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Control of Feed-flavour by Herd Management.

Results of Trials at Ruakura Farm.

E. R. MARRYATT, Fields Instructor, Ruakura Farm.

IN the September, 1938, issue of the *Journal* Mr. J. E. Davies published an article with the same title describing trials at Waimate West Demonstration Farm. He showed that the milking-herd, when amply fed in the morning, can be removed from pasture to a bare yard three hours before the evening milking without loss of production. Experiments at the Dairy Research Institute have shown that there is a reduction in the intensity of feed-flavour in cream from stall-fed cows when flavour-producing fodder is withheld for about three hours before milking.

It was considered desirable to try this method of controlling feed-flavour in the Waikato where feed-flavour is very troublesome, and to demonstrate its possibilities as a farm practice. Some small trials were therefore carried out on the "feed-flavour area" at Ruakura Farm.

Results of a number of trials point to a valuable and simple method of reducing feed-flavour by herd-management. Further trials at Ruakura Farm bear out the theory that feed taints can be considerably reduced by feeding the herd fully in the morning and then shifting the cows into a bare yard at least three hours before the afternoon milking.

Small Trials at Ruakura.

The "feed-flavour herd" of twelve cows at Ruakura was divided into an "A" herd and a "B" herd, each of six cows. The two herds were run together as one herd except when feed-flavour was most likely to be strong. On those occasions the "A" herd was taken away at noon (sometimes later) from the "B" herd and shut in the bare concrete yard at the shed until the afternoon milking, which commences at 3 p.m. The "A" herd was then milked first. Their milk was separated into a can marked "A," and the cream from the "B" herd, which was left on the pasture until the "A" herd had been milked, was sent to the factory in a can marked "B."

Critical grading for feed-flavour on a 0–10 scale was done at the factory under the supervision of an officer of the Dairy Division. Table 1 gives the details of the gradings for feed-flavour of the creams from the two herds on the thirty-one days of the trial, and also the length of time the "A" herd was held in the bare yard on each day before the afternoon milking.

Table 1.

Details for all days of trial of gradings for feed-flavour in creams of "A" herd, which was held in a bare yard before the evening milking, and of the "B" herd, which was left on pasture.

Date.	Hours "A" Herd in Yard before Evening Milking.	Flavour in Cream (0–10 Scale).*	
		"A" Herd.	"B" Herd.
14/9/38	3	1	3
15/9/38	3	0	2
17/10/38	3	0	1
18/10/38	3	0	0
19/10/38	2	1	1
20/10/38	3	0	1
8/11/38	3	0	2
9/11/38	3	0	1
10/11/38	3	0	2
11/11/38	3	0	1
12/11/38	1½	1	2
13/11/38	1	1	1
14/11/38	2½	1	1
15/11/38	3	0	1
16/11/38	2½	0	1
17/11/38	3	1	1
18/11/38	2	0	1
19/11/38	1½	1	2
21/11/38	1½	2	2
22/11/38	3¼	2	3
23/11/38	3	2	3
24/11/38	2	0	1
25/11/38	2	1	1
26/11/38	3	0	2
28/11/38	3	1	2
29/11/38	3	0	2
30/11/38	3	0	1
1/12/38	3	0	0
2/12/38	¾	1	0
3/12/38	3	0	0
4/12/38	3	1	1
Totals (31 days)	79½	17	42
Averages (per day)	2·6	0·6	1·4

* 0 = no feed-flavour; 10 = maximum feed-flavour.

Comments on Table 1.

Unfortunately for this experiment, feed-flavour has been exceptionally mild throughout this spring, the highest grading for feed-flavour at Ruakura being 3 points. This, of course, is due to the peculiar season and the failure of pastures to flush as they normally do in October or November. The mildness of the flavour has prevented the collection of evidence about controlling strong feed-flavour—the main purpose of the trials—and the experiment will have to be repeated next spring.

While the trials have not revealed anything about strong feed-flavour, they have provided some valuable evidence. They have shown that, on the average, mild feed-flavour can be reduced to about half of its intensity by herd management, and while we lack information about the control of strong feed-flavour it will be well to act on this, assuming that a similar tendency will apply towards control of strong feed-flavour.

Tables 2 and 3 bring out another lesson from the trials. These tables are made from Table 1 by extracting all days on which the "A" herd was in the yard for three hours (Table 2) and all days for which the "A" herd was in the yard for less than three hours (Table 3).

Table 2.

Details of gradings for feed-flavour in creams of "A" herd for all days in which it was held in a bare yard for three hours before the evening milking, and of the "B" herd, which was left on pasture on those days.

Date.	Hours "A" Herd in Yard before Evening Milking.	Flavour in Cream.	
		"A" Herd.	"B" Herd.
14/9/38	3	1	3
15/9/38	3	0	2
17/9/38	3	0	1
18/10/38	3	0	0
20/10/38	3	0	1
8/11/38	3	0	2
9/11/38	3	0	1
10/11/38	3	0	2
11/11/38	3	0	1
15/11/38	3	0	1
17/11/38	3	1	1
22/11/38	3¼	2	3
23/11/38	3	2	3
26/11/38	3	0	2
28/11/38	3	1	2
29/11/38	3	0	2
30/11/38	3	0	1
1/12/38	3	0	0
3/12/38	3	0	0
4/12/38	3	1	1
Totals (20 days)	60	8	29
Averages (per day)	3	0·4	1·5

Table 3.

Details of gradings for feed-flavour in creams of "A" herd for all days in which it was held in a bare yard for less than three hours before the evening milking, and of the "B" herd, which was left on pasture on those days.

Date.	Hours "A" Herd in Yard before Evening Milking.	Flavour in Cream.	
		"A" Herd.	"B" Herd.
9/10/38	2	1	1
12/11/38	1½	1	2
13/11/38	1	1	1
14/11/38	2½	1	1
16/11/38	2½	0	1
18/11/38	2	0	1
19/11/38	1½	1	2
21/11/38	1½	2	2
24/11/38	2	0	1
25/11/38	2	1	1
2/12/38	¾	1	0
Totals (11 days)	19¼	9	13
Averages (per day)	1¾	0·8	1·0

For the twenty days on which the "A" herd was shut in the yard for three hours before milking the average daily feed-flavour was 0·4, and for the "B" herd left on pasture was 1·5. For the eleven days on which the "A" herd was shut in the yard for less than three hours before milking the average daily period being 1¾ hours, the average daily feed-flavour was 0·8, and for the "B" herd left on pasture was 1·0.

The ratio of average flavour between the two herds when the "A" herd was shut in the yard for three hours and when it was shut in the yard for less than three hours is therefore 0·4 : 1·5 : : 0·8 : 1·0, or more plainly 8 : 30 : : 24 : 30. In other words, taking the flavour produced in the cream of the "B" herd as a standard, when the "A" herd was shut in the bare yard for less than three hours (1¾ hours on the average) the flavour in its cream was three times as strong as when it was shut in the yard for fully three hours.

Recommendations.

These results, together with the results of the trials at Waimate West Demonstration Farm and those at the Dairy Research Institute, give the farmer a valuable and simple method of reducing feed-flavour. All that is necessary is to feed the herd fully in the morning, and that simply means do not put them on pasturage which is too short; then shift the cows into the yard *at least three hours* before the afternoon milking, say, after lunch, before commencing the afternoon's work.

Drinking-water must be available in the yard, and it is a good plan to put plenty of rock salt about in boxes, as, in addition to being good for cows, it helps to keep them contented giving them something to do other than chew the cud. If other licks are used here is an excellent opportunity to give them to the cows.

A concrete yard is not likely to induce contentment in the cows, but it seems to be the only place likely to be successful in reducing feed-flavour by herd-management. Even bare paddocks usually provide some taint-producing plant—for example hog-cress, and hard-grazed pastures always provide a "picking" of clover sufficient to give flavour in the spring.

Farmers are also warned against removing the herd from pastures when pasturage is short, for there is no evidence to show that production would not drop under these conditions.

Feed-flavour generally occurs from August to early December, and again in March, April, and May. The strongest flavour usually occurs in October and November. Farmers should be guided by the grading of their cream at the factory and modify their herd-management when necessary. It is well, however, to continue the practice daily when once commenced, as cows are creatures of habit; they dislike irregularities, and react to them by decreased production.

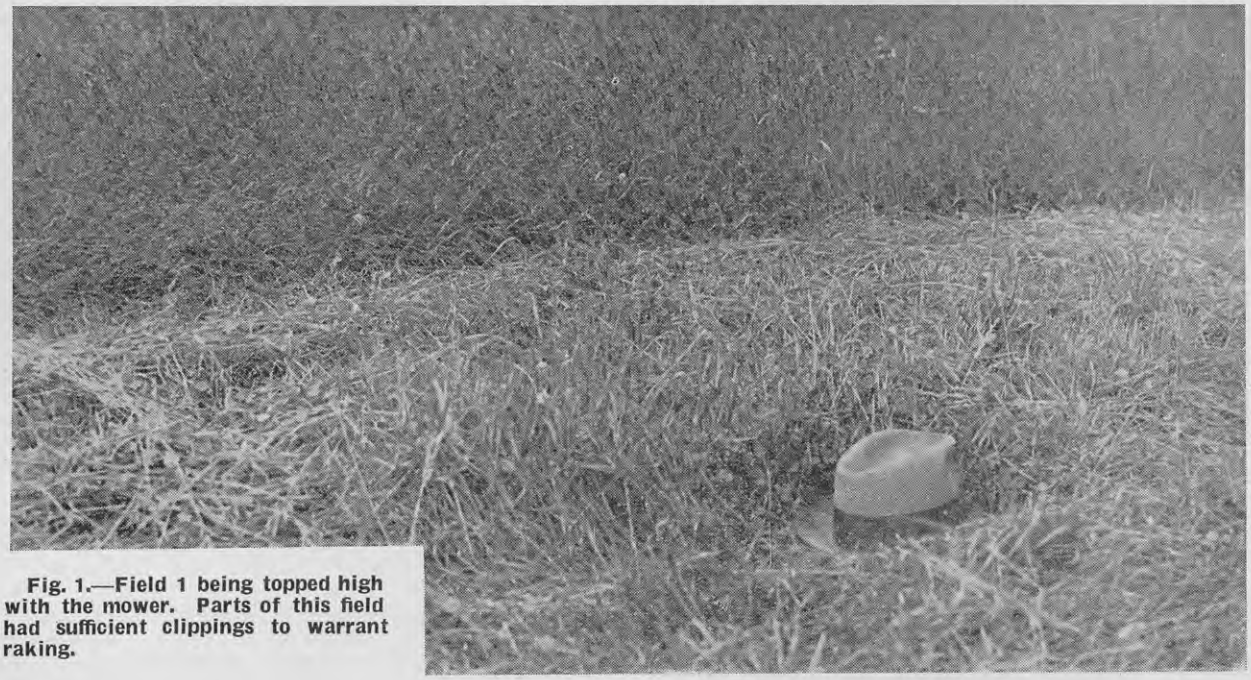

Fig. 1.—Field 1 being topped high with the mower. Parts of this field had sufficient clippings to warrant raking.

Control of Facial Eczema by Farm Management.

Features of Closed-fields Plan at Ruakura Farm of Instruction.

P. W. SMALLFIELD, Fields Superintendent, Hamilton.

IN early December the Facial Eczema Management Committee published advice on pasture-management for the control of facial eczema in sheep and cattle. The suggested management plan was to provide mature feed for the maintenance of sheep and cattle should a dangerous flush of grass occur in the late summer or autumn. The committee advised that sheep-farmers in particular should close up from a quarter to a third of their farms in December, and that the areas to be closed should consist of at least four fields, so that the fields could be closed and utilized in rotation.

Fields closed on this plan at the Ruakura Farm of Instruction now show certain interesting features, and the management methods adopted at Ruakura to preserve this mature feed will prove of interest to farmers.

Recommendations on pasture-management for the control of facial eczema in sheep and cattle were outlined recently by the Facial Eczema Management Committee. The suggested plan was carried out at Ruakura, and certain interesting features have resulted.

Closing the Fields.

The fields closed at Ruakura are situated on the Hamilton clay loam soil on the undulating land of the Waikato, and consist of pastures in which perennial rye-grass and white and subterranean clovers are dominant. Other grasses present are cocksfoot, fog, *Poa annua*, goose-grass, and sweet vernal.

Field 1 was closed on the 9th December, field 2 on the 16th December, field 3 on the 23rd December, and field 4 on the 30th December. Before being closed the fields were evenly grazed off with sheep and cattle, and by the 11th January excellent feed was available in fields 1 and 2.

Field 1 (Fig. 1) showed a dense bottom growth 7 in. to 8 in. high of clover and grass surmounted by a light growth of seed-stalk. Field 2 (Fig. 2) had a 3 in. to 4 in. growth of clover and grass, and also showed a good deal of seed-head. Field 3 (Fig. 3) was just freshening, with a 2 in. to 3 in. growth, and field 4 (Fig. 4) had made practically no growth since closing.

Fig. 2—Field 1, closed on 9th December, 1938, and photographed on 11th January, 1939. The field had a dense bottom growth of grass and clover 7 in. to 8 in. high surmounted by a light growth of seed-stalk.

Fig. 3—Field 2, closed on 16th December, 1938, and photographed on 11th January, 1939. The field had a 3 in. to 4 in. growth of clover and grass, and showed a good deal of seed-head.

Fig. 4—Field 3, closed on 23rd December, 1938, and photographed on 11th January, 1939. Growth just freshening.

Fig. 5—Field 4, closed on 30th December, 1938, and photographed on 11th January, 1939. Field had made practically no growth since closing.

Fig. 6—Field 2 being topped high with the mower. No raking was necessary in this field.

[*J. F. Louden, photos.*

To maintain a fresh, even growth on fields 1 and 2 and to preserve the feed for later utilization the fields were topped with the mower on the 12th January (Figs. 5 and 6). The mower-knife was set high to cut the seed-stalks just above the dense clover bottom, and as the seed-stalk growth was light the clippings were left in the field. With periodical topping it is expected that the saved grass will be maintained to an even, fresh growth until required for grazing.

Management of Mature Grass.

The high topping of fields of mature grass which is being done at Ruakura is a practice that could be generally applied by sheep-farmers. In the recommendations issued by the Facial Eczema Management Committee it was suggested that if good growing weather were experienced after December early closed fields might become rank and require grazing off with cattle and then shutting up again.

As the growth on fields shut up in late December has not been good, the grass saved in the earlier closed fields should be maintained by high topping and no fields grazed off completely by cattle until a satisfactory reserve growth has been secured on the later closed fields.

Grazing off will be warranted only if exceptionally good growing weather is experienced; otherwise the field should be held and maintained in a satisfactory state of high topping. A heavy growth of seed-stalk may require raking off the field if it is likely to smother the bottom growth.

Eradication of Goat's Rue.

" Dairyman " (Levin) :—

Will you please give me what information you can about goat's rue and its eradication on a small place well grassed and with river alluvial formation ?

Fields Division :—

Where pastures are infested with old plants of goat's rue the best method of dealing with it is to scythe or cut with the mower. Old plants which have grown to the stage of having hollow stems generally die on being cut.

With young seedling plants the best and quickest treatment is to spray with a 2-per-cent. solution of arsenic pentoxide —that is, 2 lb. of arsenic pentoxide dissolved in 10 gallons of water. The solution should be applied through a very fine nozzle to the plants when they are up to 6 in. high, when little more than a whiff of the spray is sufficient to kill them.

Spraying with a 3-per-cent. or 4-per-cent. solution is required for older plants, but the treatment is not altogether economical, mowing being cheaper.

Where seedlings tend to come in, it will be found that the sward is open in the early autumn, and top-dressing to bring in an early growth of clover will do much to prevent invasion of the pastures. Grubbing of odd old plants and hand-pulling of scattered seedlings is effective when the goat's rue is not thick or in dense clumps.

Internal Parasites in Sheep.

Care in Prevention of Infection.

W. J. GRAY, Veterinarian, Masterton.

SHEEP are probably more severely affected by internal parasites than any other kind of live-stock. Lambs and hoggets as a rule suffer most, as they are more easily infected, while older sheep in general, appear to acquire an increasing resistance against parasitic infection. Hence, it is important in preventing infection to pay special attention to the care and handling of lambs and hoggets.

The chief internal parasites are round-worms, tapeworms, and flat-worms or flukes. The majority of worms parasitic in sheep are found in the digestive tract, and each species is more or less restricted to a part of the tract which is their particular habitat. Other common seats of these internal parasites are the lungs and liver.

From the fact that so many of these worms have their habitat in the digestive tract it can readily be understood how simple it is for worm eggs, or even young worms themselves, to pass out in the droppings and thus infect the pastures. The fact that sheep droppings carry infestation is the basis of such preventive measures as pasture rotation and rotation of different kinds of stock on the same pasture.

Detection of Worms.

Many of the intestinal worms are not easily detected unless some special means are used to separate them from the rest of the gut contents. This will be more readily understood when it is realized that a number of the worms are only from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. in length.

In a general way the presence of internal parasites may be suspected where there are a number of animals in a flock losing condition and becoming thin and commonly having a diarrhœa or becoming constipated. Blood-sucking parasites such as the large stomach-worm and liver-fluke also produce anæmia, recognized by the pale colour of the skin and the lining of the mouth and eyelids. Where the anæmia is severe these membranes may be quite white.

The life-history of many of these worms may be stated in the general way to be somewhat as follows: The eggs produced by the female worm pass out in the droppings and hatch in a few hours under the most favourable conditions of warmth and moisture; under less favourable conditions hatching may require days or even weeks. The immature parasite which leaves the eggs undergoes further development until it becomes what is termed an infective larva. At this stage it is taken in by the sheep as they feed. In the digestive tract of the sheep these immature parasites develop into the adult worm. Other worms—for instance, some of the tapeworms—have two hosts, living as adults in one host and as immature worms in a different host. An example of this is the small tapeworm which lives its adult life in the dog's intestine, but is found in its immature stage as the hydatid cyst so common in the lungs and liver of sheep.

Special attention to the care and handling of lambs and hoggets is important if infection from internal parasites is to be prevented. Emphasis is laid on the importance of proper feeding and frequent changes of pasture in controlling and preventing parasitic diseases.

Some general idea of the life-history of these parasites is both useful and necessary for an intelligent attempt to be made in their prevention or control.

Chief Parasites.

The chief internal parasites causing disease in sheep are the stomach-worms, both large and medium, which are found in the fourth or true stomach, the small intestinal worm which is found along the first 15 ft. of small intestine, the large-mouthed worm, which is found in the crown or colon, and the liver-fluke.

The large stomach-worm is dangerous to all classes of sheep. The medium stomach-worm and the small intestinal worm are dangerous to an animal only during its first twelve months of life—very rarely do they affect two-tooths. The large-mouthed worm affects all classes of sheep, as does the liver-fluke.

Prevention and Control.

Preventive measures are based partly on the known life-history of these parasites. It is known that the disease is spread by eggs produced by the female worm, which escapes in the droppings on to the pastures. Infected sheep must be regarded, therefore, as a danger to uninfected sheep, as must also the pastures which have been used by the infected animals. The advisability of moving sheep frequently will be obvious.

Thus, if sheep are moved every week or ten days the eggs they have passed will not have had time to reach the infective stage. This measure further prevents, to some extent, the necessity for close grazing, which is another danger in that the parasites are most concentrated under the lowest leaves of the herbage, where the conditions are most suitable for the further development of the parasites.

Therefore, avoid long periods of stocking on any one place and overstocking. Furthermore, sheep pastures must not be allowed to become too long, as such conditions, by protecting the parasites, afford them every opportunity for development.

Lambs and Hoggets.

Bearing in mind the particular susceptibility of lambs and hoggets to infection with these parasites, it will be apparent that they must be given the cleanest pastures. Lambs should be weaned on to as clean a pasture as possible, and lambs and hoggets should be allowed to graze ahead of older sheep, as the latter are able to resist infection to a greater extent.

In this connection it is worth mentioning the advantages of allowing cattle to graze ahead of sheep. Apart from eating out the longer feed and leaving more suitable grazing for the sheep which follow, cattle ingest many of the parasites in the infective stage which are capable of infecting sheep, and thus in a sense clean the pastures for the sheep following on. Sheep parasites do not affect cattle over twelve months old. Those eaten by the cattle are destroyed with the exception of liver-fluke.

