 5, *ibid.*). On 1st May, 1924, was weaned, and finished the feeding on molasses for a time; grazing on No. 1 paddock off turnips and young grass. At 16th May the two calves—"Darkie's" third calf and this one—which had been on molasses, were quite the best up to the time of weaning. At 30th May his condition was good; still grazing on soft turnips and young grass, and also getting about 2 lb. crushed oats once daily. On 5th June was turned on to the swede tops, but still getting crushed oats. At 30th June still feeding on swedes and getting a little hay; looking well. At 31st July was grazing on swedes and getting a little hay; had lost a little condition during the month. On 31st August was at a standstill, looking rough and not growing; still getting hay and turnips. On 1st September

commenced giving ¼ lb. molasses twice daily. At 15th September no improvement; still getting molasses. At 1st October the molasses were stopped; a slight improvement was now noticeable. Calf continued to graze in No. 2 paddock, recently top-dressed with ½ cwt. sulphate of iron per acre. At 1st December this yearling had improved during the month passed in No. 2 paddock. At 1st January, 1925, he was still grazing in No. 2 paddock, his condition being very good. At 23rd February he was doing well.

Fourth calf, born 4th November, 1924, is shown in Fig. 1, and is doing well.

Dam "Te Kuiti."

Second calf—a Jersey heifer born 6th October, 1922 (see Fig. 4, *ibid.*). The calf was originally of weak constitution. Had various treatment, and was reported to be going back, but owing to delay in receiving instructions was not given proper treatment, and died 3rd May, 1924.

Dam "Daisy."

Calf born 19th November, 1922—a red-and-white bull (see Fig. 4, *ibid.*). In May, 1924, he was in good condition. A strong calf, treated with iron ammonium citrate, home-made, in ¼ lb. molasses twice daily since 22nd April. A little improvement was noted on 30th May, when the treatment was increased by a little crushed oats and local chaff. By 30th June he had quite recovered, and was put on to the swede-paddock. At 31st July was still on swedes, with a little hay; slowly improving. At 31st August a good improvement was noted; still on swedes, with a little hay and a good run-off. By 7th September the swedes were all finished, and his condition was still improving. On 30th September was turned out on back paddock, where there was more feed; condition still good. On 31st October was doing well and in first-rate condition, which was maintained till 1st December. At 1st January, 1925, was at a standstill, or, if anything, going back in condition, although on good feed but not top-dressed pasture. At 7th February was going sick quickly; commenced drenching with iron ammonium citrate, with a little molasses.

Dam "Store Heifer."

Calf "Flora," born 25th August, 1922. At 10th May, 1924, condition of calf was good; still in No. 1 paddock. At 5th June in No. 4 paddock, receiving hay treated with commercial iron ammonium citrate incorporated with stack when building, and getting swedes daily. 30th June, still feeding as at 5th June; condition fair. 31st July, condition good. On 20th September the treated hay was finished, and "Flora" was running on cultivated pasture and springing to calve; condition first rate, which was maintained until 8th December, when a strong calf was born; cow in first-rate condition. 12th December, weight of milk 18 lb. 1st January, 1925, had lost a little condition during the month, but was giving more milk—*i.e.*, 25 lb. 23rd February, condition fair and doing well for a two-year-old; milk, 25 lb. At 28th December the calf was not doing well, scouring badly. On 1st January, bad with white scours. Died subsequently, shortly after New Year.

Dam "Cherry."

A strong healthy calf, born 17th October, 1923. At 30th May, 1924, was still on No. 1 paddock; lost condition through the month—weather rough. Getting 2 lb. crushed oats in a little local chaff once daily. At 5th June was turned out on swede-tops; still getting crushed oats. At 30th June was running on turnips and getting a little hay, but lost condition this month. At 12th July was going off quickly; was put on home-made iron ammonium citrate made from lime-juice, twice daily (2 fl. oz.), in warm water and a little molasses to sweeten it, which it readily took. Treatment was stopped on 31st July and calf put on swede-tops; condition about the same as on 12th July. From 4th to 20th August recommenced giving iron treatment, also molasses, and calf getting swedes and hay. At 21st August turned into swede-paddock, also getting hay and a good run-off. 31st August, a little improvement; still on swedes. 1st November, finished giving iron and molasses; quite a marked improvement in condition. In November was grazing in No. 7 paddock, recently top-dressed with iron oxide, super, and slag. At 1st December was in very good condition and grazing in the top-dressed paddocks. At 1st January, 1925, condition was good; still grazing in the top-dressed paddocks.

Second calf, born October, 1924—a roan bull, strong and healthy. At 31st October was feeding on new milk, and at 30th November on half new and half separator milk.

Dam "Polly."

A red heifer calf with white hind legs, born 20th October, 1923. At 30th May, 1924, was still grazing on No. 1 paddock; condition good; getting 2 lb. crushed oats once daily in chaff. 5th June, turned on to swede-tops, and getting crushed oats as well. 30th June, still on turnips, and getting hay; had lost condition through the month. 12th July, put on to No. 5 paddock; going back slowly in condition, although on good feed. Commenced giving sugar-iron brick and the run of haystack, also carted turnips. 31st July, taking sugar brick well; condition unchanged. 31st August, treatment continued, condition the same. 30th September, slight improvement noticeable; treatment continued.

FIG. 3. TREATED CALVES OF 1923 AT MAMAKU.

Three in front—left to right: Maud's, Daisy's, Mona's. Three at back—left to right: Beauty's, Polly's, Jean's. Note poor growth and condition of Polly's calf, apparently due to excess of sugar-iron brick.

20th October, taken off lick; quantity taken, about 1½ bricks a week. None of the three calves on this brick treatment had done as well as those on molasses or those getting iron ammonium citrate in water twice daily, with a little molasses to make it palatable. 1st November, condition about the same; then running on No. 7 paddock. 1st December, calf growing as well as it should; condition fair; grazing on top-dressed paddock. In January, 1925, calf was, if anything, losing condition, though running on the best of feed. (See note to dam "Daisy.")

Dam "Maud."

Heifer calf, born 28th October, 1923—strong and healthy. At 30th May, 1924, was still grazing on No. 1 paddock; condition good; getting 2 lb. oats in local chaff once daily. 5th June, turned on to swede-tops, still getting oats. 30th June, getting hay; in swede-paddock; lost condition through the month. 12th July, now losing condition all the time; put on to sugar-iron brick in No. 5

paddock, also had the run of haystack and getting turnips, carted. 21st July, no improvement, though taking the lick well and getting plenty of hay and turnips. 31st August, still getting sugar brick; no improvement. 30th September, same treatment, little improvement. 20th October, finished sugar-iron brick; slowly improving in condition, but not grown much; 1½ bricks taken per week. 5th November, a little improvement on this brick, but this animal had not grown like some of the others; now running on No. 7 paddock (top-dressed with super, slag, and iron oxide). 1st December, improving very slowly, but not growing much. January, 1925, like its mate, losing condition if anything. None of the three calves treated with sugar-iron brick is equal to the others. (See note to dam "Daisy.")

Dam "Daisy."

Third calf—a roan heifer with light strip in centre of back—born 5th January, 1924. At 20th May was still in No. 1 paddock; condition good; getting 2 lb. crushed oats once daily in chaff. 4th June, was turned on to swede-tops, where she remained up to 30th June, getting a few handfuls of crushed oats, but losing condition. 12th July, put into No. 5 paddock, having run of haystack; getting sugar-iron brick and carted turnips. 31st July, holding her own if anything, but little improvement; taking brick well. 31st August, under same treatment as on 12th July. Condition the same at 30th September. 30th October, finished lick; took 1½ bricks a week. Calf just about held its own through the winter. 25th November, condition about the same. The three calves under this treatment had not done so well as the others. In December this calf was in good condition, but, like its mates, had not grown like the other calves under different treatment. 1st January, 1925, now doing fairly well; grazing on top-dressed pasture. (NOTE.—The three calves of "Polly," "Maud," and "Daisy," which had the sugar-iron brick in winter, went on to it again on 20th January, 1925, and at 23rd February were still on this treatment, but getting a controlled quantity—not *ad lib.* as previously.)

Dam "Darkie."

Third calf—a brindle bull—born 16th November, 1923. On 16th May, 1924, was grazing on soft turnips. 30th May, still on turnips, getting 2 lb. crushed oats in local chaff once daily. On 1st June was turned on to swede-tops; getting handful of crushed oats daily. On 30th June was still on the turnip-tops, with a little crushed oats; in good condition. 31st July, feeding on hay and turnips all through this month; now put on to new break of swedes, also getting hay. 31st August, on turnips all through this month, and getting a little hay, but with a good run-off; condition good. 3rd September, condition good; grazing on pasture grown on cultivated land. 31st October to 1st January, 1925, condition good and similar throughout. 23rd February, doing well.

Dam "Spot."

Red-and-white bull calf, born 3rd July, 1923 (see Fig. 6, p. 235, *Journal*, April, 1924). On 1st April, 1924, was doing well, but on 30th May condition was not so good; on turnips and young grass, and getting 2 lb. crushed oats in chaff once daily. 1st June, put on swede-tops; also getting a few handfuls of crushed oats. Calf had not grown much since weaning. At 30th June was still on turnips and getting a little hay. At 5th July was going back quickly. Put on treated hay in No. 4 paddock; this stack (2 tons) had 5 lb. of commercial iron ammonium citrate scales mixed with a little molasses and sprayed on to hay when built. On 12th July calf was holding its own. At 31st July was still on the treated hay and getting turnips, and its condition was improving. At 31st August, with the same treatment, it was looking better. At 20th September, the treated hay being finished, it was put on to top-dressed pasture; condition fair. At 1st November was not putting on condition, but looked healthy; was then placed on No. 7 paddock, top-dressed with iron oxide, super, and slag. At 1st December was losing condition and showing signs of sickness. On 10th December commenced giving ½ lb. molasses in a little oats; calf took it well; grazing on No. 2 paddock, which was top-dressed with iron sulphate (½ cwt. per acre) on 8th August, 1924. 1st January, 1925, condition maintained, no worse; treatment continued. 1st February, as no improvement had occurred, drenching with iron ammonium citrate with molasses was tried. This is a poor-constitutioned calf.

Dam "Mona."