The importance of proper feeding in controlling parasitic diseases cannot be over-emphasized. Where sheep, particularly lambs and hoggets, have been under-nourished or where they have received a check due to unsuitable feed, the resistance to infection is considerably lowered. The early training of lambs to take dry feed such as chaff, crushed oats, or concentrates is a wise practice. An allowance of hay fed from racks should also be made available.

Particularly in winter this supplementary feed may be required, but unless the animals are trained early they will not take to it readily later on, least of all when they have become infested with parasites. Supplementary green feeds, such as rape, barley, oats, or kale, are also useful. Whatever practices are adopted it is essential that proper and adequate feed conditions be maintained. The regular supply of a comprehensive mineral lick is also beneficial.

Most Effective Drench.

The drench found most effective in combating the small intestinal and medium stomach-worm is the bluestone-nicotine-sulphate mixture, used in a 2 per cent., 4 per cent., or 5 per cent. strength. The dose of the 2 per cent. mixture is: Lambs under four months, ½ oz.; lambs four to eight months, ¾ oz.; lambs eight to twelve months, 1 oz.; two-tooths, 1½ oz.; adults, 2 oz. Weakly lambs in any age group should be given the dose corresponding to the younger age group.

The same drench is efficient against the large stomach-worm, but where adult sheep are being treated the nicotine may be omitted, as the bluestone alone is equally efficient.

The most efficient drench against liver-fluke is carbon tetrachloride.

There is nothing to be gained by fasting prior to drenching, but it is desirable to keep the sheep away from water for an hour or two after drenching.

On properties where infestation is known or suspected to exist drenching should be commenced at weaning-time or a little earlier and repeated at three-weekly or monthly intervals. It must be stressed, however, that medicinal treatment is not sufficient. Drenching alone is not enough; it must be accompanied by improved feeding. Additional feeding with dry food is always of great value, and it is also important that the improvement in nutrition be maintained.

An interesting and instructive pamphlet on "Internal Parasites of Sheep and Calves and their Treatment" is issued free by the Department of Agriculture, and should be read by all flockowners.

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Winter Pasture-management on Dairy Farms.

Attaining High Production Per Acre.

E. R. MARRYATT, Fields Instructor, Ruakura Farm.

IT is bad farm-practice to adopt—

Close and Continuous Winter-grazing

on more fields than the minimum necessary for the wintering of stock because :—

(1) Constant defoliation in the winter weakens the grasses' ability to produce in the spring. (Just as

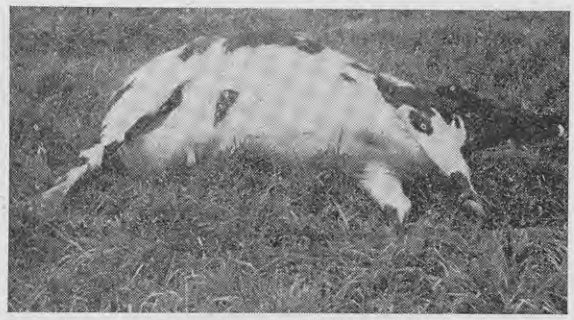
prolonged and continuous dripping of water reduces the usefulness of the best concrete, so does close and

continuous grazing in the winter reduce the spring-production of the best pasture.)

(2) It gives less grazing than it appears to give ; hay and silage must still be fed.

(3) By reducing the competition of the grasses it strengthens the clovers' ability to produce in the spring.

(4) It results in what is often dangerous flush growth in the spring, and this may be accompanied by stock-troubles, such as "grass-staggers" and bloat,



and difficulties in producing milk and cream of good quality because of feed-flavours.

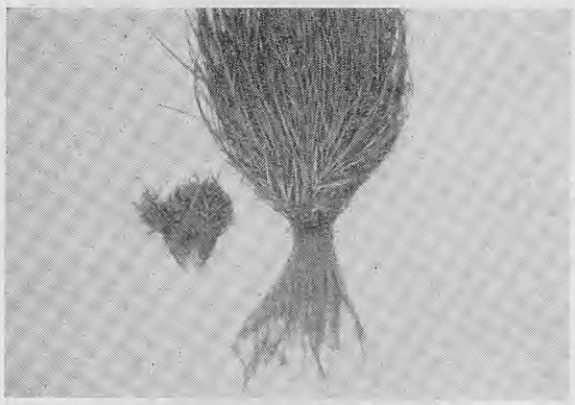
(5) It reduces the possible total of pasture-production for the year.

On the other hand—

Winter-spelling

of at least four fields is a good farm-practice because :—

(1) Freedom from constant defoliation allows the grasses to build up large root-systems.



(2) It provides good grazing for early-calving cows, and this may be rationed off to them.

(3) It provides mature and "safe" pasturage in the spring, and is therefore an insurance against "grass-staggers," bloat, and feed-flavour.

Cheap Insurance Against Feed-flavour, Bloat, and Late Spring.

(4) It changes clovery pastures

into more grassy pastures,

and for this reason, also, it insures against some spring troubles.

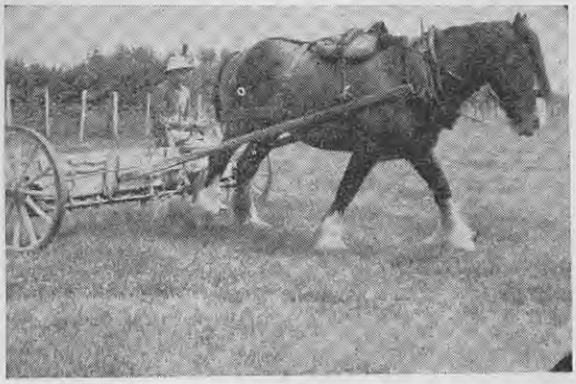
(5) It ensures the maximum pasture-production for the year.

But

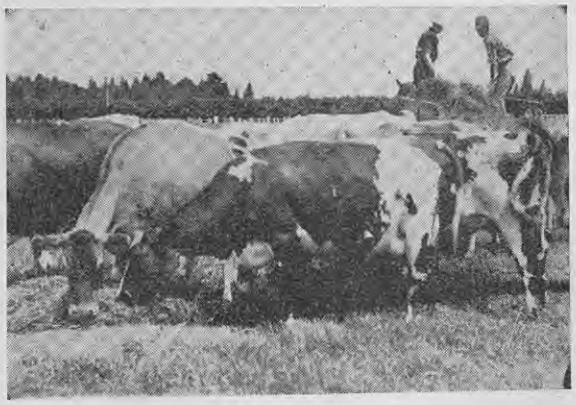
To Winter-spell

you must not be over-stocked and you should :—

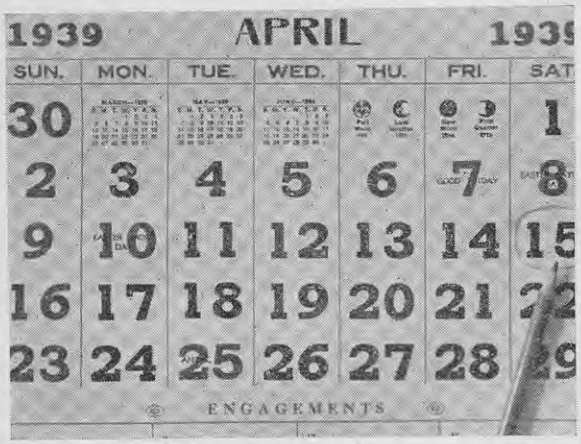
(1) Top-dress with phosphates in February or March.



(2) Begin feeding out hay and silage before this actually becomes essential.



(3) Close the fields to be spelled about mid-April while some growth is still likely to occur.



(4) When the closed pasture has grown to about 8 in.,

graze it down to about 3 in., but no closer.

(5) Then spell until the next 8 in. stage and repeat the grazing to 3 in. and the spelling to 8 in. You will probably get four grazings of from 8 in. to 3 in. between mid-April and mid-October.

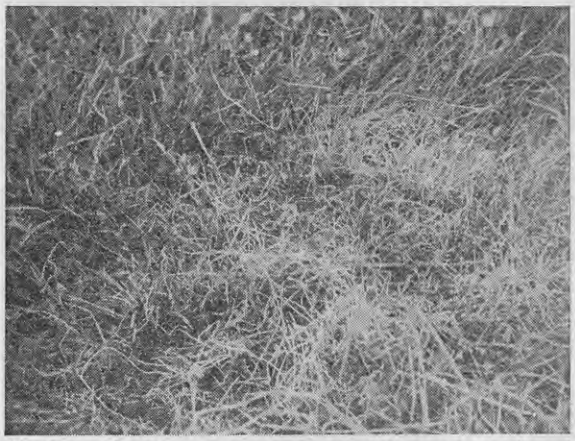
*This method of lenient winter-grazing is better than the old method of simple winter-spelling (*i.e., *not grazing at all) because :—*

Simple Winter-spelling without Lenient Grazing

(1) Gives less pasture-production than winter-spelling plus lenient grazing because simple spelling tends to allow growth to cease, whereas lenient grazing encourages continued leaf-production even in the depth of winter.

(2) Damages the pasture by smothering the clover, whereas lenient grazing re-invigorates the clover by letting in light at each grazing.

(3) Usually causes partial rotting of the undergrowth, which the cows dislike and which damages the sward.



In the spring the winter-spelled fields may be rationed-off to early-calving cows,

but for successful rationing-off of saved grass

At Least Four Fields should be Winter-spelled,

so that by the time the fourth will have been rationed off in the spring the first will have recovered and rationing-off can be continuous while it is necessary.

Lenient winter-grazing and rationing-off of saved grass to early-calving cows, as well as minimizing spring troubles and simplifying the production of milk and cream of good quality, is also a splendid means towards attaining high production per acre.

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Fig. 1.—A tractor and scrub bar cutting gorse.

Destruction of Gorse and Blackberry.

Methods of Eradication and Control.

J. E. BELL, Instructor in Agriculture, Auckland.

GORSE and blackberry are two prickly weeds well endowed by nature in their struggle for existence, and they need no formal introduction to the New Zealand farmer. Blackberry grows most vigorously in wet climates and moist soils, being most common in Westland and in the North Island. Gorse prevails everywhere. Both are very difficult to kill, and arguments as to which is harder to eradicate are common.

The fight with these weeds is going on continuously. Farms are neglected, becoming therefore infested, and infested farms are gradually won back to freedom from gorse and blackberry—often enough a lifetime struggle.

Gorse gained a foothold in Canterbury because the early settlers required stock-proof hedges. In the absence of timber and wire, gorse fences, established from seed sown on raised banks, have served and continue to serve a useful purpose. In parts of Auckland Province gorse was sown for the provision of sheep feed and to make live hedges. Blackberry was introduced because of the lusciousness of its berries. Both plants grew extremely well—better, probably, than in their native land—and in a young colony with a small population they have quickly spread out of control.

The destruction of gorse and blackberry is a vital problem on many farms in New Zealand. While no completely satisfactory method of eradication has yet been found, there are certain steps which may be undertaken to alleviate the position. These methods are freely examined in this article, and many helpful recommendations are made.

Protected by Thorns.

Gorse and blackberry are perennial plants, and are protected by thorns from man and beast. Blackberry produces long stems which often travel several feet, when they anchor themselves to the ground anew by means of roots before continuing. Thus, large bushes of this plant are formed consisting of an almost impenetrable mass of stems and leaves. Birds spread the seed through their liking for the berries. Gorse spreads only by means of its seed, which is notorious for the length of time it will retain its germinating-powers, and from which it yields a heavy annual crop.

The chief enemy to the spread of these two vigorous weeds is a good, tight sole of grass. Gorse and blackberry do not encroach rapidly where the pastures are highly productive. Where the pasture is open and poor, gorse and blackberry seedlings establish, and, spreading rapidly, entail a considerable amount of work in their control.

The most common method of controlling blackberry is by cutting it close to the ground, and for gorse by cutting and grubbing. In the past the cutting was usually done with a slasher, but now the scrub bar with the safety release mechanism working behind a tractor has resulted in acres being mown in this way. Gorse stems up to the thickness of a thumb can be cut in this manner. Lately

other methods of control have arisen. Some farmers have acclaimed these as successful, while others have condemned them as useless.

The Plant Itself.

Before discussing some of these methods let us examine the gorse-plant. First a seedling with soft clover-like leaves and later a spiney, small plant an inch or so high, it still later grows into a plant with stout, upright, woody stems with sharp prickles, growing up to 7 ft. or 8 ft. high. In time it grows old and dies. The plant is easily killed when it is very young and when it is old. The effect of merely cutting it down with a slasher will frequently kill " old man gorse."

The young gorse-plant can often be destroyed by fire before it flowers and by grazing stock nibbling it close to the ground. However, when the gorse-plant has flowered once, and particularly when it has flowered twice, it is fully vigorous and much more difficult to kill. Hence we have the conflicting reports on the effectiveness of different methods of gorse-destruction.

Vigorous gorse can be destroyed by grubbing it out, severing the tap root about 1 in. below the crown. Once the tap-root is cut it is preferable to pull the plant out with a gloved hand and replace the turf, for the disturbed soil proves an excellent bed for the germination of the gorse-seeds which lie in their thousands wherever gorse has flowered. Whether gorse has been cut or burnt it is a wise plan not to fire it, but to leave the cut vegetation to rot away. A wonderful seed-bed is provided if it is burnt, and thousands of gorse seedlings soon establish on the burn. Left alone, the cut vegetation does smother or check some of the gorse.

If the area is to be grubbed soon after the cutting the dead vegetation may interfere with this operation and may, of necessity, be burnt; if the intention is to plough the area soon after cutting the gorse must be burnt. The burning can, advantageously at times, be delayed until regrowth appears from the old stumps, thus giving the gorse a second setback.

Burning of Gorse.

The burning of standing gorse probably does more harm to the grass and clover competing with the gorse than it does to the gorse itself. The burning of any gorse where no useful purpose is served and where it is not intended to pursue the eradication process further is foolish. The behaviour of gorse would almost lead one to believe that it was evolved on the farm of the man who did much of his farming operations with the fire-stick. Every time mature gorse is fired more gorse is brought to life, which, in two years' time, will be in full vigour of young adulthood.

Chemicals have proved to be of little use in gorse-control. A 5-per-cent. solution of sodium chlorate will kill gorse seedlings in the soft-leaf stage, but let them develop spines, and two or three times the concentration is then required to effect a kill. Left until later, chlorate sprays do little harm.

Attention has lately been drawn to the flame-thrower as a controllant of gorse. One farmer I know effected good control with one burning-off. The gorse, however, was " old man gorse," and a match might have been equally effective. This patch of gorse had stock tracks running through it, and there was a good sole of grass, including much paspalum, under the tall gorse. After being burnt the area was shut up for hay, and no doubt the young gorse seedlings, which would germinate profusely after the burn, were smothered by the vigorous grass-growth. Where the flame-thrower has attacked other gorse areas the victory has not been so easy.

Figure 2 shows an area of gorse and blackberry which has had six flame-throwings. The farmer, Mr. T. Bowker, of Patumahoe, who has carried out the work, is very satisfied with what has been accomplished, for the gorse and blackberry were 5 ft. high twelve months before taking the photograph. The method adopted was one which did the greatest damage to the weed with the least expenditure. First, a light touch of the flame-thrower was given to all the accessible plants, and after this had gone brown the area was fired with a match.

Flame-thrower's Use.

One of the attributes of the flame-thrower is its ability to bring about a burn in this way at any season of the year. This enables the farmer to continue punishing the gorse by burning it at short intervals. A few weeks later, when new growth had commenced, the flame-thrower was used to play on this and to kill the young gorse seedlings which came up. The gorse seedling is killed if just singed with the flame. Later, a fresh

Fig. 2.—The result of the use of the flame-thrower. Twelve years ago the area beyond the fence was gorse and blackberry 5 ft. high.

Fig. 3.—A close-up of a portion of the ground in Fig. 2. The white object is a handkerchief.

Fig. 4.—A flame-thrower at work.

Fig. 5.—Blackberry destroyed by three sprayings with sodium chlorate on a farm at Glenbrook.

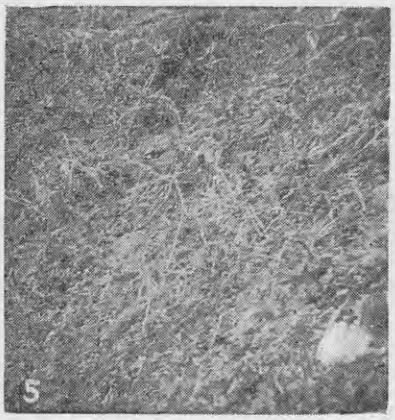

Fig. 6.—Goats eating down blackberry on an infested farm at Paerata. The gorse is practically untouched.

Fig. 7.—A close-up of the blackberry showing how the goats keep the plants defoliated and thereby let in light and encourage grass and clover growth among the blackberry.

attack was made on the accessible tall growth, followed, as before, by the match and a second playing of the flame-thrower to kill the gorse seedlings and check new growth.

When the photograph was taken the area, which consists of about half an acre, had had six flame-throwings and was in a position to be handled by other methods. So far the work has cost 17s. 6d. for the 30 gallons of oil used. Nearly all of the gorse and much of the blackberry has been destroyed, and Fig. 3 shows a close-up of parts where the kill has been good. The more vigorous plants still remain, and blackberry appears to resist the flame-thrower more than gorse.

Farmers sometimes take up farms badly infested with gorse. It is always better to tackle small areas at a time than to try and crush all the gorse at once. Grubbing, cutting the gorse, feeding hay on the poorly grassed portions, and top-dressing to thicken up the sward all tend to eliminate the gorse. The first step is to cut the gorse. This operation should take place in the autumn. Leave the gorse to lie and rot. Stock the area next winter with cattle and sheep if available, and feed much hay on the gorse area. The trampling of the cattle will injure the gorse and will make a seed-bed for the grass and clover seed in the hay. The sheep will nibble at the gorse and keep it in check.

Concentration of Efforts.

Next spring begin grubbing all plants showing any sign of recovery, and apply a heavy dressing of fertilizer and lime, if necessary, to the area. Next year deal with another small area, going back with the grubber whenever necessary over the area previously tackled. If the work is concentrated in this manner, and the farmer reminds himself that what is in thick gorse cannot become worse infested and is better left alone than tackled in a half-hearted fashion, then real progress will be made. A large area cut and burnt looks tidy, but is a large accomplishment for only a short time.

Farmers hesitate to plough gorse-infested areas because of the danger of making a very fine bed for the gorse-seed to germinate in their millions. Once he has ploughed he knows that he must continue with the cultivation until he has germinated almost every seedling and destroyed it. Once it has germinated, the young seedling is easily destroyed by cultivation and by a smothering crop. Autumn-sown crops, such as Italian rye-grass and oats for winter grazing, are excellent for this purpose.

Once the old gorse has been destroyed by the cultivation and the majority of the seeds germinated the area can be laid down to permanent pasture in the autumn. If the permanent grass is sown early on a good firm seed-bed, with plenty of suitable fertilizer and lime so that it begins growth quickly, enabling the area to be stocked early by numerous grazing animals, the seedling gorse will suffer from the smothering effect of the fast-growing grass and from the trampling and nibbling of the numerous stock. If the grass is slow in developing and the growth is poor the gorse will grow out of the delicate baby stage before the stock are likely to harm it. It can be seen, therefore, that it is particularly important to sow permanent pasture only when conditions are likely to be ideal on gorse-seed-infested ground.

Gorse as a Feed.

Stock are fond of young gorse. In the Karaka, a district to the south of Manukau Harbour, gorse was once drilled on large estates for the provision of sheep feed on land that at that time was too poor to grow other crops. After grazing, the young gorse was destroyed

Fig. 8: A tethered goat patrols the roadside of her owner's property. Note the infestation of blackberry on the neighbour's roadside. Fig. 9: A close-up of the roadside at the junction of the two properties. Goats prefer blackberry leaves to pasture. Fig. 10: Photo taken in September shows Mr. C. G. Hawken, of Kopuku, standing among Glyceria aquatica which has replaced tall blackberry. Behind Mr. Hawken is to be seen the tall blackberry against which this vigorous grass is advancing. Fig. 11: A slightly drier portion of the swamp on Mr. Hawken's farm where the ground is dry under foot in winter and where phalaris arundinacea, with some assistance from the slasher and fire, has eliminated vigorous blackberry growth in twelve months. The white object is a handkerchief.

by ploughing it in. Unfortunately, some of it must have been left, because gorse was afterwards very prevalent in that district.

On dry soils in dry climates the sowing of gorse-seed for sheep feed may still be of some value, but the plant has become such a nuisance that the very thought of it is horrifying to most farmers. Once gorse ages it is not liked by stock, which eat only the tender young shoots. Sheep are more fond of gorse than cattle, and are commonly used to control it, but all they do, however, is to keep it somewhat in check, except when it is a seedling.

Unaided by grubber or slasher and good grass-growth, gorse will outgrow the sheep's efforts to keep it in check. Even in cold climates where feed is scarce in winter the gorse-plant will, besides providing young shoots for the sheep, gradually elongate its main stem and branches, until one day one young shoot grows beyond reach of the sheep. Horses nibble gorse, but as a controlling factor they are never numerous enough to do much good.

Stock, as controllers of gorse, are not very effective, because they will graze it hard only in times of feed-scarcity. At other times the gorse is left well alone, and, with its vigorous growth, it soon makes up for lost time. Grazed gorse protects its stems from damage by grazing stock by the springing-up of numerous branches bearing many spines, so that it looks like a pin-cushion.

Attacking Blackberry.

Blackberry is generally attacked with the slasher or mowing-machine. Continual cutting will destroy blackberry, but generally it takes a long time and is then only accomplished with the aid of a good sole of grass. Grubbing does more harm to blackberry than cutting, but it is not so effective on this plant as on gorse. Nevertheless, it probably should be more regularly employed. Heavy harrowing damages blackberry, for it lacerates the stems and is an easy and quick method of attacking blackberry a foot or so high in a pasture.

Whatever method of attack is used, success will not be secured unless the grass pasture is encouraged by top-dressing. Because of its vigorous growth, one of the best grasses to fight against gorse or blackberry is paspalum, which can be established by feeding paspalum hay on the area, or, better still, by seeding it and *Lotus major* among the burnt-out areas of blackberry in late November. Seeding is essential where blackberry has grown so thick that all pasture plants have been smothered.

Wherever the pasture is very poor, or where it does not exist, it pays, if possible, to plough blackberry-infested areas. Two or three ploughings with or without crops between will, with the cultivation, eradicate almost all of the blackberry. Cultivations should aim to bring the old blackberry roots to the surface, where

they can be dried and burnt or carted away. When the ground is clean, permanent pasture can be sown.

Sheep are fond of blackberry, and readily eat the young leaves. Blackberry growth is slow from May until September, but it grows rapidly in the spring. Sheep can keep blackberry in control in the winter, but in the spring, when other fodder is plentiful, they do not effect much control, and it is at this time that the farmer desires control.

Control by Goats.

Goats, as shown in Figs. 6 and 7, effect exceptionally good control of blackberry, and in winter will not allow a leaf to develop. In the spring the blackberry does develop a few leaves, but its vitality is low, and in the end goats, plus the top-dresser, will eliminate it. About two goats per acre are required on thickly-infested blackberry country. They eat very little grass while blackberry leaves are available.

The trouble with goats is their tendency to wander and help the neighbour out also. While this is often quite desirable, it does not encourage the purchase of goats for blackberry-control. Blackberry constitutes little difficulty on ploughable areas; it is on inaccessible and unploughable country that blackberry is a menace. There the goat reigns supreme, and is the best method of eradication.

Blackberry is very frequently a nuisance on roadsides. Top-dressing and stocking cannot help to control the blackberry here, and on many farms cleared of blackberry and gorse the weediness of the roadside remains a problem.

Figure 8 shows the way one goat, tethered by a chain, is keeping the blackberry on the roadside controlled. Note the blackberry on the neighbour's area, to which the goat is not allowed access. All who have blackberry on their farms should read the interesting article by Mr. H. Guthrie Smith in the *Journal of Agriculture*, January, 1929, on "Blackberry Control by Goats."

Use of Sodium Chlorate.

The use of sodium chlorate deserves some mention. One spraying of a 5-per-cent. solution of sodium chlorate in May will result in the plant lying dormant for five or six months. Spraying thick blackberry every autumn with a 7-per-cent. solution for three years has resulted in most of the blackberry being killed, and has enabled a fair sole of grass to establish, which, top-dressed and with a few more sprayings, should result in clean pasture. Spraying appears to be more effective in controlling blackberry than does the flame-thrower. The reverse can be said for gorse.

In alluvial swamps blackberry grows to perfection, making masses of growth up to 7 ft. or 8 ft. high. Where the swamp is very wet, *Glyceria aquatica* (*Poa aquatica*) established among it will soon destroy the pest. I have watched for several years a large swamp of 500 acres at Kopuku which was almost completely covered with dense blackberry. The *Glyceria aquatica* has been established here and there throughout the swamp. It has taken charge of about half the swamp, having ousted the blackberry. It is still fighting against the remaining blackberry, and in a few years' time there should be none in this swamp.

Glyceria aquatica is a grass with underground running stems or rhizomes. A plant established among the blackberry sends out rhizomes in all directions, from which arise a forest of upright stems, bearing seed-heads. A circular patch of *Glyceria aquatica* soon develops, in which the blackberry is completely destroyed. Along the margin of the *Glyceria aquatica* and blackberry the fight goes on. The *Glyceria aquatica* grows up and, leaning against the blackberry with its dense foliage, gradually smothers it. In this way, much in the manner a man advances over blackberry using a plank, this grass will overcome blackberry twice the height of its leaves.

Blackberry Smothered.

It advances against blackberry in a face, like a wave rolling over the shore, the only difference being that the wave in this case is steady in its advancement and does not recede. Once smothered, the blackberry, however tall and thick it was, has no chance to re-appear. The tiny circle grows larger, and so steady is the advancement that the circular shape is often maintained until it is quite large in dimension. *Glyceria aquatica* can be aided in its attack against blackberry by firing along its line of march in the early spring.

In alluvial swamps which are not very wet, even where the ground is not covered with water over winter, another grass assisted a little by cutting, will quickly smother blackberry. This grass is *Phalaris arundinacea* or reed-canary grass. This grass will also live where the water lies in the swamp 2 ft. deep in winter, but it appears more vigorous where the water is not so deep. Both these grasses are most surely established by plants, but seed sown in the ash of blackberry bushes in the spring often results in good strikes. Both plants are high yielding and palatable.

Glyceria aquatica is the higher yielder and more suitable for swamps where water lies deep over the winter, while *Phalaris arundinacea*, which is the more palatable of the two, is more suited for areas where water does not lie at all or does not lie deeply over the winter. Both plants withstand fairly heavy frost and, if well grazed, grow all the year round, but their heaviest growth occurs in the summer, when they out-yield other grasses. A swamp of 65 acres at Kopuku, once in dense blackberry and now carrying a dense growth of these two grasses, has been reported to graze over the summer months more than three hundred head of stock, the majority of which were milking cows.

Farmer Avoids Trouble with Club-root.

A farmer on the Taieri has had a paddock under cultivation for the past sixteen years. Every second year it has been in mixed brassicas and mangels. Club-root is hard to find in most parts of the crop. The farmer states that he has not been troubled with club-root in this paddock at any time. His programme is as follows: Following turnips the paddock is sown down to oats and peas for hay. After this has been cut the paddock is ploughed, worked down and sown in early autumn with oats. These are ploughed in during the spring and the paddock sown down with swedes, chou moellier, &c. This completes his two-year rotation. One ton of carbonate of lime is applied annually. All the brassicas are carted out of the paddock, being fed to the stock in stalls or grass paddocks.

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Iodine Naturally Available To Live-stock.

Extra Iodine Is Required Only In Certain Districts.

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MOST people are familiar with the term "ductless glands" and are aware that certain glands and organs in the body secrete chemical substances which pass into the blood-stream and control some process vital to the life of the animal. One of these glands, the thyroid, is a soft body lying with a lobe on each side of the wind-pipe, the lobes being connected by a bridge across the "Adam's apple."

The secretion of this gland controls growth and basal metabolic rate of the animal. Animals born with glands which do not provide sufficient secretion are hairless and deformed or stunted, and will not attain maturity unless treated immediately. Such glands become grossly enlarged, and in the human are recognized as "goitres."

Iodine and Goitre.

Ever since the discovery that the element iodine occurs in the thyroid gland research workers have endeavoured to show that a deficiency of this element is the cause of goitre. The greatest authority on the subject, Sir Robert McCarrison, has found several different factors which may cause goitre, but has stated that, whatever is the primary cause, goitre can be prevented if a sufficient supply of iodine is available to the animal. The importance of iodine to health is now generally recognized, and it is desirable to realize how the element is obtained by the animal.

A survey to determine what iodine is available to stock in New Zealand from natural sources was recently undertaken, and a broad outline of the results is given in this article. Indications are given where it is advisable to provide extra iodine for the stock.

Occurrence of Iodine.

Iodine occurs in minute amounts in all rocks and in sea-water. Plants have a tendency to concentrate iodine within their tissues, and this is particularly noticeable in the case of water-cress and seaweeds. Soil, being derived from rock, contains a small amount of iodine and becomes enriched in that element as humus accumulates.

It seems certain that the soil iodine is the main source of iodine upon which man and animal alike depend, usually through the medium of vegetable food.

Position in New Zealand.

In New Zealand the common occurrence of goitre in humans and occasional cases of goitre in live-stock point to a generally low level of iodine in some soils in this country. Farmers have been prompted to supply iodized licks to their stock without any definite need for such licks being demonstrated.

The purpose of this survey was to determine the status of farming districts in New Zealand so that advice could be given as to the use or necessity for iodized licks for stock.

Present Investigation.

For the purposes of the Department it was decided that the survey could be based upon the iodine content of glands taken from fat lambs at freezing-works. It is claimed that this direct approach allows for nearly all factors disturbing the balance between the iodine available to the stock and the iodine required by them for complete health under the conditions in that area. If many of the samples of glands from one district are low in iodine it is concluded that stock in that district do not get sufficient iodine and iodized licks may be recommended.

In the course of the survey approximately two thousand samples were analysed, mostly of six glands each taken at random from a mob of lambs at the works. On an average of fifty lambs to each draft the twelve thousand glands analysed represented samples from one hundred thousand lambs.

Results and Conclusions.

The results have been published in detail in the *Transactions of the New Zealand Royal Society*, and are outlined

below. The districts surveyed are classified broadly into three classes:—

(*a*) High in iodine where the average iodine content of the glands received approached or exceeded 0·30 per cent. iodine on the dry weight.

(*b*) Medium when the iodine content was about 0·20 per cent. iodine.

(*c*) Low when the iodine content was about 0·15 per cent. iodine or lower.

The broad classification of results and only approximate boundaries of districts have been used, because the iodine content of glands is very variable and it is impossible to indicate any area and state that goitre will occur there unless iodized licks are used. The most that can be said is that most glands received from that area are low and that it is advisable to provide extra iodine for the stock.

North Island.

Auckland.—North Auckland is high in iodine. The Waikato district is high, with the exception of small areas in the vicinity of Hamilton and Taupiri, which are medium. The Bay of Plenty was sampled around Tauranga only, which gave very high figures. Poverty Bay is high in iodine towards East Cape and medium round Te Karaka and Patutahi. The King-country and West Coast are high.

Taranaki.—This province was not sampled very completely, as few suitable lambs were available. The results obtained are uniformly high throughout the area.

Hawke's Bay.—Medium in most areas, tending to low in the vicinity of Hastings, Waipawa, and Waipukurau.

Wellington.—The coast west of the ranges is medium from Wellington to Levin and from Kai Iwi to Waverley. Between Shannon and Wanganui the results are low. The Taihape and central district are medium. Wairarapa is generally high, but medium on river-flats.

South Island.

Nelson.—High at Collingwood and Moutere, and medium throughout the rest of the area north of Glenhope. The Buller Valley area is low.

Westland.—Low throughout the area, and very low in the Grey Valley.

Marlborough.—The Marlborough Sounds and adjacent areas are medium in iodine content, but D'Urville Island is high. The Wairau Valley is medium, tending to low around Blenheim. The Upper Awatere Valley is low, but the lower valley is high. The area from Cape Campbell to Ward is high, but south of this to Kaikoura is low.

Canterbury.—Generally, the Canterbury Plains are medium in iodine content. Low figures are obtained from river-flats subject to flooding. Banks Peninsula and Timaru are high.

Otago.—Medium to high in the north and low in the Clutha Valley. The dry districts in Central Otago tend to be very high, but low figures have been obtained for samples from the Lake districts.

Southland.—Low to medium in the river valleys.

Practical Points.

"*Low*" *Areas.*—In the areas classed as "low" the regular provision of iodized licks can be recommended. A lick containing 10 oz. of potassium iodide to the ton should be ample for this purpose, and although many licks are advertised as suitable for curing all stock ailments only reputable licks clearly branded with the iodine content can be relied upon to contain a sufficient amount of iodine.

It is interesting to note that recently workers in the United States have claimed that iodized *blocks* cannot be relied upon to prevent goitre, as the action of the sun, moisture, and air liberates the iodine from the surface layer, and as this non-iodized layer is licked off another layer is exposed which, in turn, loses its iodine.

Experiments in feeding iodized licks in Southland (New Zealand) gave very erratic results, and it seems highly probable that losses of iodine occurred in the manner just suggested in addition to leaching by rain. Such losses could be diminished by using loose licks in covered boxes, putting out only sufficient for a week or less at a time.

"*Medium*" *Areas.*—In the areas classed as "medium" the stock should generally get sufficient iodine, although under abnormal conditions deficiencies may occur. This was illustrated in North Canterbury where the iodine content of glands in one season was only one half that in the previous season. In such districts it would be as well to give iodized licks to breeding-ewes in order to provide additional iodine, as their need is then greater, and to ensure that the lambs are adequately provided for until weaned.

"*High*" *Areas.*—The provision of iodized licks should not be necessary in these areas.

Checking Iodine Supply.

The question of iodine supply may readily be checked if the thyroid gland is inspected when an animal is killed for home consumption. In lambs any glands whose separate lobes are much larger than an almond kernel should be suspected as being deficient in iodine, and the local Veterinarian or Stock Inspector should be consulted about the use of an iodized lick.

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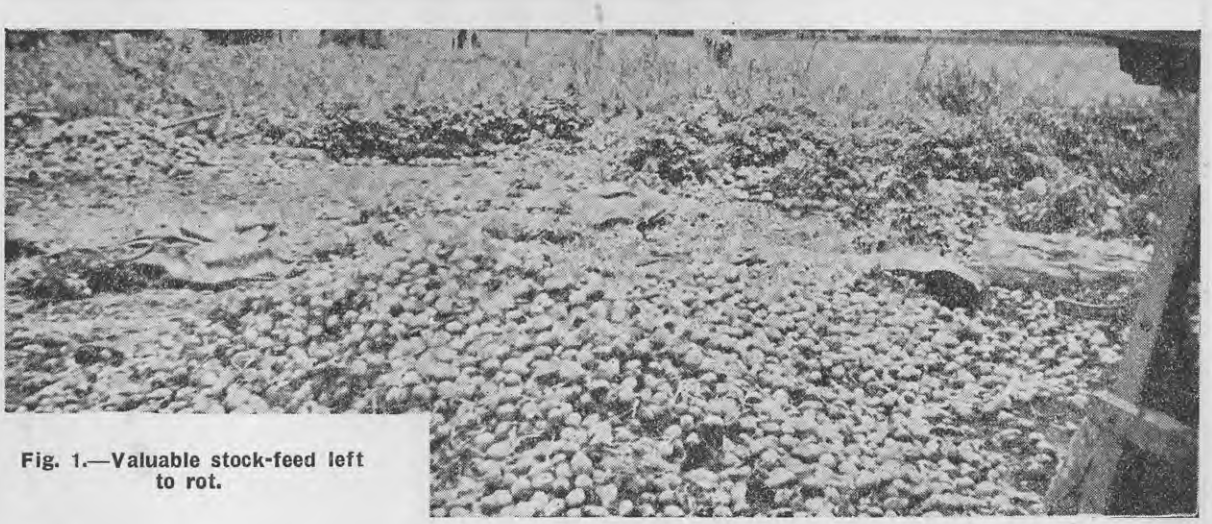

Fig. 1.—Valuable stock-feed left to rot.

Converting Surplus Potatoes Into Valuable Stock Feed.

Utilizing Potato Silage to Eliminate Waste of Crops.

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GROWERS of potatoes in New Zealand are periodically faced with a surplus crop for which they have no sale and no alternate way of disposal. On such occasions many tons of potatoes are wasted when they could be converted into valuable feed for all classes of stock. This state of affairs has arisen this year in Canterbury, and in many instances potatoes could be obtained for pig-feeding by those who would take the trouble to cart the tubers.

This does not occur every year, but there are men who grow large areas of potatoes regularly and after sorting and grading have a large quantity of pig potatoes on hand for which they have no immediate use. Generally, these potatoes are left to become soft and useless.

This is particularly so in the late spring and in cases where the grower has held his potatoes in the hope that the price will improve. By this time there is plenty of other feed for his stock, and the pig potatoes are left to rot. If these surplus potatoes had been available in the previous winter, or if they could be preserved until the following winter, they would be a valuable feed for all classes of stock.

Surplus potatoes which are often wasted can easily be converted into valuable feed for all classes of stock. Potato silage, for instance, offers a cheap and valuable source of feed by preserving the surplus potatoes for future use. Several methods of making this silage are described in this article.

Two Methods.

The problem of surplus potatoes is not peculiar to New Zealand but is present from time to time in Britain and in Northern European countries. There the position has been met by making potato silage. Two methods of silage-making are used. One is to preserve the potatoes by placing them in layers in grass silage stacked in the usual way. This method gives a type of silage suitable for stock other than pigs.

The second method is by preserving the potatoes in pits either after cooking them or by slicing and pitting the raw potatoes with a small quantity of fermented maize-meal. The latter methods give a type of silage suitable for pigs and all other classes of stock. Not only can sound potatoes be used for silage, but damaged or slightly diseased tubers can also be used, provided they are cooked.

Unfortunately, Canterbury makes very little grass silage for its stock, and the amount of potatoes that would be saved at present by this method would be very small. There is no reason, however, why the other types of silage cannot be made, and where too small a quantity of the tubers are available for pitting they can be successfully preserved in oil-drums or discarded water-tanks. A thin layer of the surface material becomes unpalatable through exposure to the air, but underneath this layer the silage will be quite good.

Provision of Feed.

The provision of a cheap winter feed supply for sows and late autumn litters is one of the problems of the pig industry of New Zealand and is often as acute on mixed farms of the South Island as on the grass farms of the North. Potato silage, then, offers a cheap and valuable source of feed from a product which is otherwise wasted. It can be used either for winter feeding or fattening early spring and late autumn litters when the skim-milk supply is insufficient.

Potatoes alone are not, however, a satisfactory feed, and when skim-milk is absent or when less than one or two gallons per head is available potatoes should be fed in conjunction with meat-meal, peas, or some other protein concentrate. With the protein concentrate may be fed as many potatoes as the pigs will consume.

While the publication of this article will be too late for the 1938 crop of potatoes to be utilized in silage-making there will be surplus supplies in the future, and the following directions for making the various types of silage, together with illustrations of the process, give the necessary information for making either type of silage. The photographs and methods have been taken from the *Journal of the Ministry of Agriculture*, December, 1931 ("Potato Silage." Wallace and Thompson; Agr. Inst., Kirton) for which methods, &c., acknowledgment is made.