Red-and-white heifer calf, born 5th August, 1923 (see Fig. 6, p. 235, *ibid.*). At 1st April, 1924, was doing well. At 30th April condition was not so good; weather rough; in No. 1 paddock. On 30th May condition was about the same; getting 2 lb. crushed oats in chaff daily, with soft turnips and young grass. On 1st June was put on swede-tops and given a few handfuls of crushed oats daily, but at 30th June had not grown much since weaning, being still under the same treatment; condition being about the same. On 12th July was given molasses in warm water twice daily. Calf had stopped growing and was going back quickly. 31st July, treatment continued; put on turnip-tops in new break; condition about the same. At 21st August the molasses treatment was stopped, and on 31st August condition was about the same. At 7th September the swedes were finished and the molasses treatment was recommenced. At 30th September was improving in condition. At 1st November molasses treatment was discontinued; condition was fair; was turned into No. 7 paddock (slag, super, and iron oxide). At 1st December was in very good condition and grazing on the top-dressed paddocks, and at 1st January, 1925, all the conditions were similar and the animal in good condition. 23rd February, doing well.

FIG. 4. ANOTHER LOT OF TREATED CALVES.

Left to right: Spot's (1923), Molly and calf (1924), Brindle's (1923), Fanny's (1923).

[*All photos by B. C. Aston.*

Dam "Fanny."

White bull, born 10th August, 1923. At 30th April, 1924, was grazing on No. 1 paddock, where he continued until 20th May; in good condition, getting crushed oats and chaff once daily. On 1st June was grazing on swede-tops with a few handfuls of crushed oats and chaff once daily, which was continued until 30th June, when he was losing condition, not having grown much since weaning. At 12th July was going back quickly and was put on to home-made iron ammonium citrate made from commercial lime-juice, given 2 fl. oz. twice a day in a little warm water, with ¼ lb. molasses in it to make him take it. At 30th July, the medicinal treatment being continued, he was put on swede-tops in new break; condition still poor. At 31st August was looking better, being still on the swedes. On 7th September, the swedes being finished, he was put on to the treatment started on 12th July, and on 30th September a great improvement was noticed. The medicinal treatment was continued until 1st November, when, being in first-rate condition, the treatment was discontinued and calf placed in No. 2 paddock (top-dressed with iron sulphate). His condition up till 1st January, 1925, was first rate, and he was continued grazing in No. 2 paddock. 23rd February, doing well.

Dam "Jean."

Red-and-white bull calf, born 10th August, 1923 (see Fig. 6, p. 235, *ibid.*). On 3rd April, 1924, was on No. 1 paddock, with soft turnips, and getting a little crushed oats in chaff; weather very rough. On 1st June was put on to swede-tops, with a little crushed oats; continued there till 30th June on this treatment, and was then losing condition, not having grown much since weaning. On 12th July was going off quickly, so was given 1 lb. molasses twice daily in a little warm water, a treatment which was continued until 21st August, when he was turned into the swede-paddock, with a little hay. On 7th September the swedes were finished and the molasses treatment was recommenced. At 30th September a good improvement was noticeable. On 1st November molasses treatment was discontinued; was put in No. 7 paddock (super, slag, and iron oxide). At 1st December was in first-rate condition and grazing on the top-dressed paddocks. Same at 1st January, 1925, his condition being then first rate. 23rd February, doing well.

Dam "Beauty."

Red heifer calf "Rose," born 20th August, 1923. At 30th April, 1924, showing signs of sickness. 10th May, commenced giving 2 oz. iron ammonium citrate in milk with ¼ lb. molasses twice daily; grazing on No. 1 paddock, soft turnips and young grass. 30th May, condition about the same; giving little crushed oats daily in chaff; very rough weather; feeding as on 10th May; calf improving. At 20th May continuing to improve, though low in condition. On 31st July was still improving and was put on swede-tops, the medicinal treatment being continued. On 20th August the medicinal treatment was stopped, and on 31st calf was looking better, being on swedes and a little hay. On 7th September, the swedes being finished, the treatment was recommenced, and on 30th September calf was looking well. At 1st November the treatment was discontinued, and calf was grazing in No. 7 paddock. She continued in good condition to 1st January, 1925, grazing on top-dressed paddocks. On 23rd February she was doing well.

Dam "Maggie."

Second calf, born 30th September, 1924, strong and healthy. At 1st November was getting new milk. Doing well in December, getting half new and half skimmed milk. At 1st January, 1925, was still doing well on quarter new and three-quarters separated milk, and 3 oz. of fluid molasses twice daily.

CURATIVE TOP-DRESSING OF PASTURE.

For the cure of iron-hunger the writer advises the top-dressing of pasture with ½ cwt. per acre of sulphate of iron (ferrous sulphate). This is a small dressing, and it is not advisable to increase it or to mix it with soluble phosphates before applying it to the soil; but it is permissible to mix it with any ground phosphate which is insoluble in water, such as Nauru ground rock, bonedust, or basic slag. The difficulty of applying such a small dressing as ½ cwt. is then got over. It is also permissible to spray closely cropped or mown pasture with the iron sulphate dissolved in water; 3½ lb. dissolved in 4 gallons of water will be enough for $\frac{1}{16}$ acre of land. Messrs. Wright, Stephenson, and Co. (Auckland), Messrs. Kempthorne, Prosser, and Co., and others stock this compound. The first-named firm has a fairly large quantity for sale at 13s. per cwt., finely ground.

The work of the farm has continued under the immediate control of Mr. Jackson, to whose capable and energetic direction much of the success attending the experiments is due. He has been well supported by Mr. MacMillan, his assistant. Mr. J. Lyons, M.R.C.V.S., District Superintendent at Auckland, exercised supervision over the operations and the farm as a whole.

THE RAISING OF FERRETS FOR RABBIT-CONTROL.

D. MUNRO, Inspector of Stock, Wanganui.

INQUIRIES have been received lately from farmers concerning the raising of ferrets or stoats, with a view to maintaining a steady supply of the "natural enemy" of the rabbit. The animal of this class which is usually bred for rabbit-control in New Zealand is the ferret, and the following notes deal specially with it. Very little breeding of stoats or weasels in captivity appears to have been carried out in this country, but, generally speaking, principles of breeding, feeding, and handling are the same for these animals as for ferrets. The latter are found to be more easily domesticated than stoats or weasels.

The number of litters produced annually by the female ferret will vary from one to two, but the majority of does will have one litter only. Does giving birth to their first litter, say, in September or October will frequently have a second litter in February or March. The period of gestation is from forty to forty-two days, and the average litter seven.

When pregnant the does must be separated, and each kept in a box or pen by itself. At this time the doe becomes very savage, and if left in the pen with others there is bound to be trouble, and generally the litter when born meets with a sudden and tragic end. For at least ten days after birth the young should not be examined or handled. If the nest is opened or interfered with in the first three or four days after birth of the young the mother will very frequently destroy them.

While suckling her young the doe should be given a plentiful diet of new milk and oatmeal porridge, say, twice daily, which may be supplemented occasionally with meat (rabbit). When about three weeks old the young will commence to feed on porridge and milk. Meat diet should not be given until they are eight or ten weeks old. The meat should be either rabbit or hare; mutton should not be fed to the young animals.

Ferrets are very susceptible to a form of distemper, which generally proves fatal. As a preventive measure it is always advisable to have the pens or boxes separated in groups at a distance of, say, 100 yards, so that should distemper break out in one colony it may be isolated there. The attendant looking after animals suffering from distemper should not go near the other colonies.

A simple but useful breeding-pen can be made from an ordinary strong packing-case, of dimensions about 2 ft. 6 in. high, 3 ft. wide, and 4 ft. or 5 ft. long, with the lid on top covered with malthoid or other waterproof substance. One end of the box—say, 18 in.—should be partitioned off as sleeping-quarters and filled with soft straw or hay, the remainder of the box being the feeding-place. The latter part should be freely perforated with ¾ in. auger-holes to allow free drainage of any liquids. Plenty of ventilation is essential in this apartment, and may be provided by cutting out a section in the end or sides of the box, over which a piece of perforated zinc is tacked securely. A hole, 6 in. by 6 in., should be cut in the partition near the floor to give access

to the sleeping and feeding apartments. A box of this description will give as good results as the most elaborately built house. Further, in the event of an outbreak of distemper the box with all its contents can be burnt, which one would hesitate to do with a more expensive structure.

Non-poisonous dip should be used freely in washing down the breeding-pens, and a good sprinkling of sawdust on the floor of the boxes will make cleansing operations more easy. This should be done daily. The boxes should be raised about 1 ft. from the ground to allow a free current of air to pass under. This may be done by nailing battens on to the four corners to serve as legs, and in this way the boxes may the more readily be moved on to clean ground as the old spot is fouled.

The first symptoms of distemper are loss of appetite and watering of the eyes, with mucous discharge from nostrils, similar to a cat or dog suffering from this complaint. The more virulent form is frequently followed by a partial paralysis of the hind quarters, and in cases where paralysis or fits are developed it is advisable to destroy the animal and burn the box and bedding.

Unless the boxes are kept thoroughly clean the ferrets will readily become affected with foot-rot. Animals so affected should be treated by rubbing in a mixture of sulphur, lard, and Stockholm tar. A thin paste of sulphur and lard should be made, after which add one part Stockholm tar to ten of the paste, mix thoroughly, and apply to the affected part with the fingers. Give two or three applications, one each second day, then wash the foot with warm water and soap, when the trouble will generally disappear.

When the young ferrets are matured they may be grouped into pens of twenty and thirty, and if possible before being liberated should be fed for two or three weeks on whole rabbits with the skin intact. Young ferrets artificially raised on porridge and milk, if liberated without such training, will frequently die of starvation. The best results will be obtained by carrying them over the winter and liberating them in the spring when there are plenty of young rabbits about.

The most important matter in the care of ferrets or stoats is cleanliness; if they are kept thoroughly clean little or no trouble should be experienced.

When handled these animals should be picked up by the tail, placed across the knee, and caught round the shoulders, one finger in front and one behind the shoulder. They should not be grasped tightly round the abdomen. If they are vicious a leather glove may be used.

FRUIT-EXPORT CONTROL BOARD.

FOLLOWING the recent polls, the following have been appointed as producers' representatives on the New Zealand Fruit-export Control Board: H. S. Izard (Auckland and Taranaki), A. M. Robertson (Hawke's Bay and Wellington), T. C. Brash and H. E. Stephens (Nelson and Marlborough). Messrs. E. H. Williams and C. Gray have been appointed Government representatives on the Board. Otago was excluded from control on petition of not less than 70 per cent. of eligible exporters, and thus has no representative on the Board.

"PREPARED" CHEESE AND THE BRITISH MARKET.

A REMARKABLE DEVELOPMENT.

G. D. MACFARLANE, New Zealand Produce Association (Ltd.), London.*

AN interesting development in the cheese industry has taken place during the last year or two. Hitherto there has been no serious competitor with the cheddar type as made in Britain, Canada, and New Zealand. This dominates the market, and will continue to do so for some time. The latest development in cheese, however, is rather disconcerting, and the enormous increase in the sale of the type in question is so remarkable that I had samples forwarded to New Zealand recently for the inspection of the Dairy Division and others interested.