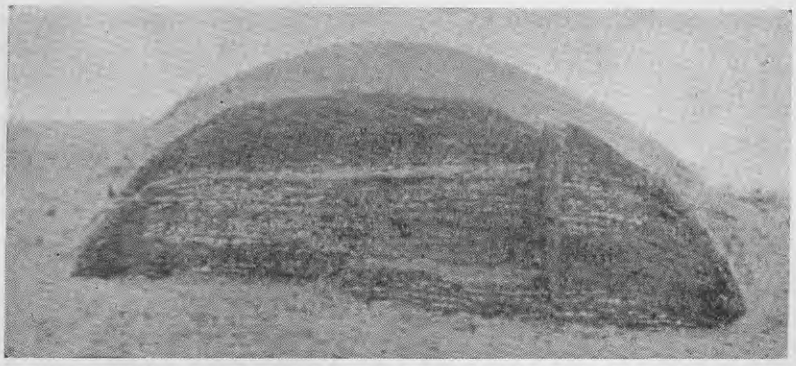

Fig. 2.—Silage made in May, 1930, and photographed a year later.

(1) Stack Silage.

A layer of green crop, 1 ft. thick, was placed evenly over the ground. A layer of 1 ton of potatoes was then spread evenly over the green crop. The potatoes were put over a riddle to remove loose soil and the young sprouts that had begun to grow. For convenience in handling the tubers were transported in bags. A run-over heap was made to secure the necessary consolidation. The green crop and potatoes were placed in alternate layers.

When complete, the sloping ends or ramps were cut away and the material thrown on the top. The following day a layer of about 6 in. of soil was placed evenly over the top, and a few days later the sides were also covered with soil. A further layer of 3 in. of soil was also placed on the top.

Very little wastage was found when the silo was opened. The grass silage was sweet and pleasant to the smell.

Where the heat had been greatest the tubers were partly cooked and quite sweet. Where there had been less heat the tubers were white in the flesh and slightly tough. There was practically no exudation of liquid from the silo. The silage was still in condition last month (November).

(2) *Potatoes Steamed and Pitted.*

The pit should be prepared on a convenient piece of dry ground near to the feeding-pens. If water is likely to be troublesome, means should be taken to get rid of it. The pit should be made about 6 ft. to 7 ft. wide, and about 2 ft. 3 in. to 2 ft. 6 in. deep. The sides should slope slightly inwards. The potatoes should be cooked in a steamer or copper and then transferred to the pit, into which they should be tightly packed. They should be well raised into a ridge in the middle. The sides and top of the ridge should then be covered with straw, on which should be placed about a foot of soil.

Potatoes made into silage in this way may be fed to pigs without any further preparation. Silage made by this method in May, 1930, was still in good condition last month (November), when it was being fed to pigs. Partly blighted potatoes which could not be otherwise ensiled may be preserved for stock-feeding if made into silage by this method.

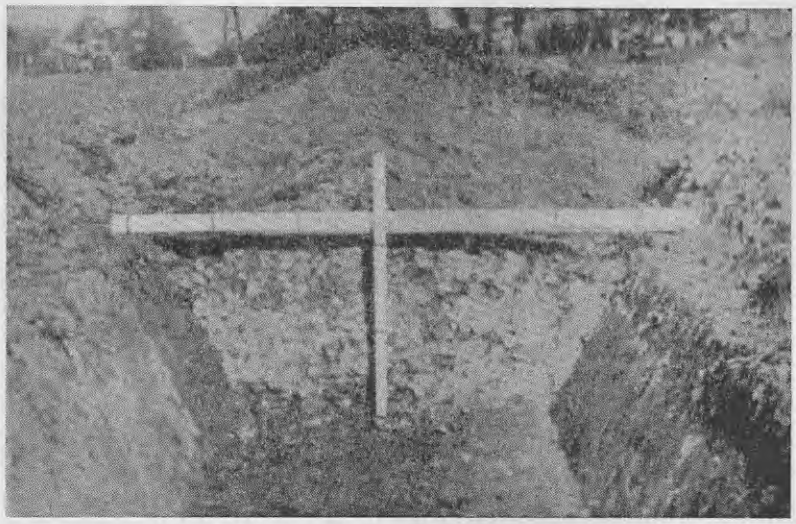

Fig. 3.—Showing the dimensions of the pit silo.

Observation trials have shown that pigs readily consume this silage, and that thus fed they do as well as pigs fed on standard balanced rations containing freshly-steamed potatoes. The silage is used in the ration in the same proportions as freshly-cooked potatoes.

(3) *Potatoes Sliced Raw and Mixed with Maize-meal.*

The steaming of potatoes adds somewhat to the cost of feeding, and for cattle it is neither necessary nor desirable. In this method steaming is dispensed with. The potatoes are sliced in a root pulper, and are placed in a pit similar to that described under method 2. At the same time, a small quantity of fermented maize-meal is mixed with the potatoes.

The maize-meal should be prepared two days previously. It should be thoroughly saturated but not made sloppy, and should be allowed to become sour before being mixed with the potatoes. About 5 per cent. by weight of soaked maize-meal is required, or approximately 1 cwt. per ton. Maize-meal will increase in weight by about 75 per cent. when soaked. The pit should be finished off in the same manner as already described. Silage thus made was readily consumed by both cattle and pigs.

Conclusions.

The methods described of utilizing surplus, waste, or chat potatoes provide a satisfactory means of preserving them for future use.

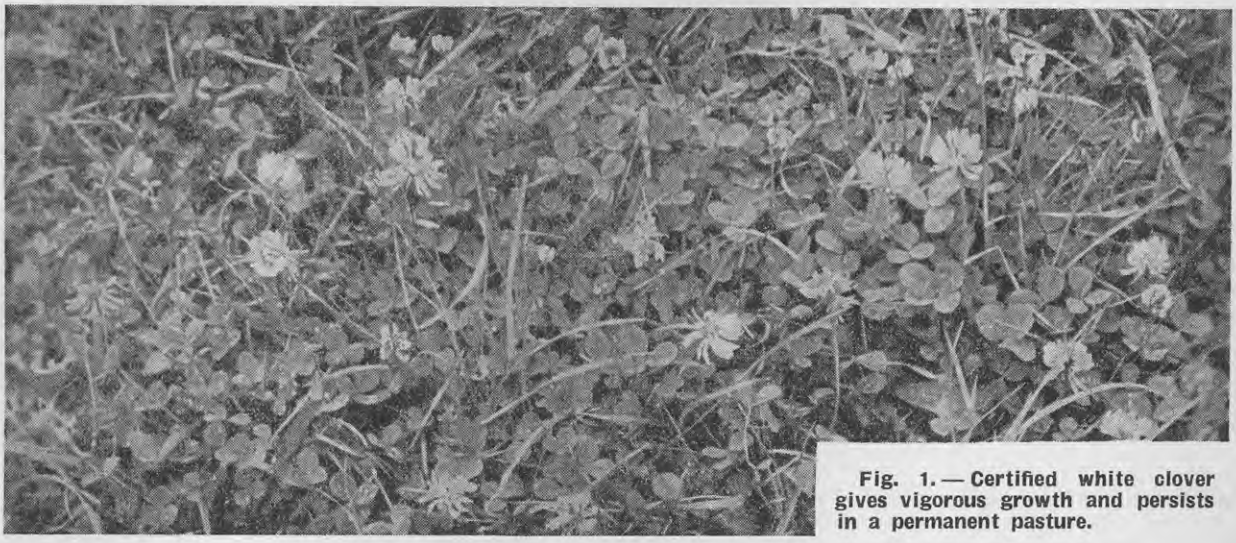

Fig. 1. — Certified white clover gives vigorous growth and persists in a permanent pasture.

Don't Gamble With Your Pastures.

Only Certified Strains of Grass and Clovers Will Give Good Results.

A. C. BURGESS, Assistant Experimentalist, Ruakura.

BEFORE the seed-certification scheme was inaugurated by the Department of Agriculture a few years ago farmers had no guarantee that any seed they bought would resist in a permanent pasture. The best they could do was to buy their seed from an area such as Hawke's Bay, which had a reputation for good seed. However, pasture-seeds can now be purchased with a certificate bearing a guarantee that the seeds are harvested from truly permanent pastures, and if these certified seeds are sown one can be sure that the pasture will last many years under reasonable management.

In these days of more intensive farming methods a farmer cannot afford to gamble with his pastures. If he is sowing down an area in new pasture he must be sure that the result will be a highly productive long-lived sward and not one that will thin out and give way to weeds after the first year or two. Yet there are still farmers who, although they spare no effort to get a good seed-bed and apply liberal amounts of fertilizer with their seed, will sow uncertified seeds merely to save expense.

Saving money in using poor, uncertified seed is false economy. A pasture sown with good certified seeds can be expected to last for ten to fifteen years, while the same pasture similarly treated but sown with uncertified seed will probably be a good pasture for only about one season, and in a few years will have to be ploughed and resown.

In these days of more intensive farming methods a farmer cannot afford to gamble with his pastures. Strain trials carried out at Ruakura during the past four years have shown conclusively that only if certified seeds are sown can good results be obtained in permanent pasture.

Strain Trial at Ruakura.

A trial carried out at the Ruakura Farm Training College over the past four years has shown conclusively that for permanent pasture good results can be obtained only if certified seeds are sown.

The area was ploughed out of pasture and sown down in March, 1934, and throughout the period of the trial all plots have received exactly the same manurial treatment and management.

Certified perennial strains of rye-grass were compared with good South Island strains, British commercial, and mass-selected station-bred lines. False perennial types were also included.

After the first six or nine months of the trial the uncertified (South Island) and imported strains began to show much poorer recovery after grazing, and did not make such vigorous growth as the certified and station-selected lines.

Points Table.

The following table shows the average number of points given to each plot at each inspection (maximum = 10) :—

	Points.
Italian rye-grass	0
Western Wolths rye-grass	0
Certified perennial rye-grass (mother seed)	7
Bad false perennial	1
South Island perennial	3½–4
Certified perennial (first harvest)	6–6½
South Island perennial	4
Bad false perennial	1½
Station selection perennial	8
Irish perennial	3
Certified perennial (mother seed)	8
Station selection	10

Fig. 2.—Uncertified white clover sown with the same mixture as Fig. 1.
[H. Drake, photo.

These points were based on the amount and vigour of perennial rye-grass in the sward. The station-selection lines have proved slightly better than the certified mother seed. It is from lines selected and bred at the Plant Research Station that our pedigree seed is derived, and this seed is the highest quality available. Nevertheless certified mother seed and certified permanent-pasture seed can be relied upon to provide a truly permanent pasture if climatic conditions and management are suitable. It will be seen from the points given above that, at their best, the uncertified types have been showing only fair results.

New Zealand strains of cocksfoot were compared with Aberystwyth (Wales) and Danish lines. During the early period of the trial New Zealand certified Akaroa cocksfoot was superior to all imported lines. After about twelve months the cocksfoot began to be less in evidence, and was replaced by weeds.

Timothy seed grown in New Zealand was compared with American-bred lines, but this species did not at any time provide much feed, and it is doubtful whether timothy, or even cocksfoot, can be considered as very valuable components of Waikato pastures under normal grazing conditions. Cocksfoot is undoubtedly a most valuable grass under certain conditions, but in high rainfall areas, where the pasture is managed to suit rye-grass and white clover, cocksfoot will not readily thrive.

Clover.

Certified and uncertified strains of New Zealand white clover were sown in comparison with imported Kentish and Danish seed and a Plant Research Station selection. These plots have given very interesting results. Although all strains grew well during the first season, the imported Danish strains soon began to thin out and were not nearly as vigorous as the certified types. Imported Kentish seed continued to make quite dense growth, but it is a small-leaved type and much lower in production than the New Zealand types. As the trial progressed the most persistent and highly productive strains were the certified strains, with a station-selection line outstanding.

The differences between various strains of red clover were never very marked, although a line bred at the Plant Research Station appeared slightly better than the others. It appears very doubtful whether red clover is a necessary or valuable constituent of first-class mixtures on high fertility land such as that on which the trial was carried out. Undoubtedly it holds a very important place in mixtures on poorer land, where it gives a large bulk of feed in the early life of the pasture and builds up the fertility of the soil.

Subterranean clover strains were compared, but here again, although subterranean clover plays an important part in building up the fertility of light land and under low rainfall conditions, it cannot compete with vigorous white clover in the Waikato.

Simple Mixtures.

A series was sown containing as a basal mixture 25 lb. certified perennial rye-grass, 10 lb. certified Akaroa cocksfoot, and 3 lb. certified white clover. To this mixture one of the following species was added in each plot and the swards of each compared: Crested dogstail, timothy, *Poa trivialis*, paspalum, Italian rye-grass, Western Wolths rye-grass, Alsyke clover, broad red clover, Montgomery red clover, *Lotus major*, and subterranean clover.

Each of these added species has shown up to some extent, but it can safely be said that none has improved the existing rye-grass - white clover sward, with the possible exception of paspalum which, however, was slow to establish and was not much in evidence during the first two seasons. During last summer the paspalum produced more green feed than the other plots and demonstrated the value of this grass under dry conditions.

Probably the most interesting series in the trial was the one in which different strains of the rye-grass - cocksfoot - white clover base were sown. Three selected strains of rye-grass were used—Akaroa and Aberystwyth cocksfoots, New Zealand No. 1, and Kentish and certified permanent pasture white clovers. The main differences have been in the growth and persistency of the rye-grass in each plot.

Fig. 3.—Certified rye-grass forms the basis of high-producing swards.
[E. R. Marryatt, photo.

Type 1 rye-grass proved to be a high-producing truly permanent strain, type 3 was a poorer type of a more temporary nature, while type 5 appeared to be a purely temporary type and disappeared from the sward almost completely. A point analysis was made of the pasture on each of these plots in October, 1935, when the trial had been in progress eighteen months. On type 1 plots the average rye-grass content was 95 per cent., while on type 3 and type 5 plots it was 72 per cent. and 41 per cent. respectively.

The New Zealand certified types of white clover have been more productive than the Kentish, which has also been replaced to some extent by volunteer growth.

Well-balanced Mixture.

A mixture was sown containing perennial rye-grass, cocksfoot, white clover, red clover, Italian rye-grass, timothy, paspalum, and crested dogstail. Varying amounts of rye-grass, white clover, red clover, cocksfoot, and Italian rye-grass were sown in turn to study the effects of different quantities of each on the establishment and subsequent growth of other species, and to determine the best quantity of each to sow.

Very small quantities of rye-grass in the mixture produced a poor sward, and the plots containing 10 lb. and 15 lb. per acre of rye-grass were always noticeably poorer and thinner than those receiving more seed. Rye-grass at 25 lb. to 30 lb. per acre appears to have given as good results as any other, and heavier seedings than this have not been of any more value. Very little difference could be seen between the varying amounts of cocksfoot sown, but not more than 8 lb. to 10 lb. per acre should be included in a mixture.

Fig. 4.—Uncertified rye-grass; sward open, and rye-grass is being replaced by weeds and volunteer clover.

[E. R. Marryatt, photo.

No extra benefit could be detected from adding more than 2 lb. to 3 lb. of white clover to the mixture, and, provided the seed-bed is firm and suited to the establishment of white clover, 2 lb. to 3 lb. will be sufficient to form a good cover of clover and a dense sward in association with rye-grass. Red clover provided but little feed in the pasture, and differences between plots receiving varying amounts of seed were very small.

Varying rates of Italian rye-grass showed that, although it provides early feed in the first season, too large a quantity of this species is liable to cause the resulting pasture to be thin and open. Where it is used, 10 lb. per acre should be quite sufficient, and again it is probably not advisable to include it in Waikato permanent pasture mixtures.

Conclusion.

From the results of this trial certain points are important.

(1) In the rye-grass and white-clover strains the New Zealand certified types have produced more feed and lasted longer in the pasture than the uncertified and imported types.

(2) Cocksfoot, red clover, timothy, subterranean clover, crested dogstail, *Poa trivialis*, *Lotus major*, paspalum, and Italian rye-grass have all been included in mixtures, but they have not really contributed much to the sward. Under dairying conditions cocksfoot and red clover may be quite valuable components of the mixture, especially where grazing is not too severe, but under sheep grazing or close and continuous grazing with cattle even these species will not thrive.

(3) For a good rye-grass - white-clover pasture not less than 20 lb. to 25 lb. of rye-grass per acre should be sown.

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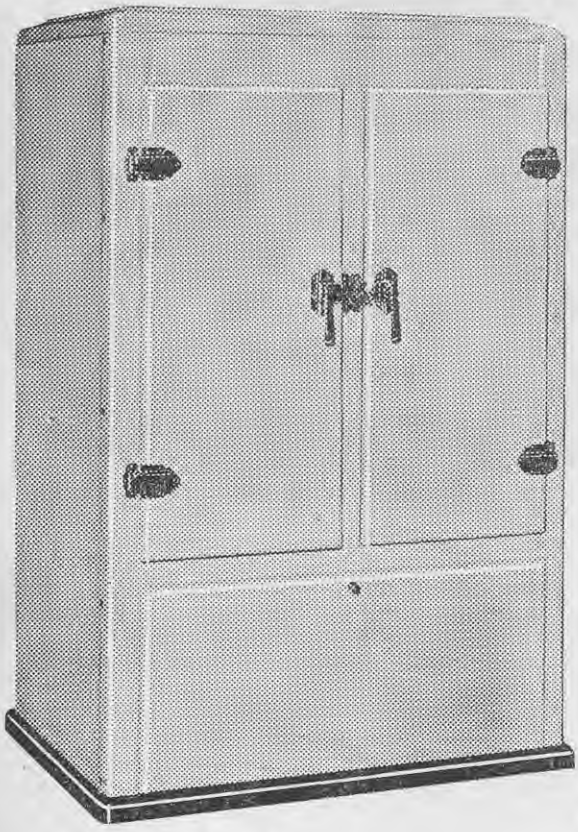

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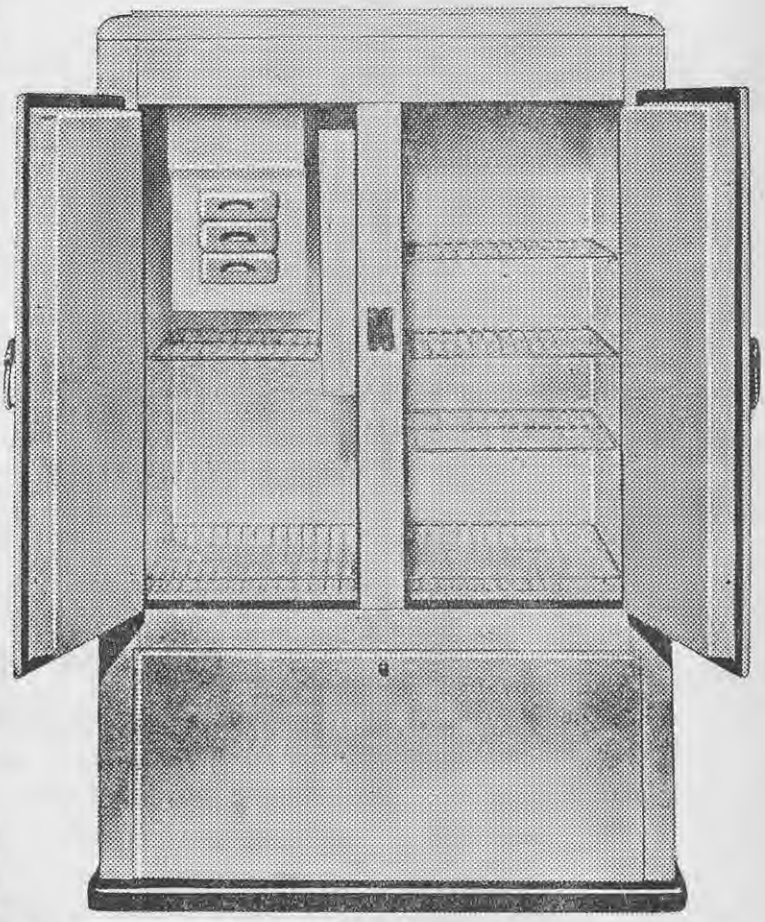

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Export of Apples and Pears During 1939 Season.

Conditions of Government Guarantee.

CONDITIONS for the Government guarantee on shipments of apples and pears made from New Zealand during the 1939 season are as follows :—

1. The guarantee shall be limited to approved varieties and classes of apples and pears packed in compliance with the requirements of "Extra Fancy," "Fancy," and "Good" grades, and shipped or loaded for direct shipment from any port in New Zealand on or before the 25th May, 1939, to the following markets: United Kingdom, Continent of Europe, Scandinavia, United States of America, South America, Panama, Canada, Jamaica, North Africa, Egypt, Palestine, and Eastern markets. Shipments made after 25th May must have the prior approval of the Hon. Minister of Agriculture. Provided, however, that the varieties Dougherty, Rokewood, and Tasma shall be admitted under the guarantee if they are shipped or loaded for direct shipment from any port in New Zealand on or before the 10th June, 1939; and that shipments of approved varieties and classes of apples and pears to Eastern markets are shipped or loaded on or before 31st August, 1939.

2. The Government guarantees to the grower a c.i.f. return of 11s. (New Zealand currency) per case in respect to those varieties of apples and pears set out in Table No. 1 appended hereto, and such other varieties of apples and pears as may be approved by the Hon. the Minister of Agriculture, graded, packed, and exported by the grower, or on his behalf, in accordance with the conditions set out herein and in the leaflet issued by the Department of Agriculture entitled "Export of Apples and Pears, 1939 Season—Export Regulations."

3. The guarantee shall be limited to apples and pears grown and shipped (otherwise than under f.o.b. contract) by *bona fide* fruitgrowers, or fruitgrowers' co-operative societies, through the New Zealand Fruit-export Control Board.

4. Any grower who exports any portion of his fruit crop outside the guarantee, unless he has obtained written approval from the Director of the Horticulture Division to do so, shall be deemed to have forfeited his right to participate in the guarantee with respect to all fruit exported during the season by him or on his behalf.

5. All apples and pears to qualify for the guarantee must be passed by an Inspector of the Department.

6. Payment of claims under the guarantee shall be calculated on the basis of the average c.i.f. price (New Zealand currency) per case received by the claimant in respect of the whole of the fruit exported on his account during the season to all markets, and only the deficiency between the average c.i.f. price realized for such fruit and 11s. (New Zealand currency) c.i.f. per case shall be payable under the guarantee.

7. Where, however, apples or pears of more than one variety and supplied by more than one grower are exported by a joint packing company or group in its own name, the guarantee shall be calculated separately in respect of the whole of the fruit supplied for export by each grower on the basis of the pool price received for each variety supplied by him: Provided that the joint packing company or group shall endorse each "inspection submit note" with the particulars relative to the number of cases of each grower's fruit included in such submit note.

8. (*a*) The Government reserves to itself the right to withhold the guarantee from any grower who, in the opinion of the Director of the Horticulture Division,—

(1) Is not satisfactorily grading out and exporting separately his "Extra Fancy," "Fancy," and "Good" grade fruit.

(2) Is not shipping under this guarantee a reasonable proportion of the higher grades and popular sizes of any variety of eligible exportable fruit produced in his orchard.

(3) Has not shipped under this guarantee a reasonable proportion of the higher grades and popular sizes of Cleopatra, Cox's Orange Pippin, Dougherty, Golden Delicious, Grannie Smith, Rokewood, Rome Beauty, and Yates apples produced in his orchard and considered to be suitable for export.

(4) Has unduly delayed, to an extent likely to detrimentally affect out-turn, the placing of any fruit in cool storage after it has been picked.

(*b*) The Government reserves to itself the right—

(1) To limit the quantity of fruit to be shipped to any market if, in the opinion of the Hon. the Minister of Agriculture, unrestricted shipments to such markets would be prejudicial to this guarantee.

(2) To insist on fruit being precooled prior to shipment if deemed necessary.

(3) To pool, for guarantee purposes, the fruit of two or more orchards owned by the same grower.

(4) To pool the fruit of any number of orchards in the event of two or more persons being interested in the same properties.

(5) To pool the fruit in the event of its being packed in the same packing shed, particularly where such fruit is produced by members of one family.

(6) To re-examine and to withdraw any fruit from export in the event of such re-examination indicating that by reason of faulty grading and/or packing, over-maturity, or other causes inimical to the keeping-qualities of the fruit it would be inadvisable to allow such fruit to be exported. All such fruit so withdrawn shall be disposed of in New Zealand by direction of the Government on behalf of the owner, and the proceeds dealt with as though the fruit had been actually exported under the guarantee, provided that if on re-examination any such withdrawn fruit is found, as the result of careless or faulty grading and/or packing, to be below the prescribed standard, it will be deemed to be ineligible for the guarantee, and the owner of such fruit may, at the option of the Hon. the Minister of Agriculture, be held to have forfeited all right to participate in the guarantee for the remainder of the season.

(*c*) The Government reserves to itself the right to withhold the privileges of the guarantee—

(1) From all fruit shipped in vessels the storage facilities of which are held by the Department to be unsatisfactory.

(2) With respect to any fruit packed contrary to such instructions as may be issued by or with the approval of the Director of the Horticulture Division.

(3) From any grower who resubmits fruit for export that has been previously rejected without having reconditioned such fruit as directed by an Inspector, or who resubmits such fruit other than as one complete line.

(4) In respect of any shipment of fruit delayed in New Zealand waters for a period exceeding fourteen days, or such longer period as may be approved by the Hon. Minister of Agriculture, subsequently to the date such fruit was loaded for shipment upon an overseas vessel.

Table I.

VARIETIES APPROVED FOR EXPORT.

APPLES.

1. Alfriston.
2. Ballarat.
3. Brighton.
4. Cleopatra.
5. Cox's Orange Pippin.
6. Delicious.
7. Dougherty.
8. Dunn's.
9. Frimley Beauty.
10. Glengyle Red.
11. Golden Delicious.
12. Grannie Smith.
13. Gravenstein.
14. Jonathan.
15. Kidd's Orange Red.
16. London Pippin.
17. Lord Wolseley.
18. Newtown Pippin.
19. Parlin's Beauty.
20. Pioneer.
21. Rokewood.
22. Rome Beauty.
23. Scarlet Nonpareil.
24. Stark.
25. Statesman.
26. Sturmer Pippin.
27. Tasma.
28. Willie Sharp.
29. Worcester.
30. Yates.

PEARS.

1. Beurré Bosc.
2. Beurré Capiaumont.
3. Beurré Clairgeau.
4. Beurré d'Amanlis.
5. Beurré d'Anjou.
6. Beurré Diel.
7. Beurré Easter.
8. Conference.
9. Doyenné du Comice.
10. Duchesse d'Angouléme.
11. Giblin's Nelis.
12. Glou Morceau.
13. Joséphine de Malines.
14. Keiffer.
15. L'Inconnue.
16. Louise Bonne de Jersey.
17. Madam Cole.
18. Marie Louise.
19. Packham's Triumph.
20. P. Barry.
21. Twyford Monarch.
22. Vicar of Winkfield.
23. Winter Cole.
24. Winter Nelis.

Cattle Poisoned by Garden Shrubs.

Care Necessary in Disposal of Trimmings.

G. B. MELROSE, Inspector of Stock, Te Awamutu.

MANY mysterious deaths among all classes of stock can be traced to poisonous plants and, in some instances, to the indiscriminate disposal of trimmings of garden shrubs. Such a case came under the notice of the writer which, to the best of his knowledge, has not been recorded in New Zealand, although a similar case has been reported from the Te Kuiti district.

It is obvious that extreme care is necessary in the disposal of trimmings from any shrub where a person is not thoroughly conversant with its poisonous properties.

The case which came under the notice of the writer occurred on a farm in the Te Rau-a-moa district, Otorohanga County. On the 29th August last the writer received an urgent message reporting sudden deaths among dairy cows. The owner of the farm was away from home for a few days, and had arranged with a neighbour to feed hay out to his herd. When half-way through the feeding out the farmer noticed a dead cow, and half an hour later another dropped dead, to be followed by a third. To use the farmer's words, " It looked as though the cows had been shot." A fourth cow showed symptoms of staggering, excitement, and slight salivation, but apparently this fourth cow did not consume sufficient of the plant to cause death, and recovered after a large dose of linseed-oil had been administered as a drench.

> Many mysterious deaths among stock can be avoided if the poisonous properties of garden shrubs are understood and extreme care is exercised in the disposal of the trimmings. On one farm a number of cows died from the effects of eating trimmings of Irish yew.

Trimmings Eaten by Stock.

Inspection of the paddock adjacent to the homestead and garden revealed a quantity of trimmings from garden shrubs in a more or less wilted condition, together with evidence of the trimmings having been eaten by stock, but chiefly the Irish yew. There is no doubt that the stock ate the trimmings, this being confirmed by the amount of leaves, stems, and buds found among the ingesta in the stomach.

The post-mortem examination of the one cow revealed little in so far as action of the toxin on the organs was concerned other than a slight irritation of the lining of the fourth stomach and pin hæmorrhages on the interior and exterior of the heart.

Specimens of the plant showing the stem, leaves, and buds were forwarded to the Plant Research Bureau for identification. Dr. H. H. Allen, Government Botanist, identified the plant as Irish yew (*Taxus baccata*) and stated that it was definitely known to be poisonous. The bark, leaves, and buds of the plant contain certain toxic principles (taxine), and are especially likely to cause death if the stock are hungry. Death may be sudden, with hardly any preliminary symptoms. Where the action is less rapid, excitement, nausea, and vomiting occur, respiration slackens, and the pulse gets very feeble; the head is lowered and the eyes closed.

A quantity of the ingesta from the first stomach, with a section of the liver and heart, were forwarded to the Chief Chemist, Mr. E. R. Grimmett, Department of Agriculture, Wellington, who reported as follows: " The ingesta from the paunch contents contained taxine, the poisonous principle of the yew, to the extent of 29·5 mgms. (approximately half a grain) per kilogram. No taxine could be recovered from the other organs sent, but this has not much significance, as the substance is liable to decompose

fairly readily. From the symptoms described and the post-mortem and chemical findings there seems to be no doubt that the animals died from yew poisoning."

The chief chemist added that several cases in animals had been reported in New Zealand, one of the most recent being in February, 1937, when ten cows died at Taihape after eating cuttings from a hedge of English yew. (Annual Report of Department of Agriculture for 1936–37, page 50.) *Taxus japonica* is another variety of yew which is extremely poisonous to live-stock.

Stock Tempted.

The following information taken from H. C. Long's " Poisonous Plants on the Farm " may be of interest to farmers. The yew (*Taxus baccata*) is one of our most poisonous plants, but although the wood, bark, leaves, and buds are all injurious the scarlet mucilaginous cup enveloping the ripe seed may be eaten with impunity. The old leaves and shoots are the most poisonous parts, and cattle and horses readily eat them. Trimmings which have been carelessly thrown down have also poisoned animals which have eaten them.

Stock are perhaps more easily tempted to browse on the dark, green foliage in winter, when grass is not plentiful. Symptoms of poisoning are then liable to follow speedily, and death may supervene in some cases with extreme rapidity, giving the appearance that the animal had been shot. Clippings from yew trees should never be thrown down where they can be eaten by stock.

Several cases of human beings, particularly children, being affected are recorded when berries of the yew-tree had been consumed. The United States Dispensatory records the death of a child four hours after consuming yew-tree berries (Dr. Jas. Thomson, *Lancet*, 17th October, 1868).

The Irish yew is of upright growth, resembling a bundle of closely packed branches. The foliage is a very dark green, with small leaves.

In conclusion, many of our beautiful shrubs are extremely poisonous to stock, as recorded by H. C. Long's " Poisonous Plants on the Farm," and it is contended that many mysterious deaths among stock can be avoided if the toxic properties of the shrubs are understood and extreme care is exercised in the disposal of trimmings.

Burnt Bones not Advisable as Manure.

R. W. S. (Te Kuiti) :—

Would it be a payable proposition to burn dry bones for top-dressing pastures ? What price could be paid for bones (not including cartage or sacks) ? What is the usual method of burning them ? How long does it take for them to disintegrate, or do they have to be pounded after burning ? What weight of the burnt bones would be a suitable dressing for pastures ?

Fields Division :—

It would not be a payable proposition to burn dry bones for pasture top-dressing. In the burning of the bones nitrogen is lost, and the bone-ash which is left contains approximately 34 per cent. to 36 per cent. of insoluble phosphoric acid.

Even allowing for the fact that you have plenty of wood on your property with which to burn the bones, the price of these—£4 10s. per ton at the boiling-down works, Te Kuiti, plus cartage and burning—would make it an expensive slow-acting phosphatic fertilizer compared with superphosphate, which gives good results in your district.

Stock Prefer Sensation Swedes.

Trials to Find Most Suitable Rations During Winter Months.

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SWEDE crops are of particular importance in the northern King-country for feeding sheep and cattle during the later months of the winter. Because of the broken nature of the country most farms have only a limited area which can be economically harvested for hay or ensilage, and consequently great reliance has to be placed on the swede crop to provide sufficient fodder at a time when pastures are producing very little grass for the stock.

Not only is the swede crop very valuable for supplying a bulk of food at a difficult period of the year, but it also plays an important part in the development of the country. Most of the pastures on the rolling to high country are those which were sown after a bush burn, and a large portion of these pastures have deteriorated into swards comprising, in the main, low-carrying-capacity grasses such as danthonia, brown-top, and *Poa pratensis*. Much of this deteriorated land can be made to carry pastures of rye-grass, white and subterranean clovers, cocksfoot, and paspalum provided it is adequately manured and managed with stock.

In the winning-back of this deteriorated land, which, generally speaking, has reverted to bracken fern, the swede crop occupies an important place in the development programme. The ploughing and cultivation of the land helps very considerably in checking the fern growth, and where two crops of roots are taken in succession, provided the land is ploughed for the second crop, bracken fern does not cause much trouble in the pasture, which is usually sown in the spring following the grazing-off of the crop.

Trials to determine whether any particular variety of swedes was more suitable for feeding at different periods during the winter showed an undoubted preference by stock, firstly, for the Sensation variety and, secondly, for the Wilhelmsburger. Although the evidence cannot be considered conclusive it is felt that farmers should continue to grow swede crops to supply a plentiful ration during low grass-production in the winter months.

Although good crops can be grown on land which has been ploughed out of poor swards badly reverted to fern it is seldom that one sees a good crop where it has been sown on undeveloped fern country. Usually the seed "strikes" well, but the bulbs fail to develop, and on this class of fern country it is desirable first of all to lay down a temporary pasture of Italian rye-grass and red clover. The red clover is a valuable pioneer legume, and helps very considerably in building up soil fertility ready for the root crop.

Present Limitations.

Of late years farmers have freely expressed the opinion that whereas at one time they could grow two crops in succession, nowadays it seems to be a thing of the past due to the ravages of disease, particularly dry-rot and club-root. While this statement is generally true, the writer has also noted that a great number of the first-sown crops are very poor, being light and in many instances badly attacked by diseases such as dry-rot and soft or wet rot. Dry-rot is mainly seed-borne, and the seed-producers overseas are making every endeavour to export seed free of dry-rot infection. In the field the disease is spread from plant to plant mainly by aphides, which are sap-sucking insects.

Soft or wet rot is generally a secondary infection, the bacteria of which gain access through the tissues damaged by dry-rot, or where the leaf scars have not healed over perfectly. This last season was a particularly disastrous one, and most of the crops were a total failure. There can be no doubt that the season was largely responsible for this. The weather during the greater part of the growing season was humid, and this condition favours the spread of fungous diseases.

Because of this heavy loss greater attention is likely to be paid to the growing of chou moellier as an alternative to

Typical Wilhelmsburger swedes. Note the short neck and vigorous top. The necks of the other varieties growing in adjoining plots were from 18 in. to 30 in. long, and the tops had wilted off. This photo was taken on 16th August. [*H. Drake, photo.*

the swede crop. While chou moellier is not so readily attacked by disease as the swede crop it must be remembered that not only can it be badly damaged by soft rot, but also that it does not produce the relative feeding value per acre of the swede crop.

However, as a safeguard against the possible total loss of the swede crop, farmers could sow ½ lb. per acre along with the swedes. The leaf offers a change in diet, but in this district chou moellier cannot be expected satisfactorily to replace swedes as a winter fodder, but it is certainly of value as a supplement to an unsatisfactory swede crop.

Probably the greatest factor responsible for a large number of poor crops is the delaying of the ploughing and cultivation of the land until a short time before the sowing of the seed. Early ploughing is important, as it allows the furrow slice to settle and gives the freshly exposed earth time to ameliorate.

Varieties Used.

Figures supplied by local seed-merchants show that about ten years ago approximately 90 per cent. of the swede-seed sold was of the Crimson King variety and only about 8 per cent. of the Superlative type, but to-day 85 per cent. is of the Superlative type and only 9 per cent. of the Crimson King variety. It is reasonable to surmise that this "change over" has eventuated because farmers generally found the Superlative a more reliable cropper and more palatable to stock. But because the Superlative type is the most popular to-day it is not to say that there are not other types which will produce as good a crop of equal feeding-value and of better keeping-qualities.

Trials with Different Varieties.

To determine whether any particular variety is more suitable for feeding at different periods during the winter a few trials were laid down. During their progress observations were made to ascertain the amount of soft rot present in the different varieties, and notes were also kept to ascertain whether stock showed a particular preference for any variety. Roots were analysed for sugar, dry matter, nitrogen content, and specific gravity to ascertain whether these factors had any relation to the preference in grazing.

The following varieties* were sown in plots ½ chain wide by six chains long: Suttons Crimson King, Carter's Tipperary, Suttons Superlative, Suttons Caledonian, Suttons Majestic, Suttons Masterpiece, Suttons Sensation, Suttons Wilhelmsburger Otofte (New-Zealand-grown seed), Webb's Selected Wilhelmsburger Otofte.

The results of the trials for this season have been particularly interesting, as the freedom from disease of some of the varieties as noted at the Plant Research Station has been borne out in the field.

During May the following estimate of damage caused through dry and soft rot was made: Crimson King, 85 per cent.; Tipperary, 60 per cent.; Superlative, 75 per cent.; Caledonian, 60 per cent.; Majestic, 90 per cent.; Masterpiece, 70 per cent.; Sensation, 65 per cent.; both strains of Wilhelmsburger Otofte, 10 per cent.

Before the stock was turned in for the July grazing the following estimate was made of the percentage of bulbs still left which would give some feeding but which were not necessarily free of soft rot: Crimson King, 5 per cent.; Tipperary,

* For full description of the varieties see *Journal of Agriculture*, Sept.–Oct., 1935.

35 per cent.; Superlative, 30 per cent.; Caledonian, 60 per cent.; Majestic, 20 per cent.; Masterpiece, 45 per cent.; Sensation, 65 per cent.; Wilhelmsburger Otofte, 90 per cent (both strains).

It is interesting to note that whereas in May, Majestic showed a relatively higher disease count than Crimson King, by July Crimson King had deteriorated very markedly; in fact, in one trial it was with some difficulty that reasonably sound bulbs could be found to forward for analytical purposes. Also, the disease had not spread in the Caledonian, Sensation, and Wilhelmsburger varieties.

Although Caledonian did not have quite so many edible bulbs as the Sensation, it had the appearance of being more hardy—tops were still green and the flesh firm, whereas the Sensation appeared to be past maturity—*i.e.*, tops were wilting off and the flesh was comparatively soft. Wilhelmsburger appeared to be still growing, the flesh being very firm and the tops very green (see the illustration).

Grazing Preference.

Each experiment was divided into three "breaks," which were grazed off in June, July, and August respectively. As each "break" was fed off several representative roots from each variety were selected and forwarded to the Chemical Laboratory, Wellington, for examination. Later experience indicated that the number of roots was insufficient and consequently there was much variation between analyses of the same variety from month to month. In general, however, the percentage dry matter and the hardness values tended to increase, total sugars and reducing sugars decreased after hydrolysis, and the specific gravity of the roots was lower in the later samples. In the tables below only data in respect of the June samples are given.

Experiment A.

On this trial hoggets were used exclusively for feeding off. In June, after cleaning off the tops, they concentrated on the Sensation, eating out the bulbs and leaving only the shell of the skin in the ground. Next they ate up the Wilhelmsburger, and only when both these varieties had been eaten was there any grazing of the other varieties. In the "break" fed off in August a slight preference was shown for the Wilhelmsburger, and although these were not eaten as rapidly as the Sensation more hoggets seemed to congregate on the former. Sensation is not so hard in the flesh as the Wilhelmsburger, and probably this would account for the rapid feeding off of this variety.