This cheese is what may be termed a prepared cheese, and is made from ordinary cheddar of good quality. The latter is ground down and treated so as to reduce it to a pulpy form. It is then moulded by machinery into 5 lb. blocks in the same way as we mould pounds of butter, tinfoiled all round in order to retain the moisture, and packed in oblong boxes. A ½ lb. indicator paper is placed on top for the guidance of the seller in cutting. The boxes are packed in parcels of five, bound at both ends with wire. There is no rind on this cheese, and none develops. The lots I received must have been five or six months old; the cheese was quite moist, and no undue ripeness had developed.

It can readily be understood that a rindless cheese of good flavour, that can be spread on bread almost like butter, is attractively put up, and assures the retailer a fair profit, without any waste or shrinkage, is bound to have a fair sale. This type of cheese suits the small shopkeeper to perfection. His complaint has always been that the large cheddars dry up so rapidly, especially when his sales are slow, as is usually the case with the smaller men, resulting in virtually no profit, if not a loss. Whereas, this new type of prepared cheese being a proprietary article, its price is fixed by the manufacturer to the wholesaler, whose profit is fixed, and the retailer in his turn has to sell at a fixed price showing him a profit of around 16 per cent.

As recently as some eighteen months ago many of the larger wholesalers in Britain did not stock this cheese, looking upon the demand as a passing phase. Their customers, however, insisted on getting the article. As an illustration of what has happened it may be mentioned that the Scottish Co-operative Wholesale's grocery manager was strongly opposed to stocking this cheese, as he considered it would have a short life. Later the demand became insistent, and he ordered 250 packages. These sold freely, and the demand increased so rapidly that when I left Scotland they alone were selling around 8 tons per week. In a recent letter this gentleman, knowing my interest in the matter, refers incidentally to the prepared cheese as follows: "Trade in this cheese is increasing very rapidly, and at the moment the manufacturers have not been able to overtake orders. They are sending fairly large quantities to the Continent, and another large factory is being erected by them."

* Mr. Macfarlane (Woodville) is now on a visit to New Zealand.

The *New York Produce Review and American Creamery* of 29th October last makes the following reference to this class of cheese :—

There is no question that loaf cheese has played havoc with the retail demand for so-called bulk cheese in the United States. However, more and more manufacturers are getting into that end of the business, most of them well capitalized and representing large interests. Competition in loaves has grown keener and keener, and undoubtedly under the forces of this competition the margin of profit has been reduced. Our personal opinion is that the only opportunity now for profitable development of such a line lies either in starting on a very limited experimental scale and building as returns permit, or entering the business with large capital after having procured the rights to a process which not only gives a popular produce, but which does not infringe any of the patents under which loaves are now being made. Patent rights on the processes under which the Kraft and Phœnix interests manufacture are held by these concerns, and they do not recognize the right of a number of others to use the "cooked cheese" methods that are now being used. At least one suit charging infringement is pending in the Courts to-day. The cooked loaf has the advantage of better keeping-qualities than most of the so-called "natural" loaves that have been brought out, though the latter are in some cases being very successfully marketed, either ground or unground. But to market loaves on a large scale, either cooked or uncooked, the investment necessary is large and the profits modest.

This class of cheese is being retailed at 50 per cent. over New Zealand or Canadian cheddar prices. That being so, it will readily be seen that it is a highly remunerative proposition for the manufacturer. Ordinary selected Canadian cheddars are bought at market price, and at certain periods New Zealand cheese has also been shipped to America for these people.

The question arises, Can the New Zealand dairy industry afford to ignore this new development? In my view it cannot.

INVENTIONS OF AGRICULTURAL INTEREST.

APPLICATIONS for patents, published with abridged specifications in the *New Zealand Patent Office Journal* from 31st December, 1924, to 26th February, 1925, include the following of agricultural interest :—

No. 51606 : Milking-machine automatic cut-off ; S. M. Potter, Mercury Bay. No. 52311 : Fence-dropper ; A. F. Johns, Rangiora. No. 53073 : Wine preserving and maturing ; A. Newmark, Fairfield, Victoria. No. 51582 : Sheep-drenching instrument ; R. O. Montgomerie, Makirikiri. No. 51631 : Cream-separtor driving-gear ; C. F. Shaw, Hokianga. No. 52948 : Rake attachment ; W. M. Stewart, Masterton. No. 53223 : Sheep-shearing tool ; Chicago Flexible Shaft Co., Chicago, U.S.A. No. 51385 : Disk plough and sledge ; R. Denham, Awatere. No. 52497 : Teat-cup inflation ; T. M. Timpany, Woodlands. No. 53314 : Preserving-jar ; A. Gunn, Sydney, N.S.W. No. 51587 : Milking-machine ; S. H. Knapp, Greytown. No. 53210 : Chicken-brooder ; H. A. Dawber, Ouruhia. No. 53304 : Milking-machine ; L. A. Sheehan, Ashgrove, Queensland. No. 53341 : Sheep-dipping apparatus ; A. C. Stewart, Arrievean, Scotland.

Copy of full specifications and drawings in respect of any of the above may be obtained from the Registrar of Patents, Wellington. Price, 1s.

Proposed Registration of Sheep-dips.—This question was referred to the Board of Agriculture by the Department for its recommendation. At its February meeting the Board came to the decision that registration was warranted in order to prevent worthless mixtures being placed upon the market, and recommended that legislation be framed on somewhat similar lines to the Fertilizers Act.

FIELD EXPERIMENTAL WORK IN THE KING-COUNTRY.

OPERATIONS AT ARIA.

J. E. F. JENKS, N.D.A., Assistant Instructor in Agriculture, Auckland.

KING-COUNTRY lands can be divided roughly into two classes—bush and fern—together with a limited amount of swamp. The bush country comprises the higher and steeper ridges and slopes; the fern country is found chiefly on the lower and more accessible ridges and undulations, and it is with this class of land that the work at Aria has been occupied. It is characteristic of fern country that all the larger forms of forest growth are absent, the principal vegetation being bracken-fern, fair-sized manuka, and tutu. The soil is for the most part a loose sandy loam, somewhat deficient in humus, with a subsoil of a stiffer nature: papa frequently occurs some feet below the surface. Evidence goes to show that this land was once forest-clad, and that successive fires during the course of many years have resulted not only in the destruction of the forest and all traces of it (save for occasional stumps), but in a marked physical change in the soil. The bracken-fern and manuka stage is without doubt an intermediate one, destined by nature to last until the supply of humus is restored sufficiently to enable the forest-trees to re-establish themselves.

Pioneering settlers have in the past somewhat neglected this class of land in favour of the bush fellings. Its light open soil seldom "holds" good permanent pasture without consistent manuring; in the absence of the latter the grasses and clovers soon give way to rib-grass, cudweed, hawkweed, and bracken-fern. Now, however, that the steeper bush country is becoming each year more difficult to control (as regards second growth, &c.), the prime importance of ploughable land, on which crops may be grown and hay cut for winter feed, has become obvious. Again, the expansion of dairying has accentuated the position, since the milking-cow, while unsuitable for crushing fern on the steeper slopes and wintering on rough feed, will yield a return per acre large enough to cover considerable expenditure on manure and cultivation. In the past the customary method of managing open fern-land has been to crop it with turnips or rape for one or two years after the first breaking, and then to sow it down with a thin seeding of rye-grass, cooksfoot, and clovers. No more would be done till, in the course of a few years, the pasture became exhausted and overgrown with fern, when the cropping and grassing would be repeated.

The object of the Aria experiments is to demonstrate not merely the suitability of this land for farming purposes (which is indisputable), but the various ways in which it can be cropped so as to improve the farm-economy of the district, and the possibility of establishing and maintaining on it, by means of suitable manuring and management, a good permanent turf. The centre of the experimental work is a block of approximately 15 acres loaned to the Department by Mr. John O'Sullivan. This block lies just south of the Township of Aria, and consists for the most part of a section across a low, steep-sided spur,

though there is also a strip of water-logged flat which has not yet been improved. When, at the request of the local settlers' association, work was first started in 1921 the ridge was in poor grass (sown in 1905 after one crop of turnips), and largely overgrown with bracken-fern except at the higher points where stock had made a practice of camping. It was typical of deteriorated fern-country pastures. In the summer of that year some 5½ acres (Fields L, M, and part of F—see sketch-map*) were broken up and cropped with turnips, but owing to the financial stringency prevailing at that time experiments were temporarily abandoned and the land was sown to temporary pasture in the autumn.

SUMMER FEED.

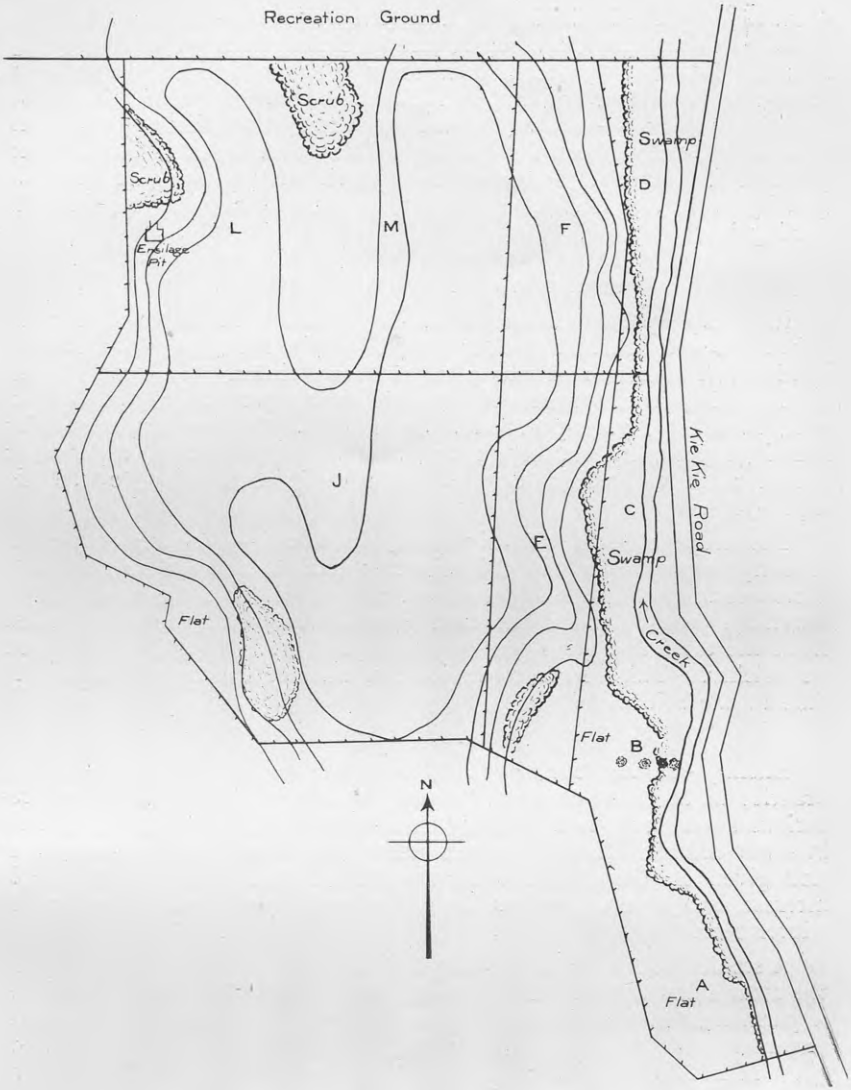
Work was recommenced in October, 1923, some 3½ acres of the temporary pasture and ½ acre of sidling (Field F) being broken up for summer feed. Japanese millet sown at the end of November was a distinct success, a good growth of succulent feed being obtained throughout the dry weather of January and February, despite the comparative poverty of the land and the light manuring—2 cwt. super and 1 cwt. ground limestone per acre. Red clover sown with the crop did not strike well. Red Paragon turnips sown at the same time, with the same manure, made good young plants, but did not develop well owing to lack of rain; neither did the red clover sown with them. The importance of early and thorough cultivation (including rolling) was demonstrated by the even stand obtained with both millet and turnips under distinctly dry conditions. Turnips and clover sown broadcast on the sidling where the latter was too steep to roll or drill were practically a failure.