Some of the results of the chemical determinations carried out on roots fed off in June in this trial are shown in the following table:—

Because of the small number of roots from each variety forwarded for analysis the value of these results is somewhat limited; nor can they be correlated with the preference shown by stock for the Sensation and Wilhelmsburger varieties. The hardness figures are of interest, however, in that the varieties which give the greatest hardness value (the Wilhelmsburgers) are reported to be "hardest" in practical experience. (These results were obtained by use of a penetrometer, and the figures given are inversely proportional to the distance penetrated by the needle.)

Experiment B.

In this trial mixed aged sheep were used, and a greater selection was made by them than by the hoggets. In June, after cleaning off the tops, they ate out the Sensation, then the Wilhelmsburger, and later ate all the remaining varieties, showing no particular preference between any of the latter. In July Wilhelmsburger Otofte and Sensation were the most sought after, particularly the former, and after getting the best out

Variety.	Dry Matter, per Cent.	Percentage of Dry Matter.		Specific Gravity.	Hardness: 1 = soft; 2·5 = hard.
		Total Nitrogen.	Total Sugars after Hydrolysis.		
Crimson King	8·5	2·19	45·6	1·01	1·6
Tipperary ..	7·4	2·30	57·0	0·99	1·4
Superlative ..	9·2	2·13	54·8	1·02	1·5
Caledonian ..	9·4	1·98	60·2	1·01	1·6
Majestic ..	8·7	1·37	61·0	1·02	1·6
Masterpiece ..	9·7	2·14	54·5	1·02	1·6
Sensation ..	9·3	2·42	54·4	0·99	1·5
Wilhelmsburger	10·1	2·02	60·0	0·99	2·4
Wilhelmsburger (Webbs)	9·7	2·55	47·8	1·04	1·8

of these the ewes more or less fed off the other varieties evenly, except that a slight preference was shown for Caledonian and that they appeared to neglect the Majestic. In August the Wilhelmsburger, especially Webb's Selected, were the most sought after. Even after driving the ewes away from this portion of the "break" it was not long before they had worked their way back again.

Some of the chemical results on roots forwarded from the June "break" in Experiment B are given in the table below.

The main fact arising from the two trials was the undoubted preference shown by stock, firstly, for the Sensation variety, and, secondly, for the Wilhelmsburger. It is not clear whether this is due to the fact that these were relatively more free from disease than other varieties or whether they were of greater feeding-value. Wilhelmsburger, in particular, does not have a good reputation as regards palatability in other districts, and this is generally put down to the hardness of the bulbs.

Accurate determinations by means of the penetrometer indicated that both Wilhelmsburger strains were among the hardest in both trials, particularly when the June "break" was fed off, and yet this variety was relatively palatable.

Dry Matter.	Dry Matter, per Cent.	Percentage of Dry Matter.		Specific Gravity.	Hardness: 1 = soft. 2·5 = hard.
		Total Nitrogen.	Total Sugars after Hydrolysis.		
Crimson King	8·7	2·46	47·3	0·97	1·9
Tipperary ..	8·2	1·51	51·0	0·97	1·6
Superlative ..	8·5	2·20	44·0	0·99	2·0
Caledonian ..	8·3	1·90	49·2	0·98	1·7
Majestic ..	9·5	1·84	55·2	1·00	1·9
Masterpiece ..	10·2	1·61	51·0	1·00	1·9
Sensation ..	9·6	2·05	38·6	0·99	2·0
Wilhelmsburger	10·7	1·65	48·4	0·99	1·9
Wilhelmsburger (Webb's)	10·7	1·55	49·4	1·02	2·2

No correlation appears to exist between this factor of stock preference and the other chemical and physical determinations. It is intended to carry out similar examinations on similar trials during the coming season, using fewer varieties and more roots from each.

Although the trials have been carried out only one year and the evidence cannot be considered conclusive it is felt that in spite of the heavy loss sustained this past season farmers should continue to grow swede crops as a means of supplying a plentiful ration during the period of low grass production in the winter months. It would be reasonable to presume that if certain varieties are capable of producing a good crop in an adverse season they should also give good results in an average season.

The evidence of this year's trials show that the Wilhelmsburger Otofte and Sensation are not only varieties which would appear suited to this part of the Dominion, but also that stock have shown a marked preference for them. For the coming season farmers are advised to try these varieties, putting in an area of Sensation more or less specially for the hoggets and the Wilhelmsburger Otofte for the late part of the season.

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Pig Census Returns.

Amount of "Other" Feed Used.

M. J. SCOTT, Superintendent of the Pig Industry.

THE census returns from 182 farms discussed in the last three issues of the *Journal* under the headings "Pig Meat Produced per 100 lb. of Butterfat," "Amount of Meal Used," and "Production of Pig Meat per Sow" have now been examined from the viewpoint of "other" feed used. "Other" feed refers to feed other than dairy by-products or meal—*i.e.*, any unharvested crops or paddock feeds, roots, grass, green crops, &c.

In stating the amount used, farmers have had to make estimates, but over the large number of farms considered the average of these estimates should be fairly reliable. In all cases the estimated crop-weight was divided by ten in order to reduce this class of feed to the basis of grain or skim-milk. Thus, 20 tons of roots or grass becomes two tons of feed.

The 182 farms are divided into two groups—(*a*) 108 using "other" feed; (*b*) 74 not using other feed.

Results.

The results are set out in the following table:—

Group.	(*a*)	(*b*)
Number of farms	108	74
Averages of pounds of other feed used to produce 100 lb. of pig-meat	126	..
Number of—		
Cows per farm	55	54
Sows per farm	4·9	4·3
Cows per sow	11·2	12·6
Production per sow: Number of pigs—		
Born	13·2	13·6
Bought	1·8	1·7
Sold	11·2	11·1
Died	2·7	3·3
Feed used to produce 100 lb. of pig meat—		
Total (lb.)—	747	735
As milk (gallons)	582	691
As meal (lb.)	39	44
As other feed (lb.)	126	..
Weight of pigs sold (lb)	86	82
Pig-meat per 100 lb. butterfat	43	36
Earning value of 1 gallon of skim-milk*	0·87d.	0·77d.

* Pork at 6d. per pound; meal at £14 per ton; other feed at £2 10s. per ton—no deduction for labour or overhead.

From the last line of the table it will be seen that the earning value of skim-milk is increased by one-tenth of a penny by the use of home-grown green and root crops. It can be fairly stated that this increase is due to the use of such crops, as the other factors (such as percentage of meal used, number of cows and sows kept, production per sow, &c.) are fairly comparable.

From the table it can be calculated that for 11·2 pigs sold per sow, each of 86 lb. carcass-weight, a sow and her progeny consume more than 5 tons of roots or grass. On the basis of 50 tons per acre this means an acre of roots to every ten sows kept.

Home-grown Crops.

Many farmers object to the growing of roots because this practice reduces the area devoted to grass and increases the labour and equipment charges, thus reacting on the whole farm turnover. Usually the area required is so small and the advantages of having roots so great that the above objections have little point. There are many cases on record where a small patch of carrots saves the situation in January and February, when milk is running low and the late litters require finishing.

Similarly, mangels, marrows, or pumpkins fill a gap usefully in early winter, while mangels and swedes are equally useful in late spring and even in early summer. Grass and lucerne for empty sows or growing baconers is so universally used that it calls for little comment. Profits from any class of live-stock are determined largely by the cost of feed used, and home-grown crops are the only really cheap feed-supply.

The importance of using as much as 40 per cent. of the total feed-supply as roots, &c.—an ideal that can be attained in New Zealand more readily than in most countries because of the large quantities of skim-milk and meat-meal used here—is gaining ground in every pig-producing country of the world. From ½ acre to 1 acre of mixed roots for every ten cows milked, together with half a ton of meal, is a sound feed combination for maximum returns.

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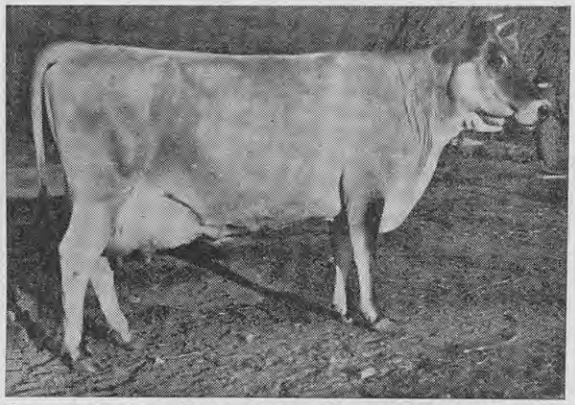
Certificate-of-Record Testing.

Contributed by DAIRY DIVISION.

THE many good yields recorded in the accompanying table of certificates issued under the C.O.R. system in December, 1938, are somewhat dwarfed by the phenomenal performance of the aged Jersey cow, Cyrilla's Twylish Girl, the latest 1,000 lb. producer and new leader of the mature class in the 305-day Division, not only for her own breed but for all breeds. As the table indicates, she qualified for a first-class certificate in the 365-day Division on a yield of 1,023·90 lb. fat, while her total yield in the 305-day Division was 906·15 lb. fat.



Mr. E. J. Clough's "Cyrillas Twylish Girl"—a new 1,000 lb. C.O.R. Jersey.

["N.Z. Farmer," photo.

Attention is drawn to her remarkably high milk-yield, which appears to be a record for the breed in New Zealand. Her consistency of production is evidenced by the fact that on a C.O.R. test commenced in August, 1933, at the age of 6 years 327 days she gained a certificate for 970·98 lb. fat from the high milk-yield of 17,953·1 lb. Both tests were on twice-daily milking for the full period, and the high milk-yield is all the more creditable for this reason.

Although Cyrilla's Twylish Girl was bred by Mr. W. H. Wallace, of Huiroa, Stratford, her tests have been conducted in the ownership of Mr. E. J. Clough, of Inglewood, to whom much credit is due for obviously efficient feeding and handling.

The pedigree of Cyrilla's Twylish Girl shows an almost complete lack of a definite breeding-plan, although the various matings which constitute the pedigree indicate that, in the earlier generations at least, some of the best sires available were chosen. Students of the foundation animals of the breed will appreciate the merit of such individuals as The Squire, Lord Twylish, Eminent's Fontaine, The Doctor, and others, and of the Primroses on the female side.

The C.O.R. record of Cyrilla's Twylish Girl was commenced on the day after calving for commencement of test, and her 365-day record concluded four days before calving subsequent to test. The period between calvings was therefore only 369 days. All things considered, it is apparent that dairy temperament, constitution, and consistency have been concentrated in this animal to an unusual degree.

With reference to the list appearing in the November *Journal*, attention is drawn to the record of the cow Blythe Mabel, in the senior two-year-old Jerseys under the ownership of Mr. T. Anstis. This cow was entered for test and owned during her testing-period by Mr. F. B. Starky, of Toatoa, to whom all credit for her record is due. Mr. Anstis purchased Blythe Mabel prior to her calving subsequent to test, and under the C.O.R. rules was therefore entitled to the certificate.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Fat.
YEARLY DIVISION.						
Jerseys.						
Junior Two-year-old.		Yrs. dys	lb.		lb.	lb.
Pukatea Dahlia ..	G. R. Bell, Waipuku	1 353	275·5	365	10,040·9	600·70
Punga Nui Marionette	D. Yandle, Te Wera	1 345	275·5	365	9,320·0	589·05
Croydon Fern's Dairymaid	W. Crosby, Waipuku	1 291	275·5	365	9,387·1	584·07
*Pukatea Aster ..	G. R. Bell, Waipuku	1 314	275·5	365	10,028·9	578·31
Cloverfields Darling	J. W. Boon, Whakatane	1 315	275·5	365	9,905·0	574·80
Sea Down Fiona ..	W. Crosby, Waipuku	2 24	277·9	365	9,093·9	542·10
Shelford Namesake ..	A. G. Melrose, Walton	1 358	275·5	365	9,358·1	539·23
*Pukatea Dainty ..	G. R. Bell, Waipuku	1 261	275·5	365	9,465·3	527·18
Roseneath Honey Bee	W. J. Russell, Leithfield	2 43	279·8	365	6,937·1	525·49
*Pukatea Saucy ..	G. R. Bell, Waipuku	2 34	278·9	365	8,672·0	523·36
Raeburn Pamela ..	J. W. Boon, Whakatane	1 352	275·5	312	9,054·9	516·41
Shelford Naomi ..	A. G. Melrose, Walton	1 358	275·5	365	8,532·2	503·53
Shelford Nymph ..	Ditto ..	1 353	275·5	365	8,577·3	492·29
Cloverfields Pansy ..	J. W. Boon, Whakatane	1 306	275·5	365	7,327·9	488·31
Cloverfields Nita ..	Ditto ..	1 341	275·5	365	7,912·8	480·57
Fairlands Primrose ..	J. Klenner, Kaimata	2 20	277·5	358	7,674·7	467·83
Soumise Gold ..	S. W. Grindley, Otakeho	2 12	276·7	365	9,114·4	456·96
Tuhirangi Bess ..	R. J. U. Wellington, Masterton	1 312	275·5	365	7,296·9	455·78
Wellfield Livinia ..	S. G. Ker, Whakatane	1 324	275·5	365	7,548·5	452·88
Earlston Golden Beauty	Chisholm Bros., Hunterville	2 8	276·3	341	7,857·3	442·14
Fairlands Sunray ..	J. Klenner, Kaimata	2 14	276·9	365	7,756·1	438·93
Tuhitarata Briar ..	J. Jameson, Featherston	2 37	279·2	365	7,434·1	434·41
Wellfield Vie ..	S. G. Ker, Whakatane	2 19	277·4	365	8·175·6	433·43
Ashgrove Pride ..	A. Worthington, Mareretu	2 3	275·8	365	7,221·5	432·39
Tuhitarata Ladybird	J. Jameson, Featherston	1 354	275·5	365	7,036·0	431·66
Tuhitarata Sylvia ..	Ditto ..	2 12	276·7	365	7,222·0	430·55
Shelford Necklace ..	A. G. Melrose, Walton	1 356	275·5	365	7,298·4	429·43
Waipiko Callbird ..	W. C. Brears, Southbridge	2 45	280·0	365	6,970·8	428·25
Pencarrow Gladys ..	Mrs. M. T. Hastie, Mangatawhiri	1 297	275·5	365	6,510·3	425·78
Glenmore Opal ..	J. F. M. Wanhill, Frankton Jn.	2 16	277·1	365	7,428·1	421·62
Wellfield Pollyanna	S. G. Ker, Whakatane	2 22	277·7	365	9,072·1	412·60
Shelford Nellie ..	A. G. Melrose, Walton	2 26	278·1	365	7,241·1	411·35

* Also received certificate in the 305-day Division.

YEARLY DIVISION—*continued.*

Jerseys—*continued.*

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—continued.		Yrs. dys	lb.		lb.	lb.
Shelford News ..	A. G. Melrose, Walton	1 332	275·5	354	7,136·2	405·43
Ashgrove Vivienne ..	A Worthington, Mareretu	1 328	275·5	365	6,631·8	401·20
Stanton Oxford Ribbon	H. E. Johnson and Co., Whangarei	1 349	275·5	365	6,842·6	400·32
Fairlands Sadie ..	J. Klenner, Kaimata	2 9	276·4	319	7,331·9	398·16
Ballymena Peggy ..	W. Douds, Mangatoki	1 358	275·5	306	7,179·3	396·25
Earlston Heather Again	Chisholm Bros., Hunterville	2 20	277·5	345	6,548·1	394·76
Shelford Nosegay ..	A. G. Melrose, Walton	1 332	275·5	350	7,718·2	393·21
Naylands Beauty ..	W. C. Brears, Southbridge	2 71	282·6	365	7,476·3	375·76
Glenafton Primrose ..	C. C. J. Astbury, Mangatoki	2 0	275·5	275	5,539·7	340·50
Shelford Norma ..	A. G. Melrose, Walton	1 315	275·5	365	5,687·8	327·81
Fern Dell Marie ..	S. W. Grindley, Otakeho	1 346	275·5	286	5,309·3	294·40
O.K. Prid's Aster ..	F. L. Watson, Auckland	2 74	282·9	277	5,130·7	290·81
Monkton Princess ..	J. F. M. Wanhill, Frankton Jn.	2 28	278·3	364	5,554·0	279·77
Senior Two-year-old.						
*Punga Nui Sunflower	D. Yandle, Te Wera	2 339	309·4	365	10,488·6	596·45
Sandbridge Surety ..	J. A. Pettigrew, Pihama	2 293	304·8	365	8,348·9	498·70
Earlston Yankee Fancy	Chisholm Bros., Hunterville	2 318	307·3	340	7,897·8	491·39
St. John's Spotted Pearl	E. G. Inglis, Riwaka, Nelson	2 319	307·4	326	7,422·3	469·32

* Also received certificate in the 305-day Division.

YEARLY DIVISION—*continued.*

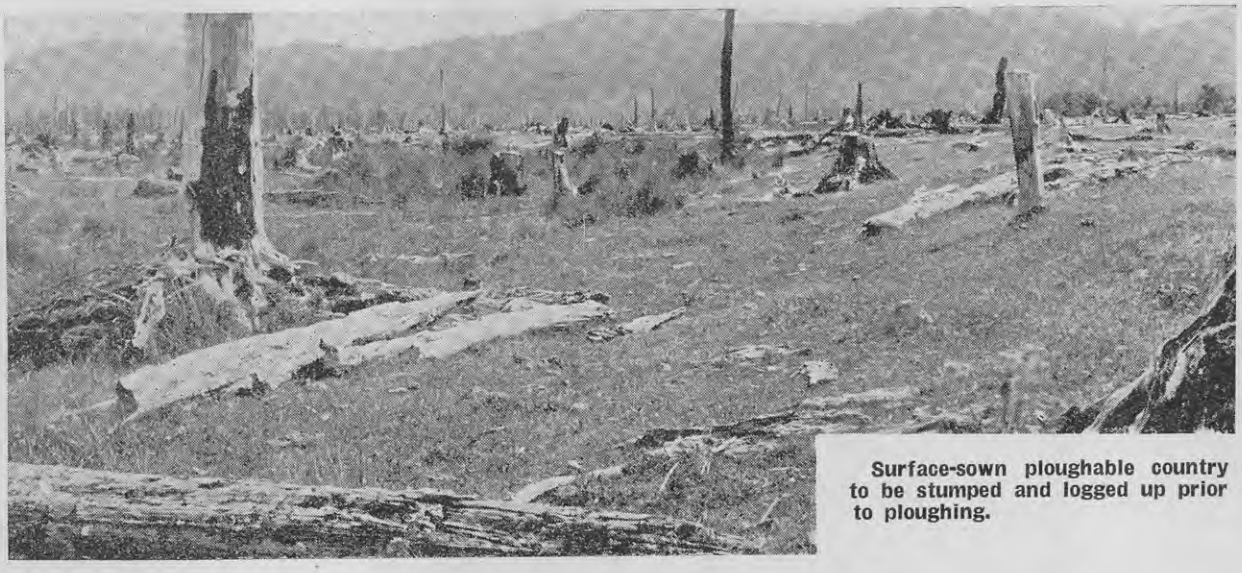
Jerseys—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Fat.
Senior Two-year-old—continued.		Yrs. dys	lb.		lb.	lb.
Brooklyn Bright Eyes	E, Arnott Rongotea	2 321	307·6	341	7,157·4	455·77
St. Lambert Priscilla	E. G. Inglis, Riwaka, Nelson	2 304	305·9	339	7,492·7	432·35
Moorpark Melissa ..	J. W. Boon, Whakatane	2 230	298·5	305	7,132·5	415·87
Derry's Superior Beauty	W. Rayson, Hamilton	2 281	303·6	351	7,309·8	388·43
Moorpark Ella ..	J. W. Boon, Whakatane	2 344	309·9	309	5,820·4	377·64
Three-year-old.						
Tuhitarata Love Nest	J. Jameson, Featherston	3 346	346·6	360	10,135·1	600·25
Raupo Lorna ..	J. W. Boon, Whakatane	3 344	346·4	365	10,076·9	588·31
Sandridge Floral ..	J. A. Pettigrew, Pihama	3 364	348·4	365	10,444·6	525·33
Raupo Owlet ..	J. W. Boon, Whakatane	3 318	343·8	332	9,499·5	519·29
Tuhitarata Novelty	J. Jameson, Featherston	3 3	312·3	365	8,796·3	516·72
Toatoa Jessie ..	Mrs. N. Bruce, Waiotahi, Bay of Plenty	3 271	339·1	365	8,489·0	497·75
Stanton Sunday ..	H. E. Johnson and Co., Whangarei	3 74	319·4	365	8,296·7	474·07
Puna Brook Ladyship	H. H. Phillips, Te Rehunga	3 328	344·8	300	6,928·9	429·93
Wellfield Bouquet ..	Mrs. N. Bruce, Waiotahi	3 346	346·6	324	7,581·2	402·23
Four-year-old.						
Elcho Budd ..	C. J. Masters, Wanganui	4 85	357·0	365	10,227·6	597·31
Stanton Fairy Sweetheart	H. E. Johnson and Co., Whangarei	4 56	354·1	365	9,247·2	533·15

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Fat.
YEARLY DIVISION—*continued.*						
Jerseys—*continued.*						
Four-year-old—contd.		Yrs. dys	lb.		lb.	lb.
Brookfields Day Lass	J. W. L. Craig, Waiuku	4 163	364·8	365	10,012·0	527·99
Kahuwera Flagella ..	J. V. Mortensen, Kahuwera	4 33	351·8	333	7,785·4	477·45
Mature.						
*Cyrilla's Twylish Girl	E. J. Clough, Inglewood	11 88	385·0	365	19,944·9	1,023·90
Richfields Patsy ..	R. G. Hosking, Whangarei	7 39	385·0	365	13,110·3	773·08
Kopipi Dewdrop ..	H. R. Snell, Ngunguru	7 13	385·0	365	10,316·6	602·63
Ebors Clarissa ..	R. J. Wilson, Putaruru	5 32	385·0	305	10,303·8	581·45
Lochgarra Bessie ..	D. Yandle, Te Wera	11 82	385·0	306	8,819·6	533·03
Golden Merry Viola	A. Cole and Sons, Onaero, Waitara	11 341	385·0	286	9,496·0	530·36
Ashleys Bonny ..	W. T. Dazeley, Pukekohe	6 111	385·0	365	9,631·2	528·55
Rewa Rosebud ..	H. E. Johnson and Co., Whangarei	5 308	385·0	339	9,484·8	520·65
Caesarea Trilby ..	F. Parsons, Patea	5 2	385·0	324	7,268·1	493·36
Kopipi Vera ..	H. R. Snell, Ngunguru	8 39	385·0	365	7,656·3	442·81
Woodlands Soloma ..	G. H. Coster, Tauranga	6 317	385·0	306	8,724·8	440·19
Kopipi Fancy ..	H. R. Snell, Ngunguru	9 300	385·0	339	7,906·5	438·96
Jersey Meadows Dream	H. H. Phillips, Te Rehunga	6 0	385·0	342	7,892·6	428·33
Friesian.						
Junior Two-year-old.						
Rosevale Isobel Queen	K. Macphail, Wainui	2 135	289·0	365	13,332·5	414·98
Senior Three-year-old.						
Mahoe Deodar ..	Major R. A. Wilson, Bulls	3 357	347·7	365	10,536·9	414·08
Junior Four-year-old.						
Mahoe Elder ..	Major R. A. Wilson, Bulls	4 47	353·2	305	10,844·6	479·70
Mature.						
Ahikouka Colantha Olga	C. A. Knutson, Dalefield	5 331	385·0	319	17,260·0	605·22
Mahoe Heketara ..	Major R. A. Wilson, Bulls	6 83	385·0	293	12,244·6	395·46
Ayrshire.						
Three-year-old.						
Greenfields Sunshine	C. E. C. Webb, Foxton Rd., R.D., Levin	3 254	337·4	365	13,464·4	542·29

* Also received certificate in the 305-day Division.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Fat.
YEARLY DIVISION—*continued.*						
SECOND CLASS.						
Jersey.						
Junior Two-year-old.		Yrs. dys	lb.		lb.	lb.
Raeburn Old Lace ..	J. W. Boon, Whakatane	1 307	275·5	365	9,114·5	611·08
Wellfield Marion ..	S. G. Ker, Whakatane	1 324	275·5	365	8,060·9	461·74
Ngamotu Tiny ..	J. Houlahan, Spotswood, N.P.	2 4	275·9	365	6,597·1	369·77
Senior Two-year-old.						
Pukatea Mischief ..	G. R. Bell, Waipuku	2 295	305·0	365	10,200·0	556·49
Hampton Soumise Queen	A. M. Bell, Otorohanga	2 349	310·4	365	9,703·0	541·59
Barton Blush ..	J. S. Gamlin, Manaia	2 270	302·5	331	7,794·2	404·55
Three-year-old.						
Hatcliffe Japonica ..	H. J. Lancaster, Glen Oroua	3 328	344·8	365	9,201·0	525·29
Four-year-old.						
Waipa Fleur-de-Lys ..	G. A. Mills, Ohaupo	4 13	349·8	365	8,181·3	506·24
Mature.						
Gowanlea Jolly ..	H. J. Lancaster, Glen Oroua	6 53	385·0	365	10,094·2	546·97
Kopipi Foxglove ..	H. R. Snell, Ngunguru	6 12	385·0	365	9,159·5	517·73
305-DAY DIVISION.						
Jersey.						
Junior Two-year-old.						
Pukatea Aster ..	G. R. Bell, Waipuku	1 314	250·5	305	8,817·7	500·83
Pukatea Dainty ..	Ditto ..	1 261	250·5	305	8,359·3	460·62
Pukatea Saucy ..	,, ..	2 34	253·9	305	7,609·1	457·24
Senior Two-year-old.						
Punga Nui Sunflower	D. Yandle, Te Wera	2 339	284·9	305	9,552·0	540·64
Three-year-old.						
Punga Nui Joyce ..	D. Yandle, Te Wera	3 360	323·0	305	10,088·5	584·91
Almadale Marae ..	P. H. Miers, Morrinsville	3 349	321·9	270	6,485·5	367·64
Four-year-old.						
Gowanlea Delphine ..	T. Ranford, Whakaronga	4 344	357·9	305	9,454·6	526·89
Mature.						
Cyrilla's Twylish Girl	E. J. Clough, Inglewood	11 88	360·0	305	17,645·4	906·15
Fairlands Rita ..	J. Klenner, Kaimata	8 286	360·0	259	9,551·8	512·84
Fairlands Sybil ..	Ditto ..	5 76	360·0	303	9,070·0	492·68
Friesian.						
Mature.						
Mahoe Rosalind ..	Major R. A. Wilson, Bulls	7 60	360·0	305	15,085·4	491·80



Surface-sown ploughable country to be stumped and logged up prior to ploughing.

Farming in the Catlins District.

Conversion of Bush Land into Farms.

A. F. GREENALL, Instructor in Agriculture, Balclutha.

(Continued from December and January issues.)

WHERE scrub or secondary growth has been cut and burnt, and where logs or stumps have been similarly dealt with it pays handsomely to sow the resultant burns with grass-seed. Much useful work can be so accomplished, and the total area of such burns at times amounts to many acres in the aggregate.

For patch sowing the following mixture is recommended :—

	Pounds per Acre.
Certified perennial rye-grass	10
Certified cocksfoot ..	8
Certified white clover ..	1
Lotus major	1
Browntop	2
Crested dogstail	4
Total	26

The operations in connection with logging and stumping are important in their effect on the subsequent pasture. Against the cost of this work must be balanced the returns from the sale of posts and firewood obtained during this process. Logging up commences any time after burning, but stumping does not usually commence until some degree of decay has taken place, as this results in the stumps being more easily removed by crowbars, jacks, teams, &c. For logging up, the axe, saw, wedge, and maul and splitting-gun are the usual implements employed, while power is provided by horses and occasionally by tractors. Posts, stakes, and firewood result from this work, the waste being heaped and burnt. During logging up and stumping any scrub is cut and burnt.

Stumping and logging operations are discussed in this, the third of a series of articles dealing with the conversion of the heavily-timbered Catlins district of Otago into farm lands. Crops commonly grown on virgin ground and typical seed mixtures used are also described.

It is common for extensive logging up to be carried out some fifteen to twenty years after burning, this work being undertaken at the same time as the stumping. It is usually undertaken in a slack period. Tractors, jacks, horses, and blasting are resorted to in stumping. Experience has also taught the expert stumper just how many plugs of " jelly " will be required to loosen each stump, for similar-sized stumps of different trees require varying amounts. The degree of decay, depth of rooting, and hardness are also factors to be gauged to a nicety, and make this work a specialized job.

Stumps, once disrupted, are split up and burnt and the cavity in the ground filled in. The work is extremely slow, only a few acres being brought in each year. One hears of costs ranging from £5 to £50 per acre for stumping, with about £10 per acre being the average cost. The only out-of-pocket expense to the settler is for tools and blasting-material, the bulk of the " cost " being his own labour.

Up till the time of writing the majority of the land logged and stumped has been cleared for the purpose of bringing additional land under cultivation for the growing of root crops, hay, oats, &c. However, in many cases clearing has proceeded beyond the requirements of crops for wintering stock. This is in some measure due to the prevalence of crop diseases, especially in swedes, but also with the knowledge that pastures can be more satisfactorily established and maintained if sown down following cultivation rather than surface sown after burning.

Following logging, stumping, and the burning of waste wood and scrub it is essential to make sure that all underrunners or earth-faults are filled in and the area made safe for teams and implements. At times rock outcrops occur, but these may be removed by blasting, while erring streams can often be confined to bounds.

The single furrow plough (and occasionally the hillside plough) is the initial implement used. Following this, harrows, clod-crushers, cultivators, &c., are used to advantage. The aim in all cultivation is fineness and consolidation, at times a difficult task on account of the accumulation of humus and ash. Deep ploughing should be attempted as it gives better aeration and drainage and brings up a little of the clay, which assists consolidation.

Crops for Virgin Ground.

The crops commonly grown on virgin ground are swedes, chou moellier, oats, or potatoes. Swedes are usually ridged, 1 lb. of seed being sown per acre often without manure. Chou moellier is grown in a similar manner, but given a slightly higher seeding of 1½ lb. per acre. Oats are often broadcast by hand or machine and harrowed in, or where a drill is available they are drilled in.

Potatoes are at times ploughed in, being planted in every second or third furrow, at other times are hand-sown in furrows made by a moulding-plough. They are then covered by splitting the ridges. The value of manure is becoming much more appreciated in connection with potatoes. Rape is sown occasionally. There is no definite rotation, root crops often being grown for several years in the one field with an occasional intervening crop of oats.

When grassing after the plough the seed is often sown with oats or rape, but sometimes alone. Of these three methods that of sowing down grass alone is to be preferred, as this results in a more even and denser strike with more rapid establishment. This in turn reduces the ingress of ragwort, daisies, bidi-bidi, &c. When grass is sown with oats there is a tendency for the resultant crop to be stocked too heavily, and this results in some of the important pasture constituents, on which the subsequent success of the field as a pasture depends, being trampled out.

Pastures on Ploughed Land.

It is interesting to note that practically the same species of pasture plants are used for pastures on ploughed land as those for surface sowing, although the proportions in each case vary a little.

The following represents a typical mixture sown :—

	Pounds per Acre.
Cocksfoot ..	.. 10
Perennial rye-grass	.. 20
Italian rye-grass	.. 5
Timothy ..	.. 2
White clover ..	.. 2
Red clover ..	.. 3
Total ..	.. 42

This represents a sowing of from 40 lb. to 45 lb. per acre.

In a large number of cases it was stated that cocksfoot was not proving as valuable where sown after the plough as it was on bush burns, the suggestion being that lowered fertility resulting from cropping was inimical to the development of cocksfoot. I am fairly certain that this is not so, and would suggest that the reason underlying this apparent paucity of cocksfoot after the plough is rather in the different management and more intensive grazing that such pastures are subjected to.

Rye-grass v. Cocksfoot.

As the result of observations it would seem that in spite of the fact that a large proportion of the district is so-called cocksfoot country, cocksfoot should not be relied on to the extent that it has been in the past for sown pastures on ploughed land. The three most satisfactory pastures observed in the district from the point of view of density, growth, vigour, and freedom from ragwort were dominantly certified rye-grass fields ; also a grass-clover-strain trial at Owaka would indicate that the presence of dense-growing certified rye-grass even under loose grazing conditions is inimical to the growth and spread of cocksfoot, which thrives under a similar condition of grazing when the certified perennial rye-grass is replaced by Italian rye-grass.

A sawmill in the Catlins district.

The following mixture is recommended following the plough and where it is intended to give the pasture reasonably good treatment :—

	Pounds per Acre.
Certified cocksfoot ..	10
Certified perennial rye-grass	22
Certified white clover ..	2
Timothy	3
Montgomery red clover ..	3
Crested dogstail	3
Total	43

There was little opportunity of observing the pasture responses to either lime or manure over the bulk of the district. However, certain farmers are using both carbonate of lime and superphosphate and obtaining responses which indicate that the practice of liming and top-dressing in this district should follow the practices adopted in similar districts of New Zealand where the value of lime and super is appreciated. One farmer using certified rye-grass and top-dressing with lime and super has pastures which have been down for seven years, are fairly free from ragwort, and would be a credit to many farmers on first-class land.

Logs dragged over the bank with a tractor.

Management of Pastures.

The general management of pastures on ploughed land is generally in line with that adopted in other districts except that special problems connected with weed-control require some adjustment. As a general rule farmers experience little difficulty in preventing the ingress of scrub on ploughed land, though ragwort is more prevalent in such areas.

Supplementary Fodder.

Owing to the climatic conditions in this district the growth of grass is seasonal. From about May to August there is a period during which the supply of feed is at a minimum. If the winter-carrying capacity is based on pasture growth alone flocks will not be large enough to economically utilize seasonal growth, while if flocks are large enough to utilize the bulk of spring feed, grass alone will not winter them.

The growing of swedes is a common practice in the district, and this crop fits in very well with farm-management. However, as they are too bulky, swedes alone are probably a bare maintenance diet and are not eminently suitable for in-lamb ewes and cows in calf. Consequently, attention has been directed at the use of fodders such as hay or ensilage for the purpose of increasing the effectiveness of the swede crops.

The great difficulty in this connection is the fact that ragwort in hay or ensilage is injurious or dangerous to animal health so that only those paddocks that are relatively free from ragwort are shut up. This is a problem of major importance, the solution of which would materially increase the carrying-capacity and the productivity of the district.

Crops for Hay.

Where the value of hay is appreciated use is being made of oats, or oats and tares, or peas to provide this desirable supplement in the form of oaten hay. The crop is broadcast or drilled in the spring after roots or out of grass. No manure is used, and the oats are cut at the milky stage and stacked. This material is usually fed out on surface-sown country to assist in the control of weeds and secondary growth.

The ragwort does not appear to be prevalent in such crops, and so little danger to stock need be feared. The main reason why this practice is not as popular as it might be appears to be the cost of growing such a crop, also many farmers have not the labour or plant to handle a heavy hay crop. Climatic conditions also make haymaking uncertain.

The use of temporary pastures, including bulky growing plants such as red clover and Italian rye-grass, seems to afford scope for use in making hay, a fair bulk of which could doubtless be produced at a slightly lower cost than in the case of oats. Doubtless, ragwort would be more in evidence in such hay.

Control of Ragwort.

In only a few cases was the use of permanent pasture for haymaking observed. In one case the farmer experienced no difficulty in obtaining a good bulk of ragwort-free hay. In this case a mixture of perennial rye-grass, cocksfoot, &c., was used on land that had been limed and was being top-dressed.

Sheep were grazed during winter and early spring to keep back growth of ragwort, the field for hay being top-dressed and closed up later than would normally be the case. The result was a rapid growth of grass which competed more than favourably with the close-grazed ragwort, which consequently was not aggressive. Mowing was carried out earlier than usual before the ragwort had started to flower, and the result was a slightly lower yield of hay of good quality, almost free from mature ragwort. This hay was fed out on recent burns to check weed and scrub invasion, and altogether the method proved sound and practicable.

As a result of unstable weather at or about harvesting-time haymaking is a little precarious and so attention was given to the possibility of ensilage-making. Wet weather or broken weather interferes but little with ensilage-making, nor does it have any very deleterious effect on the quality of the silage. One farmer, realizing this, has made a pit silo and, using green oats, gets good results. Either oats, temporary pasture, or permanent pasture can be used for this purpose. However, ensilage generally is not as high as good hay in feeding-value and is not so suitable for feeding with turnips and swedes.

(To be continued.)

Citrus Pests: (6) Scale Insects.

(II) Unshielded Scales.

W. COTTIER, Plant Diseases Division, Plant Research Bureau.

IN this group the insect is not a soft-bodied creature shielded by a scale which is separate from the insect. On the other hand, the scale seen is actually the hardened and thickened back of the insect itself, perhaps ornamented with a waxy covering, as in the white-wax scale. The Olive Scale (*Saissetia oleae* Bern.) is typical of the unshielded scales (see Fig. 1).

Life-history.

In New Zealand the females of the species on citrus all produce eggs which subsequently hatch into " crawlers," very similar in appearance to those of the shielded scales. As the adult female lays the eggs the soft parts of her body shrink so that the lower surface ultimately comes to rest against the upper interior surface of the scale. The space made by this shrinkage is occupied by the eggs, so that should an old adult female scale be taken from its host it will be seen to be little more than a hollow shell containing either eggs or egg envelopes from which the " crawlers " have emerged.

After wandering on the food plant for a time the " crawlers " settle down and begin feeding. In some cases feeding-places selected by the " crawlers " become the permanent abode of the scale, while in others the insects may migrate later in life. Once the " crawlers " have settled the upper surface of the body becomes hardened and thickened and remains so, at least in the case of females, throughout life.

The female insects during growth cast their skins or moult twice, but they differ from the shielded scales in that the legs and antennæ are not lost but always remain, although often in a comparatively reduced form. In the case of the males, which usually moult three times before reaching maturity, the first nymphal stage is similar to that of the female, but in the second stage the male forms a cocoon, which is usually a partly depressed, thin, glassy, or waxy covering. Beneath this covering the male moults twice more, and ultimately emerges as a two-winged insect, similar in appearance to the males of the shielded scales.

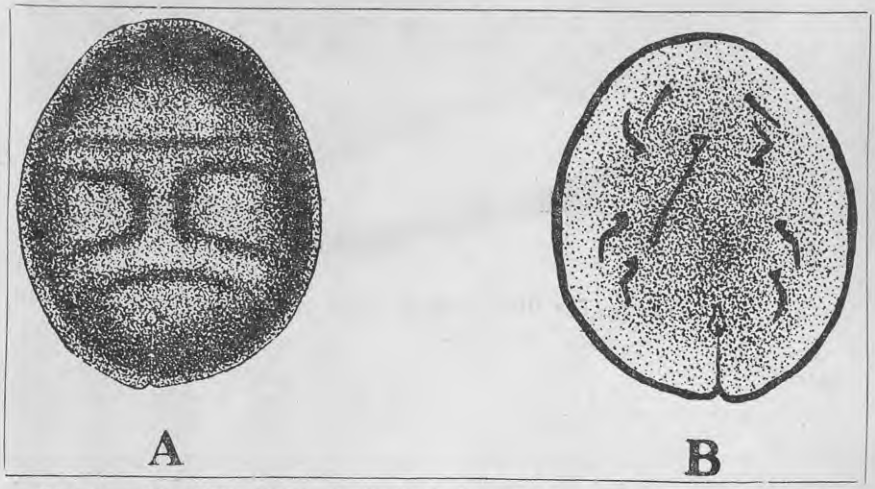


Fig. 1.—The Olive Scale—typical of the unshielded scales. A: Dorsal surface of scale insect. B: Ventral surface of scale insect.

[*Del.—W. Cottier.*

The Olive Scale.

The Olive Scale (*Saissetia oleæ* Bern.) is convex and about 3 mm. long when full grown. The colour of the adult scale is very dark brown or almost black, the younger stages, however, are usually distinctly brown. The surface is roughened, and a characteristic feature is the presence of a raised H-shaped marking on the scale, this feature being present in both immature and mature scales (Fig. 1).