WINTER FEED.

The remaining 2½ acres of temporary pasture (Field L) were top-dressed in October, 1923, with super and lime, with indifferent results. The land was ploughed in the following February (1924), and sown in late March in various fodder crops in ½-acre plots as follows, the quantities given being per acre: (1.) Italian rye-grass, 20 lb.; crimson clover, 10 lb. (2.) Algerian oats, 2½ bushels; Scotch tares, 1 bushel. (3.) Algerian oats, 3 bushels. (4.) Rye-corn (Emerald), 2 bushels. (5.) Barley (Black skinless), 2 bushels. Manure—3 cwt. basic super per acre—was applied in each case.

These crops were intended for grazing in August and September—a very difficult period for both dairymen and sheep-farmers—but owing to the mild autumn they had to be grazed back in June. This grazing was a little overdone, with the result that they were not fit to feed again till mid-September. However, some valuable information was afforded in regard to these crops, which are of considerable value to farmers who are not yet in a position to grow mangolds or save any quantity of hay. The Italian rye-grass and crimson clover made comparatively little autumn growth, but came away well in the spring, and yielded in December a crop equivalent to 2 tons of hay. The Algerian oats threw a good deal of autumn feed, but were backward in the spring and did not make much subsequent growth. They were attacked in patches by rust in the autumn. Oats do not

* The writer is indebted to Mr. E. Tolme, Aria, for assistance in preparing this map.



SKETCH-MAP OF THE EXPERIMENTAL BLOCK AT ARIA.

appear to be an ideal fodder crop for winter use on such light land. For the best results they should be sown in April and allowed to stand till September. The tares were not a pronounced success, being better suited to land of a heavier nature. The Emerald rye-corn did well, germinating quickly, and stooling out with its usual vigour. Contrary to a common belief, the stock relished the feed and grazed the plot closely; it was the first to come away again after stocking. This crop is to be recommended for winter grazing on light land, though, like barley, it is useless for fodder purposes once it has shot into ear. The Black barley grew at a phenomenal rate during the autumn, being

12 in. high by the beginning of June (ten weeks from sowing). It was therefore too rank when stocked, and in consequence was not properly grazed. Like the rye-corn, it appears to have decided merits as a catch-crop for winter use, but as it does not stool out well it should be sown fairly thickly—say, at 3 bushels per acre. Both these crops should be sown in early March for grazing in May and again in August and September. If sown at the end of April they could give valuable feed by early August, but in either case should be ploughed in after grazing in the spring.

SPRING-SOWN CROPS FOR ENSILAGE.

In order to provide fodder for ensilage-making, Field M was devoted this season to further fodder crops. This field grew millet and turnips last season, and was ploughed last winter. On 27th August the following crops were sown, the rates being per acre: (1.) Algerian oats, 2 bushels; grass-pea, 80 lb. (½ acre). (2.) Algerian oats, 2 bushels; Partridge peas, 1½ bushels (1 acre). (3.) Algerian oats, 2 bushels; Scotch tares, 1¼ bushels (1 acre). Manure in each case, 3 cwt. basic super per acre.

The crops suffered severely from bird-attack—a serious objection to early spring sowing in this district; but the oats developed into a crop estimated at about 8 tons per acre green. Of the legumes, the Partridge peas did best, but their growth was by no means vigorous. Both the tares and grass-peas were comparative failures, being stunted and sickly. This seems to indicate a distinct shortage of available lime in the soil.

ENSILAGE-MAKING.

Ensilage-making could with advantage be made a regular farm practice in the King-country, partially as a substitute for the now precarious swede crop, and partially as a solution of haymaking difficulties in a wet climate. Little has been attempted so far, but the demonstration given on the experimental area this season evoked considerable interest, and several settlers are adopting this method of conserving winter feed.

A small "hillside" pit was dug in Field L, this method being deemed the most suitable for local conditions, since few settlers can afford either a permanent silo or stacking apparatus. A pit approximately 12 ft. square by 8 ft. deep was constructed by contract labour at a cost of £7. It is estimated that a pit of this size should hold from 30 to 35 tons of settled silage. The material for ensilage-making consisted of the various crops from Fields L and M, mainly oats and Italian rye-grass, with a foundation of suckling-clover. The filling was done on 12th and 13th December, about 16 tons being put in on the first and 20 tons on the second day. The temperature before weighting with earth on the 15th had reached 125° F. The work was performed voluntarily by local settlers interested in the question of ensilage.

GRASSING.

Field F consists of a slope of loose friable soil, faces east, and is about 1 acre in extent. It was originally ploughed and grassed with the rest of the land, but reverted badly to bracken-fern. As has been stated, the top part was ploughed in 1921 and the whole in 1923; some of

the red clover sown in the latter year still persists. This piece is typical of much land in the district—just ploughable, but too steep for either the drill or the mower. In July and August, 1923, the land was worked up with disks and harrows. On 31st August 3 cwt. basic super was sown, applied by hand, and on 1st September various grass-mixtures were sown, the ground being then tine-harrowed. Three plots have been set out as follows:—

(1.) Italian rye-grass, 9 lb.; Hawke's Bay rye-grass, 9 lb.; paspalum, 6 lb.; red-top, 3 lb.; Chewing's fescue, 3 lb.; Poa pratensis, 1½ lb.; cow-grass, 3 lb.; Lotus major, ½ lb.; wild white clover (imported Kentish), ¼ lb.; subterranean clover, ½ lb.: total, 35¾ lb. per acre.

(2.) Cow-grass, 3 lb.; Lotus major, 1½ lb.; subterranean clover, 1½ lb.: total, 6 lb. per acre.

(3.) Italian rye-grass, 6 lb.; Hawke's Bay rye-grass, 6 lb.; cocksfoot, 6 lb.; crested dogstail, 3 lb.; brown-top, 3 lb.; cow-grass, 3 lb.; Lotus major, ½ lb.; wild white clover (imported Cotswold), ¼ lb.; Danthonia pilosa, 6 lb.; Danthonia semi-annularis, 3 lb.: total, 39¾ lb. per acre.

Plot 2 was partially planted with kikuyu-grass (from the Albany Experimental Area) on 23rd October. A good take of practically all the species has been obtained, and these plots should furnish a rough guide as to the comparative value of the various grasses and clovers under such conditions.

TOP-DRESSING OF PASTURE.

Four series of plots have been laid out with a view to demonstrating the value of phosphatic manures and lime on permanent pasture. Two of these series are on undulating fern country, in one case on very poor light land, and in both cases on decidedly deteriorated pasture; the third is on a river-flat carrying a comparatively good turf; and the fourth is on Field E, a steepish slope where the bracken-fern is fast overshadowing the weakening grasses and clovers of the original sowing. The manure was applied at the end of July. In every case the value of the phosphates has been fully demonstrated in the improved colour and vigour of the turf, the increased clover content, and the decided preference shown by live-stock for the manured plots. At the time of writing (January) there is little to choose between super and super plus lime: basic slag has given gratifying results, but has not yet proved so potent an agent as super. Further observations will be made later.

GENERAL.

There is ample scope for experimental work in the King-country, and farmers are keenly alive to the necessity for improved methods. A new local committee has been formed, and the more energetic settlers have readily come forward to assist with the erection of fences and other work. A considerable amount of pasture top-dressing is now carried out in the district, and on this point, as well as others, the advice of the Fields Division officers and the evidence of the plots are frequently sought. It is always difficult to conduct careful experiments on a co-operative basis, however helpful (as in this case) the co-operating farmers may be, but in the meantime the Aria experimental area is serving both as an object-lesson and an encouragement to a district that needs and appreciates both.

SEASONAL NOTES.

THE FARM.

CULTURAL AND CROPPING OPERATIONS.

In Canterbury and other South Island districts with similar conditions the teams from now on should be working at high pressure preparing land for wheat and oats. There is no advantage in sowing wheat too early—May and June being the best months—as autumn flights of Hessian fly are liable to injure the young plants. The earlier sowings of wheat should be light—say, 1¼ bushels per acre—as the land is usually in good condition and the stooling of plants greater. Further sowings of oats can be made in the coming month. Cape barley is not as serviceable as Algerian oats for winter feed for sheep. Black Skinless barley is best suited to early spring sowing, owing to its very rapid growth. In the North Island, as a general rule, wheat gives the best results when spring sown, but oats may be sown any time now. Algerians usually give the best results; for autumn sowing 2½ bushels per acre is ample.

In preparing a seed-bed for autumn-sown cereals it is advisable to work the land fine underneath but leave it somewhat lumpy on the surface; this condition affords a certain amount of shelter for the young plants and prevents the soil from running together. In ploughing lea land a good deep furrow should be turned. Too often the ploughing is of the same depth each season; it is advisable to vary it each year so as to avoid the forming of a pan.

Any stubble or other vacant land should be ploughed at once and either sown in a green crop or left to fallow. Very stiff wet land is greatly benefited by a winter fallow; but the lighter North Island lands are apt to leach badly if left fallow, and for this reason they are usually better sown in a green crop. Suitable forages for this purpose were mentioned in last month's notes.

Advantage of the winter months should be taken for cleaning yarrow-infested lands. If ploughed now sheep can very profitably be grazed on the ploughed land, as they thrive on the yarrow-roots.

CROPS AND FEEDING.

Cocksfoot-paddocks from which seed has been taken should not be stocked till July, as the April growth of leafage assists next season's production. Late-sown rape-paddocks having been once fed, especially if sown with grass-seed, may be closed for early spring feed for ewes and lambs. Rape land should be ploughed now if required for winter-sown cereals. If dry-rot has made its appearance in the swede crop, and shows signs of spreading, the roots should be fed off without delay. Crops like maize and millet should be cleaned up as far as possible during April, as they are easily damaged by frosts. In most dairying districts the cows will be dried off during May, and every opportunity should be taken by generous feeding to get them in as good condition as possible before they go out.

LIMING.

The coming month is a suitable time for liming operations, it being a great advantage to get the carting done before the land is too wet. Lime is best applied to the ploughed surface, as it quickly works down. The question as to which form of lime to use is one for each farmer to determine for himself. In many districts carbonate of lime (raw crushed limestone) is satisfactory, but if very quick results are desired the burnt form should be used. Again, if the lime has to be carted long distances there is a saving in haulage in the case of burnt compared with the carbonate, as about 12 cwt. of the former is equivalent to 1 ton of the latter. Against this advantage the greater cost of burnt lime must be taken into consideration, this being on average some 70 per cent. more than for the carbonate. The unpleasantness of distributing burnt lime is also a factor in the pros and cons.

Except where the land is of a very sour nature the best results are usually obtained by light and frequent dressings, as against heavy dressings at long intervals—say, 6 cwt. to 10 cwt. of carbonate or half this quantity of burnt. Considerable benefit may be derived from even half these quantities. It should be remembered that liming cannot be fully efficacious unless the land is properly drained.

LUCERNE.

After the last cut of the season has been taken the stand should be closed for winter, and not trampled by stock as is frequently the case. The autumn cultivation is best done with at least two strokes of the rigid-tined cultivator to a depth of 5 in. to 6 in., and the land left in a rough state to be mellowed by the effects of frost. Early cultivation will allow the stand to make a few inches of protective growth before severe weather sets in. Lucerne will benefit by autumn applications of lime or manure at the time of grubbing the stand; 10 cwt. per acre of ground burnt lime or 2 cwt. per acre of super are suitable dressings.

Land in which it is intended to sow lucerne next season should be ploughed during the autumn, limed, and thoroughly cultivated through the winter. These cultivations germinate and destroy weed-seeds, especially when continued in the spring. They also promote the firm, sweet seed-bed so necessary in the establishment of lucerne.

GROWING LUPINS FOR SEED.

The growing of blue lupins for seed is on the increase in the Marlborough and Nelson Districts. Sowing may be carried out with advantage during April, the optimum rate being about 1½ bushels or 90 lb. per acre. A mixture of 5 cwt. lime with 1 cwt. super, or ½ cwt. super mixed with ½ cwt. rock phosphate, constitutes a satisfactory fertilizer. The crop is best cut with the binder, as the small sheaves may then be stooked in round stooks with a fork. If the pods then split, as they frequently do, the seeds fall into the centre of the stook, and are less easily lost than when the crop is cut with the ordinary mower. For this reason it is a wise precaution to leave a strip of about 5 yards undrilled all round the headlands, thus obviating the necessity of opening out with the binder.

MISCELLANEOUS.

Stacks of late-harvested cereals should now be securely thatched and made snug for winter if not intended for early threshing or chaffing. It is also wise to plough a few furrows round the hay or sheaf stacks as a precaution against fire spreading to them by a carelessly dropped match.

New season's chaff, if it has not been properly matured by a few weeks in the stack, is very prone to heat, and if it has to be bagged should be left as loose as possible. The effect of immature chaff will usually be noticed in the team by swellings on the legs, especially if it is fed suddenly. The better plan is to mix it with old chaff and gradually accustom the animals to it, until the material in the stack is properly sweated and matured.

The outlets of all drains should now have attention, so that water may get away rapidly during the winter months. Plans for winter and spring drainage should also be put in hand; the work may be then done when opportunity offers.

—*Fields Division.*

MATING THE EWE FLOCK.

When all the rams are turned into the same paddock with the ewes it is often noticed that they spend a great deal of their time and energy in fighting each other for possession of the first ewes to come in season. The effect of this fighting is reflected later on during the period of mating. The following plan will be found decidedly advantageous on the smaller sheep-farms, though it cannot be adopted in every case, particularly on large stations: First separate the ewes into small lots of about fifty to sixty in each paddock, put a ram in with each lot, and leave them for a fortnight. Then mix every two lots, leaving them together for ten days. Next mix them all, and let them run together until the rams are taken out at the end of the season. The idea is that each ram is first of all put with a separate lot of ewes; therefore he is undisturbed and can pay strict attention to business for a full fortnight. By the time the mixing of every two lots takes place each ram has steadied down a good deal, and fighting will not take place nearly so readily as would have been the case had all been put in together in the first place. When the mixing takes place each ram will pick up the ewes that the other one has missed, and after the mixing of the whole lot there is every chance of each ewe having been served before the rams are finally taken out.

Another method is to hold a small number of rams in reserve until half-way through the mating-period, and then turn them in with the others. Being quite fresh, they will sort out the ewes not yet served. Either method leads to an increased lambing, but the first-mentioned plan is recommended where practicable. It has been tried and has always given good results.

—*J. G. Cook, Live-stock Division.*

THE ORCHARD.

PREPARING FOR EXTENSIONS.

THE next two months will keep growers very busy picking, packing, and marketing all midsummer and late varieties of apples and pears. This doubtless will occupy a large portion of their time, but it is poor orchard practice to complete one job before the next one is well thought out and planned. The question of further planting will have to be considered, and where extension of orchard areas is contemplated it will be necessary to fix upon varieties. When this has been settled an order should be placed early with a good reliable nurseryman, so as to ensure supply of the trees required. Early selection and preparation of the land should also be carried out, thereby giving the young trees a chance to do their best. The object should be to select only the best varieties. Until this is done we shall always have unproductive trees that never will prove worth the space they occupy.

The land should be given a first ploughing during the autumn, and any fencing that may be necessary may be done in any spare time. This will enable growers to keep abreast of their work. Fruit-trees will do well on different varieties of soil if they are given fair treatment with respect to drainage, shelter, and cultivation.

AUTUMN SPRAYING.

The only spraying necessary during March may be for woolly aphis. This pest has given considerable trouble in the past, but indications are that it is one which will no longer be dreaded. The natural enemy, *Aphelinus mali*, is doing good work in many orchards. Should the weather continue hot and dry it may be wise to make a late application of arsenate of lead for the control of codlin-moth and Leaf-roller caterpillar on late varieties of apples, after which the spray-pump can be put away for a short period. It is good practice to destroy all infected and diseased fruit which has fallen to the ground in the orchard, also any that may be in cases in packing-sheds. This cannot be stressed too strongly. The more pests and diseases held over through the winter the greater will be the danger of infection during the following year.

This is the time when the orchardist should take careful stock of his failures and successes during the past season so as to profit thereby in the future. Every orchardist should keep some form of record in which all spraying data are regularly entered up, in order that he may be able to amend his programme in the future as experience determines.

MARKETING.

It should be the grower's constant policy to put up a good article and make no attempt to deceive the buyer. Complaints are sometimes made about inspection, but even supposing the Inspector is passed there is still the buyer and consumer. He is the critic and the person who must be pleased in order to create a demand. Given satisfaction, the demand for good sound fruit will increase year by year.

—L. Paynter, Orchard Instructor, Christchurch.

CITRUS-CULTURE.

In many citrus-orchards in the Auckland District the autumn blossoming will be considerably in advance of that of previous seasons, and promises to be on the heavy side. Some growers are somewhat neglectful in applying their insecticide for the control of scale insects, thrips, &c. This is a most important undertaking, as no doubt those who have neglected it over a period will have found to their sorrow, for the results are readily shown on the fruits, and much labour is required in washing them before they are marketable. It would be as well for those growers who still have some trouble at this period with sucking-insects generally to apply another spray as early in the coming month as possible. Red oil may be used at 1–40, or, as a substitute, commercial lime-sulphur, 1–35. If the latter is employed it would be as well to use the same compound, at 1–35 or 1–40, for the control of fungoid diseases when the fruit has set.

Those citrus-growers requiring to make an application of chemical fertilizers in the autumn are advised to carry out this work immediately. A well-balanced manure is, of course, essential, but it is as well to point out here that an overdose of nitrogenous matter, especially that which is readily available, is injudicious at this stage. It would only result in a large amount of sappy growth, which would be immediately nipped off should frosty weather occur later.

It is noticed that in some groves—especially the small ones—the lemons are not being harvested as often as they should be. It is not advisable to leave fruit on until it becomes tree-ripe, as this takes considerable nutriment from the tree, and such fruit is generally not of equal commercial value to that taken at the "silver" stage or a little sooner. The size most favoured is $2\frac{3}{8}$ in. to $2\frac{1}{2}$ in., when the fruits may be successfully stored and cured, and, if properly treated, become a good commercial product.

—J. W. Collard, Orchard Instructor, Auckland.

POULTRY-KEEPING.

PRECOCIOUS PULLETS.

THE incorrect information so often given that early maturity is an indication of egg-laying power, and that premature laying is the sign of the desirable breeding-bird, has led many poultry-keepers to overforce their pullets with rich foods such as meat, milk, &c., with the result that many of the young birds have commenced to lay at about four and a half months old. This precocity, of course, is very undesirable, because under the conditions mentioned the birds cannot grow into vigorous stock. Further, from a productive point of view they will prove unprofitable, and it is not unlikely that their eggs will never be of a satisfactory size.

Later on such pullets will be undesirable for breeding purposes. Where fowls have been bred to an extreme egg-producing objective generation after generation, the natural inclination to lay is so strongly developed that no forcing methods are needed to make them lay as soon as they have reached the correct productive age. In the

breeding of any class of live-stock it is now recognized that constitutional vigour is the foundation on which success rests, and with the modern high-type layer, upon which there is such an exceptional strain, the possession of outstanding constitution is of special significance. It stands to reason that constitution in a flock will never be maintained by breeding from a bird of a super-laying strain that was brought on to lay before it became fully developed. Of course, precocity should not be confused with the early laying of the well-developed bird; these remarks apply only to pullets which commence to lay when little more than half-grown.

Where it is found that the pullets are making premature development their diet should be changed and a plainer one substituted. In this connection it is a good plan to feed plenty of good plump oats (when the price warrants their use) and an abundance of green food.

SCALY LEG.

Scaly leg is caused by a minute mite which burrows under the scales of the feet and legs of fowls, giving the legs an unsightly appearance. The trouble is most common where fowls are running on sandy ground, or where the quarters are not kept clean. Scaly leg should never be neglected, as it is easily spread from one bird to another. There are several remedies that can be applied to destroy the mites and thereby effect a cure. A few applications of a mixture of equal parts of sulphur and lard, liquefied with kerosene to a consistency of thick oil, will usually prove efficacious. Another proved cure is to dip the affected parts for a few seconds in a mixture of equal parts of kerosene and raw linseed-oil. In each case the legs should be wiped over with a dry cloth after treatment, in order to prevent as far as possible the mixture from getting on the bird's feathers.

LEG-WEAKNESS.

A trouble that may show itself now among the growing stock is a loss of leg-power, although the affected birds may show every indication of being in normal health in all other respects. Cockerels are more subject to this trouble than pullets. Leg-weakness is often confused with rheumatism by poultry-keepers, and in their endeavour to effect a cure they rub the legs with liniments, &c., but seldom or never with the desired effect. There is practically no way of curing this trouble, and prevention is the only feasible way of dealing with it. Leg-weakness is often brought about by overfeeding rich foods such as meat, table scraps, &c., but more frequently it can be traced to insufficient exercise. These influences tend to force the body to a degree that is beyond the strength of the undeveloped legs to carry. On the first sign of leg-weakness all forcing foods should be eliminated from the ration. In addition the birds should be kept busy by compelling them to scratch in deep litter for their grain food, or, better still, by providing a good range under the most natural conditions possible. Free range is essential to healthy development, especially for cockerels that it is intended to breed from. Confinement is necessary in fattening birds for table, but is most undesirable for vigorous and healthy growth.

FLYING-ANTS.

It is safe to say that many fowls die annually as a result of eating flying-ants, yet in the great majority of cases the owners have no idea that these are in any way responsible for the mortality. Several such cases have recently come under my notice. In some instances the birds lost were few, while in others the losses were considerable. The ants make their appearance mostly on a hot sultry day, and, as a rule, just before a shower of rain. They are seen near the sea-coast more frequently than inland, and they usually settle on a sandy area. It would appear that when on the wing they instinctively know when they are nearing the sea, with the result that they fall to the ground, cast their wings, and soon afterwards bury themselves in the sand. In the majority of cases death of the birds soon follows upon their having eaten the ants, while in other cases they may linger for a few days and finally die. Once a bird has eaten these ants little or nothing can be done to save it. The only safe course is to get the birds into the house and confine them there immediately the ants are observed to be on the wing, as it is seldom that the ants find their way to the interior of a house. As an extra precaution it is a good plan to fasten some sacking-material over the open part at the front of the house when the ants are about. (An interesting natural-history note on flying-ants by Mr. W. W. Smith, of New Plymouth, was published in the *Journal* for July, 1921, p. 6.—EDITOR.)

VERMIN AND DISEASE.

Poultry-keepers are often lured into a false sense of security because, having new houses and runs, they go on for several seasons with their stock in a healthy condition. In time they become a trifle careless, failing to realize the importance of keeping the quarters as clean as they should be and the runs fresh and sweet. Then they are suddenly confronted with some infectious disease, and a drastic cure becomes imperative, while stringent means have to be taken to prevent the trouble from spreading. Had preventive measures been in force right from the establishment of the plant the trouble would have been avoided. Although the quarters may be comparatively new it is of the greatest importance that all causes favourable to insect-life and the germs of disease be frequently removed. This implies strict attention to cleanliness, combined with the periodical spraying of disinfectant. In the great majority of houses, however, the spraying against insect-life is not as effective as it should be, as the spraying-material does not reach the crevices and cracks where the insects swarm most thickly. Therefore at the outset it is a good plan to give the whole interior of the houses, as well as all fittings, a good coating of tar. A house well coated with tar can be thoroughly disinfected and disease-germs destroyed, but it is seldom that the interior of an ordinary untarred fowlhouse can be treated with any measure of success.

The run is also a great source of danger to the flock, for the germs of disease and parasitic life may survive in the soil for a considerable time. If these germs are to be destroyed the soil should be periodically turned over, well limed, and sown down with grass, rape, &c. A common mistake made in the laying-out of poultry plants is to have only one run allotted to each poultry-house. The result is that by

constant stocking the run soon becomes poultry-sick, and, having no opportunity of a rest, it provides a harbouring-place for germ-life of all kinds. Moreover, if disease does appear, proper means cannot be resorted to in order to prevent the trouble from spreading. The importance of having two runs for each house and allowing the birds access to them alternately can scarcely be overestimated. No poultry plant is complete unless there is an alternate run to each house. In this way a certain area of ground can be turned over each year, sown down, and allowed to sweeten.

The first thing to do on the appearance of disease is to promptly isolate affected birds, and if the bird is badly affected it should be at once destroyed and the carcase burnt.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

DEALING WITH SUPERS.

ALL extracting-combs should be removed as soon as they are cleaned up by the bees. At this period it is important that the bees be restricted to as small a space as possible. By reducing the size of the hive there is less air-space for the bees to keep warm, and they winter better. It is advisable to leave some supers on the hives where impossible to confine the bees to the brood-chamber. These supers may be dealt with in the spring, when most of the bees will be in one story. A good plan to induce the bees to quickly clean up the wet combs in the supers is to place a mat in which is cut a small hole about 1 in. square between the brood-chamber and super containing the combs. The bees, finding the combs partly cut off by the mat, lose very little time in removing the honey from them. At the time of this operation the excluders should be removed from the hives; they may be cleaned and stored away until required again. Remove all bare combs, taking care not to bend the wires. Zinc excluders are readily cleaned by plunging into boiling water.

FOUL-BROOD.

A strict watch should be kept on the brood-combs for symptoms of foul-brood. In case disease is found in a bad form do not attempt to treat the colony, but destroy it. Very little success will attend treatment at this season, and it is far wiser to postpone it until the spring. Too much caution cannot be exercised in handling infected colonies in the autumn, as robbing is likely to be started and disease spread by the robbers. If the disease occurs in a mild form, take out the infected combs and substitute clean drawn-out combs. Mark all diseased colonies for treatment, and carry out all operations with diseased hives as expeditiously as possible. Tinkering with diseased hives in the off-season is dangerous, as the beekeeper will find to his cost.

CARE OF EXTRACTING-COMBS.

If proper care is not to be exercised in storing the extracting-combs when removed to the honey-house it is far better that they should be stored in the hives. If the latter plan is adopted the mats must be

placed on top of the brood-chamber and the supers tiered above the mats. Unless the apiary is well sheltered, however, they must be weighted, as the winter gales may easily upset them when only empty combs are stored inside. It is far better to remove the combs if it can possibly be done, and thereby obviate the labour of lifting the supers if it becomes necessary to examine the brood-chamber. But in this case the combs must be properly housed to secure them from destruction by mice and wax-moths. It is not uncommon to find tiers of extracting-combs destroyed as the result of carelessness. Mice are especially destructive, and the damage they will do in a short period is such as to render the greatest trouble worth while in preventing them from gaining access to the combs.

During extracting many combs may become damaged, but the damage can be repaired by the bees when the combs are returned to the hives. As a rule, however, mice destroy the combs beyond repair, and no effort on the part of the bees can restore them to their original form. It is during the working season that the beekeeper realizes the value of combs in securing a crop. A shortage of combs during the flow will often prevent the bees being kept in working trim, and the production of honey will be greatly restricted. Mice destroy the combs to gain access to the pollen, and render them foul and offensive to the bees. In the absence of a mouse-proof room the combs can be stacked in supers tiered one above another. Be sure that there are no holes or cracks in the supers through which mice can obtain an entrance. Place a queen-excluder at the bottom of the tier and another on the top. Queen-excluders, if used as described, are a complete success in preventing mice from destroying combs during the off-season.

Should the wax-moth be detected the combs must be fumigated. Bisulphide of carbon is generally used for destroying insect-life, but it should be used with great caution, as it is highly inflammable. It is far better when storing the combs at the end of the season to place a few moth-balls among them. This will usually be sufficient to prevent the attack of the moths.

CARE OF UTENSILS.

As soon as the honey has been disposed of all utensils used in handling the crop should be thoroughly cleaned. Remove all traces of honey from the extractor, tanks, uncapping-knives, &c. Wash carefully with boiling water and dry thoroughly to prevent rusting. The high cost of working equipment should impel the beekeeper to take great care in storing his plant during the off-season. It is advantageous to use loose washing covers of close texture to cover the tanks and extractor. The covers will help to keep the utensils free from dust that is likely to accumulate during the winter. See that all metal parts likely to rust are given a good coating of oil. In season or out of season the watchword of the beekeeper in the extracting-house should be cleanliness.

BOTTOM-BOARDS.

Before finally closing down the hives for winter the bottom-boards will require attention, and may be cleaned by scraping. Usually there is an accumulation of pollen, wax-particles, and dead bees, and,

if left, this material is liable to become mouldy and offensive to the bees. The quickest way is to provide a spare bottom-board; lift the hive on to a spare one, scrape the old board, and replace the hive.

MATS.

It is highly important that every hive should be supplied with one or two good mats during the winter months. Mats keep the bees warm, more especially when gable roofs are adopted, and in case of a late examination having to be made this can more readily be done without disturbing the cluster. Not enough attention is paid to the use of mats, both in winter and summer. They are serviceable in both seasons, and the beekeeper would be saved a great deal of trouble if he could be persuaded to place them in all hives. In winter they keep the bees warm, and in the summer prevent the bees from building combs in the roofs. Neglecting their use altogether when using gable roofs is a constant source of trouble, and leads to unnecessary labour in removing the comb which the bees will have built in the roof. There is no excuse for not using mats, as almost every beekeeper has ample material on hand for making them. Good mats can be made from clean corn-sacks or sugar-bags. They should be cut to exactly fit on top of the frames. A corn-sack will cut up into six mats, and what remains can be used for the smoker. A good plan to adopt in cutting mats is to place a zinc excluder on the material and cut to the same size. Calico mats are useless, providing no warmth and being readily gnawed by the bees.

—E. A. Earp, Senior Apiary Instructor.

HORTICULTURE.

VEGETABLE-GROWING.

In the sheltered beds where spring cabbage and cauliflower plants are being grown at this season aphis, thrips, and caterpillars are doing extensive damage in some localities. This may be checked if the plants are sprayed with a mixture composed of 3 gallons of rain-water and three teaspoonfuls of Black Leaf 40, the latter compound to be diluted and stirred well into half a pint of the water before adding it to the 3 gallons with which it is then mixed; also 2 oz. arsenate of lead with a little water worked into a thin cream before adding it to the bulk. Stir the mixture well, making it up to 4 gallons, and apply as a spray in the early morning or evening, repeating it weekly as required. For early spring cutting these plants (cabbage and cauliflower) and lettuce should be planted out now into land that is warm, well drained, and well prepared.

Seed-beds of main-crop cabbage, cauliflower, and lettuce may be sown down now, also onions—if this has not already been done—the intention being to allow the plants to remain in the beds till about July, when they are usually planted out. In localities sufficiently sheltered peas may be sown for harvesting in early spring.

Continue to earth up celery as it is ready; avoid packing the soil too firm, or the sticks will rot off. Take advantage of any dry fine weather to hoe weeds among growing crops. As soon as land that

is not required immediately for another crop becomes vacant, sow it down in cover-crop to be ploughed in. White mustard matures quickly and has much to recommend it. Oats and horse-beans make good growth during winter months.

The harvesting of crops will still occupy much time. There is a tendency to allow potatoes to remain in the ground after they are mature, but many risks attach to this policy. Far better is it to lift them when the ground is dry, and sort and bag them up daily, maintaining a consistently sound grade. Onions may be ripened in the field in fine weather, otherwise they are better spread under cover until thoroughly dry, when they should be trimmed and sorted. Too often they are kept in a damp, close, dark store; such a place is quite unsuitable. A light, dry, well-ventilated shed is necessary to keep them in good condition.

Tomato-vines, as soon as the crop is gathered, should be dug, and, when dry, gathered and carefully burned. Unless another crop is to follow immediately, broadcast a cover-crop and harrow the seed in. The time for sowing the next tomato crop is not far away, and soil will then be required for seed and plant boxes. A good, clean, sweet, friable mixture will be required if the plants are to be grown satisfactorily. This cannot be compounded at the last moment. Most of our troubles with young plants are owing to an endeavour being made to do so. The compost heap should be already mixed for this purpose; if not, it should be got together without delay.

STRAWBERRY-PLANTING.

The strawberry is a hardy plant, preferring a heavy well-drained loam in a district with a good rainfall. On clean, well-prepared land it may be planted now. It is customary in most localities to make a liberal dressing of blood-and-bone manure just before the last ploughing. The greatest care is necessary to obtain good plants of a variety proved suitable to the district. Plant securely on a firm even surface as soon as the plants can be obtained.

TOBACCO.

With the colder days now being experienced the tobacco crop will want closer supervision, specially if the season be wet. At such times mould fungus is likely to develop and seriously depreciate the quality of the leaf. In extreme cases it may be necessary to dry the atmosphere of the store by means of charcoal fires or setting up a stove heater for a time. This should be done with due caution, remembering that when dry the leaf is very inflammable.

HERBACEOUS PLANTS.

Preparations for the planting season should now be well forward. Most plants of the herbaceous class may be dealt with at once. Such plants in nature do not remain and flourish long in one position, and in gardens four years or thereabouts is the period of their usefulness. They have then to be lifted, the land reconditioned, and the plants broken up and replanted. Better still is it to recast the scheme of planting so that both the plants and the land enjoy a change.

PERSIMMONS, FIGS, LOQUATS, AND NUTS.

Many kinds of fruit and nuts deserve more attention from the planter. The persimmon, a native of northern China, where it is grown extensively, has done well almost wherever it has been planted in this country. Too often an unsuitable variety has been chosen, but such varieties as Tsuro-gaki and Tamopan are of high quality, and the fruit is said to keep well in cool storage.

On the better class of soils with good drainage figs and loquats might well receive more attention. In this instance, also, growers have been disappointed with seedlings and inferior varieties—experiences, however, that are almost unavoidable for the pioneer. While the Smyrna class of figs is unsurpassed for richness of flavour, they require the assistance of the little *Blastophaga* wasp to enable them to set their crop—an insect that has not yet been successfully introduced into this country. Perhaps nearly as important commercially, however, are White Adriatic and Mission (California Black) varieties, which do not require the assistance above mentioned. The bold foliage of the loquat-tree is a familiar sight in many gardens, but very rarely is a good fruiting variety met with. Named varieties, with fruit of large size and good quality, are now listed by nurserymen. These are worth a trial in good soil and warm localities.

The price of edible nuts warrants further planting. Walnuts, chestnuts, and hazels crop well in this country; it only remains to secure satisfactory varieties, which, in the case of the first two, must be properly worked on seedling stocks. The hazels and filberts are more often propagated by layering.

—*W. C. Hyde, Horticulturist.*

Investigation of Irrigation in America.—On 3rd March Mr. C. J. McKenzie, Public Works Department, together with Messrs. R. B. Tennent and J. R. Marks, writers of the series of articles on "Irrigation and its Practice," concluded in last month's *Journal*, left Wellington for California and Canada on an official mission of inquiry into irrigation in those territories. The subject will be studied from engineering, agricultural, marketing, administrative, and financial points of view. Messrs. Tennent and Marks will return to New Zealand in about four months; Mr. McKenzie proceeds to Europe from America on other engineering business.

Rabbit-control in Harapepe District.—Regulations under the Rabbit Nuisance Amendment Act, 1920, were gazetted on 19th February, the effect of which is to suspend trapping in the Harapepe Rabbit District (South Auckland) except by permission and under conditions specified by the Board.

London Market for Peas and Beans.—The following advice was cabled by the High Commissioner on 7th March: *Peas*—Market slow. Japanese parcels which have arrived sold at £23 12s. 6d. per ton; March–April shipments, £23 15s. Stocks of New Zealand and Tasmanian Partridge heavy and demand poor; nominal values are—New Zealand 65s. to 70s., Tasmanian 75s. to 78s., per 504 lb. ex store; English best quoted at 51s., inferior down to 42s. *Beans*—English in large supply and demand slow; quoted at 46s. to 51s. per 532 lb. Chinese horse-beans, new crop, July–September shipment, offered at £10 2s. 6d. per ton without finding buyers.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

PIGS INFECTED WITH SOIL ORGANISM.

J. D., Te Poi :—

I have some twenty pigs, varying in size from slips to young porkers, running on pasture and getting all the skim-milk they can drink, the milk being always fed sour and from twelve to twenty-four hours old ; condition of huts, &c., clean. Occasionally one or more of the pigs will break out into what appears to be ordinary boils, generally on the face but sometimes on a leg. These come up to a head, burst, and then quickly heal, just as a boil does on a human being. Should the affected pigs be isolated, and would medicine or a change of diet be beneficial ? All the pigs are fat and apparently full of health and vigour.

The Live-stock Division :—

The trouble is apparently due to infection with a soil organism — *Bacillus necrosis*. This arises in the first instance through inoculation of some scratch or sore on the skin ; the discharge from the swelling which forms later may be infectious. In the circumstances, as the ground is infected, it is advisable to remove non-affected pigs from this place to clean sties, keeping the affected animals there until they are disposed of. Cleanliness and frequent disinfection of the sties must be observed in dealing with the trouble. The sores on affected pigs can be painted once or twice with tincture of iodine as an antiseptic measure.

FOOT-TROUBLE IN SHEEP.

J. C., Eiffelton :—

My land is of a swampy nature and the pasture grows very rank. I always run crossbred sheep, but find difficulty in keeping their feet sound. After a line of sheep has been grazed at this time of the year and on through the winter, in about six to eight weeks a little fester or gathering starts at the top of the hoof between the toes. Could you recommend any preventive or cure for this trouble ?

The Live-stock Division :—

Swampy land frequently gives rise to either foot-rot or scalding between the toes of sheep. Long rank grasses irritate the softer structures between the toes, including the small duct (opening), which becomes covered over with dirt, &c., with consequent growth of bacteria and pus formation. Prevention would necessitate draining the swamp, which in your case may be impracticable. Treatment consists of cleansing the part and removing any foreign bodies. If only a few sheep are affected the parts may be painted with tincture of iodine, using a stiff brush for the purpose. Where large numbers of sheep are affected the use of a race is advisable. In this race should be placed a trough containing a 5-per-cent. solution of bluestone (copper sulphate), ½ lb. to gallon of water, and through this the sheep should be slowly driven. Arsenic may also be used, but owing to its poisonous nature its use is not recommended. A paste made of one part bluestone, one part lard, and two parts of tar, carefully mixed over a slow fire, is also useful where only a few sheep are to be treated.

DESTROYING WILLOWS IN A STREAM.

K. L. BEDLINGTON, Otorohanga :—

Could you inform me as to the best method for destroying willows in a stream ?

The Horticulture Division :—

The best method of destroying willows in a stream depends on circumstances, concerning which you say nothing in this case. One method is to impregnate the trees at this season with commercial sulphuric acid or any good weed-killer. The acid is introduced by means of auger-holes made low down in the butts.

HORSE LICKING THE GROUND.

E. T. DEAN, Puhipuhi :—

Could you advise treatment of a horse, age about six years, that is constantly trying to eat soil? The animal was in very poor condition last winter, but is fair now. She usually starts licking the ground when left standing with harness on.

The Live-stock Division :—

The symptoms indicate the animal to be suffering from a form of gastric indigestion with acidity. If possible, a change of pasture should be given. The following powder given once daily, mixed in a bran mash and continued for a fortnight, should prove beneficial: Bicarbonate of soda, ½ oz.; gentian, ½ oz. You should also place a lump of rock salt in a convenient place for the animal to lick.

CONTROL OF PENNYROYAL.

W. J. C., Kairanga :—

Please give me directions for destroying pennyroyal in pastoral land.

The Live-stock Division (Noxious-weeds Inspection) :—

Pennyroyal (*Mantha pulegium*), which is a perennial, and which thrives especially on heavy, damp land—more especially sour land—is somewhat difficult to eradicate by cutting, grubbing out, pulling up, and suchlike methods. Where the land is ploughable it is more easily dealt with, as it can be worked out through a succession of crops. In 1917 a number of experiments for the control of pennyroyal were carried out at Awahuri, the net results of which were, in effect, that pennyroyal thrives best in wet, sour land (though it also grows fairly well on all classes of land), and to get rid of it wet places must be drained and steps taken to sweeten the land by liming and general cultivation. It was also demonstrated to be good practice to sow two good smother-crops, such as rape and green oats, before sowing down to pasture. Patches of pennyroyal showing in the new pasture may be killed by spraying with an arsenic and soda mixture, made up as follows: 1 lb. arsenic, 1 lb. caustic soda, 20 gallons water; the arsenic and soda to be boiled in 1 gallon of water until all ingredients are dissolved, and the balance of the water added before use. To clear this weed from unploughable land the same spray may be used. A heavy dressing of salt (1 to 2 tons per acre) and most of the proprietary weed-destroyers will also kill pennyroyal, but the arsenic preparation has been found the cheapest. As the arsenic spray is poisonous, stock must be kept off the pasture until after a good rain. The arsenic spray is detrimental to clovers, but appears to have no ill effect on grasses. Salt is detrimental to both grass and clover, but probably would have a stimulating effect on next season's growth of the pasture.

MARE FAILING TO BREED.

"CLYDESDALE," Hakaru :—

I have a good type of farm mare, sixteen or seventeen years old, which has failed to breed recently. She had two foals in succession, but last year and this year failed to get in foal again. She was washed out with Lysol just before coming in season and just before putting her to the horse for the second time this year—quantity about one and a half teaspoonfuls to a quart of warm water. Can you advise me in the matter, as I am very anxious to breed from her. If you recommend irrigation, will you state when to do it—either now or next season when I put her to the horse again, and whether it is to be done when she is in season or just before? I have noticed her throwing out white matter when in season. She failed to breed to an old horse last year, so was put to a two-year-old draught this year, and is about the only failure.

The Live-stock Division :—

The symptom of a muco-purulent discharge at the period of heat points to the mare being affected with a catarrhal condition of the womb. This is seen occasionally in old mares, and is usually the cause of permanent sterility. The

infection probably dates from the last foaling. On account of the age of the mare, treatment is not likely to be successful. However, irrigation of the womb might be tried when she is in season. For this purpose a solution made by adding 2 oz. of Lugol's solution of iodine to 5 pints of water should be used as a douche. This is to be carried out daily for two or three days. It is not advisable to irrigate before service with an antiseptic solution, but as acidity of the genital passage is frequently present in such cases it is often found beneficial to wash out with an alkaline solution; 4 oz. of baking-soda dissolved in a gallon of water, used as a douche one hour before service, answers this purpose. Improvement in the mare's condition by an extra allowance of nourishing food is essential.

OVERGROWN HOOF IN COW.

S. DENNIS, Glenroy:—

I have a cow that has a hoof which is overgrown in length and is inclined to crack more or less. This animal seems to be in pain, and has not done well for a long time. What is the best thing to do for it?

The Live-stock Division:—

The overgrowing of claws in cattle is very common where animals are grazed on soft land. The part of the claw which is overgrown may be removed, there being a special instrument for the purpose; but, failing this, a pair of strong pruning-shears may be used. The cow must be fixed in a position so that the foot affected is easily manipulated, and the leg fixed by a leg-rope to prevent kicking. A portion of the horn is severed from the end of the claw with the shears, care being taken that the claw is not severed too far back or the sensitive tissues will be injured. Another method is to use a piece of board, a broad chisel, and a mallet. The board is placed under the claw, and the chisel where it is intended to cut off some of the horn. With a sharp blow from the mallet the claws can be severed. The only difficulties are the kicking of the cow and the possibility of cutting the claw too far back and severing the sensitive structures. The pain suffered by your cow is the result of the excessive strain, as also is the cracking, and it should ease on the removal of the growth of horn.

WEATHER RECORDS: FEBRUARY, 1925.

Dominion Meteorological Office.

GENERAL SUMMARY.

IN the early part of February the weather was generally mild, warm, and fine, though showery conditions were experienced at times north of Auckland, with light east to south-east winds. On the 14th a prolonged spell of westerly weather set in and caused unsettled conditions until the 24th. During this period stormy weather was prevalent in different parts at different times. Thus on the 14th the winds rose and heavy rain followed in the North; on the night of the 16th there was a heavy thunderstorm and deluge of rain for a short time about Dunedin; on the night of the 17th and morning of the 18th hard north-west gales did considerable damage in the Wairarapa and Wellington districts; and from the 21st to the 23rd the weather was very boisterous, especially about Cook Strait and in Westland and Canterbury.

The month's total rainfall was above the average on all the western coast and in the high country of the South, 28·88 in. being recorded at Arthur's Pass. On the east coast of both Islands, however, the rainfall was below the mean; for example, at Napier 0·72 in. fell, which is 72 per cent. below the mean; and at Christchurch 0·27 in. for the month, which is 84 per cent. less than the mean of former years.

A remarkable feature in Canterbury was the heavy rain in the high back country, which caused the rivers to flood, though the weather was dry on the plains, and the Waimakariri broke through its banks on the night of the 23rd.

—*D. C. Bates, Director.*

RAINFALL FOR FEBRUARY, 1925, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average February Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	3·13	6	1·50	2·95
Russell	2·64	9	1·10	4·35
Whangarei	2·86	12	1·72	4·95
Auckland	3·37	14	1·32	3·02
Hamilton	3·10	13	1·02	2·85
Kawhia	3·91	12	1·46	2·40
New Plymouth	2·91	11	0·77	4·09
Inglewood (Riversdale)	6·97	13	2·00	6·30
Whangamomona	4·43	11	1·86	4·14
Tairua, Thames	2·10	8	1·15	4·52
Tauranga	2·54	10	1·10	3·73
Maraehako Station, Opotiki ..	2·78	13	1·60	3·70
Gisborne	2·21	10	1·01	3·68
Taupo	3·00	8	1·04	2·81
Napier	0·72	8	0·44	2·56
Maraekakaho Station, Hastings ..	1·00	6	0·80	2·52
Taihape	1·41	13	0·29	2·43
Masterton	1·58	10	0·37	2·71
Patea	3·29	11	0·60	2·33
Wanganui	1·56	5	0·53	2·49
Foxton	1·98	6	0·42	1·71
Wellington	3·90	10	1·14	3·18
South Island.				
Westport	5·00	16	1·98	4·37
Greymouth	8·80	15	1·71	6·13
Hokitika	11·23	17	2·87	7·20
Arthur's Pass	28·88	14	7·50	7·55
Okuru, Westland	17·42	15	2·94	7·92
Collingwood	9·14	14	3·36	5·63
Nelson	3·49	13	1·09	2·80
Spring Creek, Blenheim	2·65	9	0·84	2·30
Tophouse	7·30	19	1·41	4·50
Hanmer Springs	3·73	14	0·81	2·93
Highfield, Waiau	1·42	7	0·50	2·59
Gore Bay	0·96	4	0·55	3·50
Christchurch	0·27	8	0·12	1·84
Timaru	1·56	15	0·28	1·89
Lambrook Station, Fairlie ..	0·80	6	0·44	1·95
Benmore Station, Omarama ..	2·25	9	0·70	1·23
Oamaru	0·68	9	0·22	1·72
Queenstown	5·50	12	1·57	1·76
Clyde	1·16	7	0·30	0·99
Dunedin	2·22	13	0·72	2·69
Gore	..	..	..	2·47
Invercargill	2·82	21	0·66	2·68

FORTHCOMING AGRICULTURAL SHOWS.

Methven A. and P. Association : Methven, 26th March.
Katikati A. and P. Society : Katikati, 26th March.
Temuka and Geraldine A. and P. Association : Winchester, 2nd April.
Malvern A. and P. Association : Sheffield, 16th April.
Flaxbourne A. and P. Association : Ward, 22nd April.

FRUIT-TREE GRADING REGULATIONS.

THE regulations of 1921 governing the grading of fruit-trees for sale from nurseries were recently revoked, and the following regulations made in their place :—

1. In these regulations, if not inconsistent with the context,—

"Diameter" means the diameter of a fruit-tree measured 2 in. above the union :

"Fruit-tree" means any variety of apple, pear, apricot, peach, or nectarine tree :

"Nursery" means any land which is used for the raising or growing of any fruit-trees, if such fruit-trees or any of them are intended for sale for replanting :

"Sale" or "sell" includes barter, and also includes offering or attempting to sell or exposing for sale, or sending or delivering for sale, or causing or allowing to be sold, offered, or exposed for sale :

"Sub-package" means one of two or more packages enclosed in one cover.

2. (1.) On every sale of fruit-trees from a nursery, whether direct or through an agent, there shall be issued, by or on behalf of the occupier of such nursery to the purchaser or intending purchaser, a statement of the grade of such fruit-trees determined as hereinafter set out ; provided that nothing in these regulations shall apply to the sale of fruit-trees in the execution of an order for not more than fifty trees or to the sale of lots of not more than ten trees of any one variety. (2.) Such statement as to grade shall be set out in the invoice, also on a tag or label attached to each package of fruit-trees. (3.) It shall not be lawful to pack trees of different grades together unless the trees constituting each grade form a distinct sub-package ; each such sub-package shall bear a tag or label in accordance with the requirements of the last preceding subclause.

3. The grading of fruit-trees from a nursery shall be done by or on behalf of the occupier of such nursery prior to the sale of such fruit-trees.

4. The following are the standards by which the grade of apple or pear trees shall be determined : (1.) "A (or commercial) grade" shall consist of trees the diameter of which is not less than $\frac{7}{16}$ in. nor more than $\frac{10}{16}$ in. : Provided that trees which are more than $\frac{10}{16}$ in. in diameter may be included in this grade if such trees are not more than one year from the bud or graft : Provided further that in the case of the following varieties of pear-trees—viz., Winter Nelis, P. Barry, Marie Louise, and Josephine de Malines—trees may be included in this grade the diameter of which is not less than $\frac{6}{16}$ in. "B (or nursery grade)" shall, subject to the last preceding proviso, consist of trees the diameter of which is less than $\frac{7}{16}$ in. "C (or special) grade" shall, subject to the first proviso in the case of A grade, consist of trees the diameter of which is more than $\frac{10}{16}$ in. (2.) Apple or pear trees of all grades shall be well rooted, and, if branched, shall be of fair shape, and shall have not less than three branches averaging 18 in. in length.

5. The following are the standards by which the grade of apricot, peach, and nectarine trees shall be determined : (1.) "Commercial grade" shall consist of trees the diameter of which is not less than $\frac{8}{16}$ in. "Nursery grade" shall consist of trees the diameter of which is less than $\frac{8}{16}$ in. (2.) Apricot, peach, and nectarine trees of commercial grade shall be well rooted and branched, and of fair shape.

6. In the grading of fruit-trees there shall be allowed a margin of error ; provided that in any one consignment of fruit-trees forwarded from a nursery to a purchaser the margin of error shall not exceed 5 per cent. by number ; and provided further that where the error relates to the diameter of the trees no greater margin than $\frac{1}{16}$ in. shall be allowed.

7. If any purchaser of fruit-trees from a nursery is dissatisfied as to the grading of such trees he may make complaint to an Inspector, but such complaint must be made within fourteen days of the receipt of such trees by the purchaser.

8. Every occupier of a nursery who (*a*) sells any ungraded fruit-trees from such nursery, or (*b*) sells any fruit-trees from such nursery without issuing to the purchaser a statement of the grade assigned to them, or (*c*) sells any fruit-trees from such nursery which are incorrectly graded, commits an offence against these regulations, and shall be liable on conviction to a fine not exceeding £20.