Life-history and Habits.

In New Zealand this species may be found in all stages during the winter. A large number of eggs is produced by each female, the number having been estimated at over fifteen hundred. It is commonly considered that there is only one generation each year and that the scale takes about three months to reach maturity. The egg-laying period commences about five weeks after maturity and proceeds for about six weeks. Observations in the Auckland district show that the young forms of this insect are abundant in October.

The Olive Scale infests the more woody parts of citrus—viz., the twigs, small branches and leaves, especially along the mid-ribs. The more succulent parts, such as the fruit, are apparently not so suitable as feeding-grounds.

The scale exudes copious supplies of honey-dew, on which the black sooty fungus grows. Consequently, infested trees usually show a more or less sooty coating on the woody parts, and where the scale is plentiful fruit and foliage is rendered unsightly.

Hosts and Distribution.

Recorded food plants include citrus, oleander, rose, guava, pear, palms, apple, apricot, plum, grape-vine, wisteria, pepper-tree, holly, laurel, camellia. It is also said to infest various native trees.

The scale has a world-wide range, having been recorded from North and South America, Italy, Australia, Algeria, Assam, South Africa, China, Eritraea, France, Philippines, Tunisia, Spain, French North Africa, Tunis, Morocco, Finland, Transcaucasia, Porto Rico, Bermuda.

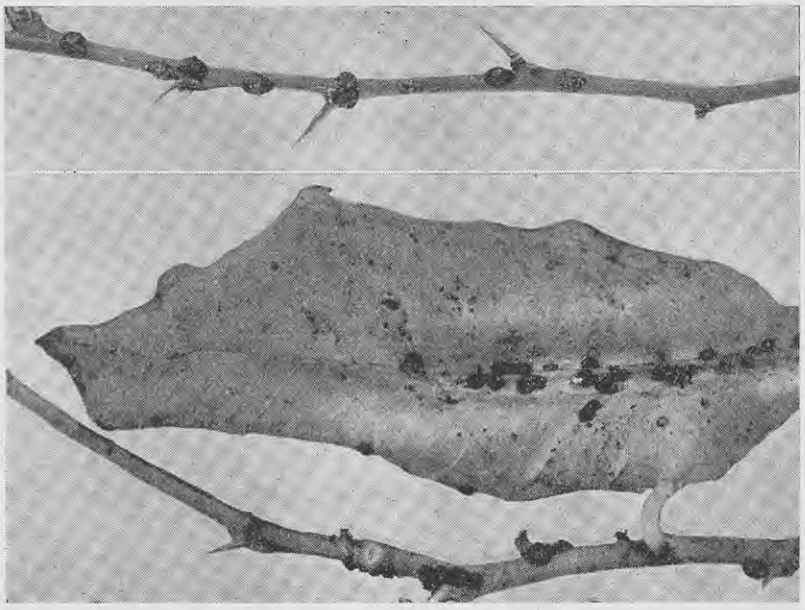


Fig. 2.—The Olive Scale on twigs and foliage.
[*H. Drake, photo.*

Control.

For this scale use summer grade oil at a strength of 1 part of oil to 60 parts of water. Apply in the early summer as soon as the spring growth has hardened somewhat. The period about early December is suitable.

The Hemispherical Scale.

The Hemispherical Scale (*Saissetia coffeæ* Wlk. *hemisphaerica Targ.*) when full grown (Fig. 3) is easily distinguished from others infesting citrus. The adult is brown to reddish-brown and, as its name implies, highly convex and of a shining smoothness. The surface is densely covered with lighter spots, which can be seen plainly, however, only under the microscope. When full grown the scale is about 4 mm. to 5 mm. long.

The young "crawlers" are very light in colour with well-developed legs and antennæ. After settling, the scale becomes light brown and is ornamented with three ridges forming a raised H pattern after the style of the Olive Scale, but unlike this latter the H disappears at maturity and the adult scale is quite smooth.

Life-history and Habits.

In the summer a generation probably takes about three months to reach maturity, so that it is likely that in New Zealand there is more than one generation annually. The scale over-winters in the immature forms, and by the spring the over-wintering females are mature and begin producing eggs. Each female is said to be capable of producing well over five hundred eggs.

The young, on settling down, choose the very young twigs, the insects rarely being found on hardened growth. As the time of reproduction approaches the females migrate to more exposed positions, mostly to leaves and, more rarely, fruits.

Sooty mould may be associated with this scale, but it is not a characteristic of it and large colonies may be free from any such fungous growth. In the open the scale is found mostly on trees showing abundant foliage and much tender growth. It occurs also under glass.

Hosts and Distribution.

The scale has a wide range of food plants, among which are citrus, oleander, palms, japonica, camellia, asparagus, orchids, cucumber, currant, and egg-plant.

Fig. 3.—The Hemispherical Scale.
[*After Summerville.*

Distribution is world-wide, the pest having been recorded from America, Australia, Netherlands, Indies, Britain, Madagascar, Philippines, Porto Rico, Africa, Ceylon, Bermuda, Hawaii, Samoa, West Indies, Jamaica, Malaya, tropical Asia, Mauritius, &c.

The control of this insect is the same as that for the Olive Scale.

Modern Cool Storage Practice.

THE term "long holding" necessarily speaks for itself when dealing with fruit cool storage, and many are the pitfalls in this class of storage. These pitfalls are well known to most fruit-growers.

A closer study of our problems reveals causes and their effects which may be remedied (1) by a determination to eliminate certain unprofitable varieties, (2) by making a study of conditions which are affecting the normal growth and maturity of other varieties, and (3) by varying cool-storage-temperature conditions to a degree that is found beneficial for the safe-keeping of these varieties.

These factors are much more efficiently dealt with when there is a closer association and co-operation of the orchardists and their cool-storage management.

The use of overhead cooling coil and trays, which are designed for the purpose of evenly distributing the cool air over the whole surface of the ceiling of each cool chamber in order to drain away the condensed moisture and to cool the fruit effectively by convection without the aid of forced circulation, is designed to increase the humidity of the chambers, which remains constant at about 92 per cent., thereby removing the main cause of wilt and shrivel in cool storage.

The excess moisture over the percentage mentioned is removed by condensation of the moisture from the atmosphere on the coil, from which it drips into the trays and runs to waste. This coil is rendered more effective for readily condensing the excess moisture because of its construction in a position near the ceiling of the chamber, where the heat rises naturally and is constantly coming in contact with the coil. As the temperature is reduced it readily gives up its excess moisture to the cold surface of the evenly distributed cooling pipes.

—*A. Powell, Cool Storage Officer, Wellington.*

Developing Farm Land In The Tuatapere District.

W. L. HARBORD, Instructor in Agriculture, Invercargill.

Fig. 1.—Showing a potato crop following the first cultivation.

THE various stages in the changing of heavily-bushed land to good pastoral areas may be studied in the Tuatapere district, which is mainly river-bed country with a rich, loamy soil, and which produces some splendid crops. The climate is moderate, and although cold winds coming from the sea in Foveaux Strait are experienced at times it is seldom that snow is seen to lie except on the high country.

Bush in this district consists, in the main, of such varieties as black pine and broad-leaf totara, and the district supplies a large amount of milled timber. After the sawmill has passed through a section of bush and left only the inferior type of timber, which does not interest the miller, the land is further cleared by means of fire. These fires clear away the rubbish left by the sawmill, and leave only the stumps and logs of the milled trees.

Land Surface-sown.

This bared, stumpy land is then surface-sown with a good mixture of grass and clover seeds. The surface-sowing takes place shortly after the fire has gone through, and allows a favourable strike of grass to compete against the weeds that are likely to appear.

Grazing on this surface-sown land is then carried out for a number of years. The main idea in the continued grazing is to allow the land to lie for sufficient time for the roots of the tree-stumps to rot. When this has happened the ground is stumped and logged up. A traction-engine with hauling-gear is installed in the paddock, and the logs and stumps, &c., are heaped for a further burning. In some cases a tall tree is left standing and a block and tackle is fitted to the top. The logs and stumps are piled high about this standing tree trunk by means of the block and tackle.

When completely cleared of timber the ground is introduced to the plough. Cultivation follows, and the first crop

Fig. 2.—A paddock of oats beside an unstumped area. In the background may be seen the heavily-bushed hills.

planted is usually potatoes. This district is favoured by northern potato-growers because of the comparatively virus-free seed produced. Potatoes grow well about Tuatapere and afford a good means of cleaning a paddock.

Following this the area is sown with a cereal—usually oats—and it is then finally sown with a good mixture of certified rye-grass, &c.

To bring his land to this stage the farmer has been put to a fairly large expense, and he should therefore consider the most profitable means of returning his outlay. By sowing an inferior type of pasture he will be subject to another early expense in that he will have to put the plough into the area within a year or so. If he sows a pasture of certified seed he is not only increasing his carrying-capacity but is saving expense by sowing a pasture that will be of a really permanent nature and will not need the plough for a number of years.

One farmer at least in the Grey Valley is now thoroughly convinced of the necessity for good consolidation of the seed-bed when sowing down grass. He noticed on the wheel-marks of the drill throughout the field that the strike of grass was very much better and the growth more advanced than elsewhere. He is now a confirmed roller.

Obituary.

Mr. W. C. Robinson, Former Secretary of the Department of Agriculture.

THE death occurred in Wellington on 19th January of Mr. William Charles Robinson, aged sixty-four, a former secretary of the Department of Agriculture.

The eldest son of the late Mr. Charles Robinson, at one time Officer in Charge, Parliament Buildings, Mr. Robinson was born in Wellington and received his primary education at the Mount Cook Boys' and Newtown Schools.

Mr. Robinson joined the Department of Agriculture as a temporary clerk in March, 1895, and in October, 1901, was appointed to the permanent staff, taking up the position of Registrar of Brands in Auckland. He was promoted to the position of Divisional Clerk of the Live-stock and Agricultural Division in January, 1907, and Acting Chief Clerk in May, 1909, being confirmed in the position six months later. He was later appointed manager of show exhibits and publisher of departmental publications.

Mr. W. C. Robinson.

On 1st April, 1929, he succeeded to the position of Secretary of the Department, and held that office till his retirement in June, 1938, because of ill health.

As a young man he was interested in the volunteer movement, and had held a commission in the Devonport Naval Submarine Miners. He was also a bowler. For a number of years he had taken an active interest in Freemasonry, and had held office as Master of Lodge Waterloo.

He is survived by his wife, three sons, Messrs. L. R. Robinson (Christchurch), C. W. Robinson (Dunedin), and G. R. Robinson (Wellington), and one daughter, Mrs. K. C. Akers (Wellington).

Cocksfoot on Light Land.

Establishment of Permanent Pasture.

A. H. FLAY, Canterbury Agricultural College, Lincoln.

IN recent years much has been said and written about subterranean clover for light land, but little or no mention has been made of cocksfoot for this class of country. Next to rye-grass, cocksfoot is the most important and valuable pasture grass, and on light land, under conditions of grazing suited to it and for special purposes, is actually superior to rye-grass.

Cocksfoot is, however, more difficult to establish than rye-grass. This is one reason why it is not used more extensively. Another is that the pastures, as sown on light land in the past, have had to be ploughed up in three or four years—at a time when the cocksfoot was just becoming well established. Where such constant renewal of pastures must be carried out, the sowing of a costly and valuable permanent species is definitely not justified, but in association with subterranean clover, which is sown to provide a permanent pasture, cocksfoot has a very important place.

A pasture with cocksfoot and subterranean clover dominant provides much late spring and early summer grazing in November and December—just at a time when there is a " pinch " in the pasture feed-supply—before rape, &c., are ready. Judicious and light early spring grazing are necessary to allow a good bulk of leafage to be available at this critical period.

Depth of Drilling.

Since the establishment is difficult more attention is necessary here. The normal and best time to sow subterranean clover is in the early autumn—February or even late January. It should be drilled with manure through every coulter very shallow on a well-prepared, firm, moist, and weed-free seed-bed. This method of sowing is also ideal for cocksfoot establishment. Too frequently when grasses and clovers are being drilled in the seeds are buried at a depth of 2 in. or 3 in. The few seeds that actually miss being completely buried grow vigorously, but the strike from deeply buried cocksfoot and clovers is a poor one.

If, however, the land is properly prepared, such as can be done after turnips or green-feed oats by ploughing, perhaps once or twice, then harrowing frequently at intervals of a week or ten days followed by rolling, the seed-bed should be firm and in good order. Weeds must be under control and moisture must be present right to the surface.

By using turnip coulters or old, worn coulters set to merely scratch the firm seed-bed so as to form a small furrow into which the cocksfoot and subterranean clover seed and manure fall, a very shallow drilling is obtained. Actually some seed and manure should be clearly visible—*i.e.*, not completely covered by earth falling in on either side of the coulter mark. Light harrowing will complete the operation of sowing.

If no seed and manure are visible in the coulter mark, then the seed is already covered deeply enough, if not too deeply, and no final light harrowing should be carried out to further cover the seed.

Sowing with Oats.

It is not likely that a pasture of cocksfoot and subterranean clover will be sown alone. Oats may be sown as well. These should be drilled in first separately before the seed-bed is finally firmed by rolling. Or a mixture of rye-grass, red clover, and white clover may be included.

Where a first-class permanent pasture is desired on light land and where it is

the intention to top-dress to assist to maintain such a pasture a general mixture is recommended. It might well consist of: Certified cocksfoot, 10 lb. to 12 lb.; certified perennial rye-grass, 4 lb. to 5 lb.; subterranean clover, 2 lb. to 3 lb.; Montgomeryshire red clover, 3 lb. to 4 lb.; and certified white clover, 1 lb. By broadcasting the rye-grass and drilling in the cocksfoot and clovers very shallow an excellent establishment of all species will be secured.

A light seeding of rye-grass sown in this fashion will not smother and retard either cocksfoot or subterranean clover on light land. The light seeding of rye-grass will assist to form a more complete cover and provide a well-balanced pasture. The value of a dominantly cocksfoot pasture for summer feed is not in any way reduced by the inclusion of a light seeding of rye-grass.

Best Strain of Cocksfoot.

In the past the Akaroa strain of cocksfoot has had preference for pasture grazing and for permanence. To-day, however, an improved or pedigree cocksfoot (known as College C23), which has been proved to be higher producing than Akaroa, is available commercially. It is uniformly finer in the leaf, is denser in the crown, stands up to close grazing better, and is generally a better pasture type of cocksfoot. It seems to be just as resistant to grass-grub attack as Akaroa. Farmers should not hesitate to use this cocksfoot-seed when sowing permanent pastures. Properly sown such pastures top-dressed will be down even on light land for many years.

Establishment of the cocksfoot cannot fail if the seed is drilled in with manure very shallow on a firm, compact, moist, and weed-free seed-bed.

New Zealand Fruit Cool Stores.

Capacity in Bushel Cases.

A. POWELL, Cool Storage Officer, Wellington.

THE following is a list of fruit cool stores and freezing-works where fruit is being precooled prior to being exported or held, for the purpose of regulating supplies throughout the year on the markets of the Dominion. The list gives the amount of cool-storage space being utilized for fruit cool storage at January, 1939, and also the total amount of space in the store suitable for the cool storage of fruit.

—	Space utilized for Fruit Storage.	Space suitable for Fruit Storage.
Auckland.		
Auckland Farmers' Freezing Co., Auckland	125,000	167,000
Auckland Farmers' Freezing Co., Southdown	..	30,000
Turners and Growers, Ltd., City Markets, Auckland	45,000	..
Radley and Co., Ltd., City Markets, Auckland	6,000	..
H. J. Masson, Te Kauwhata	2,700	..
W. J. McMiken, Hamilton	4,000	..
	182,700	..
Gisborne.		
Gisborne Refrigerating Co., Ltd., Gisborne	16,000	..
Hawke's Bay.		
Wattie's Cannery, King Street, Hastings	26,000	..
Ashcroft and Edwards, Mills Street, Hastings	26,000	..
The Elite Bacon and Ice Co., Heretaunga Street, Hastings	22,500	..
C. H. Slater, Ltd., 86 Aubyn Street, Hastings	35,000	..
W. Sisson, York Street, Hastings	10,000	..
J. E. Hope, Twyford, Hastings	12,000	..
A. Frost, Havelock North	9,000	..
J. H. Milne, Havelock North	7,000	..
H. G. Apsey and Co., Hastings Street, Hastings	6,000	..
E. J. R. Milne, Pukahu, Havelock North	5,000	..
E. French, Lyndhurst Road, Hastings	3,000	..
F. A. Mintoft, Thompson Road, Havelock North	2,400	..
	163,900	..
Palmerston North.		
Tiki Bacon Factory, Princess Street, Palmerston North	1,800	..
Greytown.		
W. A. Tate	10,000	..
Wellington.		
Co-operative Dairy Farmers' Freezing Co.	80,000	100,000
Harbour Board Cool Stores, Wellington (precooling)	28,000	100,000
Frozen Products, Wellington	35,000	..
	143,000	..
Nelson District.		
Nelson Freezing-works, Stoke	36,000	40,000
J. C. McMurtry, Waimea West	3,200	..
Maitland Cool Stores, Port Nelson	5,000	..
Motueka Cool Stores, Motueka	40,000	..
G. Hawkins, Westport	1,250	..
	85,450	..
Canterbury.		
Canterbury Orchardists' Co-operative Society, 551 Colombo Street, Christchurch	20,000	..
Christchurch Fruit and Produce Co.	8,000	..
Papanui Fruit and Storage Co., 27 Harewood Street, Christchurch	35,000	40,000
Wardell Bros., Christchurch	4,000	..
F. Sisson, 120 Sawyers Arms Road, Papanui, Christchurch	20,000	..
E. A. Sisson, 83 Sawyers Arms Road, Papanui, Christchurch	5,000	..
Radley and Co., Christchurch	3,600	..
McFarlane and Co., Lichfield Street, Christchurch	2,500	..
N.Z. Farmers' Co-operative Association, Ltd., Christchurch	..	3,500
	98,100	..
Otago.		
Otago Dairy Products Cool Storage Co., Ltd., Dunedin	2,000	..
Royal Ice Co., Dunedin	..	1,750
Crystal Ice Cream Co., Ltd., Dunedin	4,500	..
R. S. Black Freezing-works, Alexandra	3,000	..
P. Mooney, Cromwell	300	..
J. Bennetts, Roxburgh	500	..
	10,300	..

Profitable Crops for Pigs.

Growing Cheap, Supplementary Feed.

A. LONGWILL, B.Agr.Sc., Supervisor, Auckland District Pig Council.

GROWTH of store pigs from 50 lb. to 140 lb. between 1st May and 1st August at a cost of only 6s. per pig for bought-in feedstuffs; the successfully wintering of forty store pigs without the loss of a single pig; £4 net per milking-cow from the pigs—these are actual results obtained by dairy-farmers, and, as such, should have a peculiar significance for every one who is desirous of improving his pig returns.

One of the features common to all such results is the provision of a small area of crops for supplementary feed for pigs. It is not suggested that this factor outweighs the general management factor, but it is surely rather a direct reflection of the latter, and the man who has the foresight to provide for a cheap supply of feed to carry pigs over the lean period, and, incidentally, to finish them when the prices are highest, is also the man who provides housing and feeding at the right level throughout the season.

This provision of cheap supplementary feed for pigs, at those periods of the year when the dairy by-products slump markedly, is an excellent means of securing greater profits from the pig section of the farm, thereby benefiting the whole farm economy.

Cropping Programme.

It is not too early to consider what steps can be taken during the coming year to provide home-grown crops to cope with the feed problem when dairy by-products are inadequate to supply the requirements of the pigs on hand. The cropping programme adopted should fulfil the following requirements:—

(*a*) Fit in with any cropping carried out for the dairy herd.

(*b*) Make provision for the economic wintering of sufficient pigs to cope effectively with the flush of dairy by-products. (Where conditions for wintering are good it would be safe to produce a surplus for sale in the spring.)

(*c*) Even up the feed-supply at any period when the milk-supply drops suddenly, so that the pigs can be finished as intended rather than sold to be unloaded on a gorged and weakened market.

Home-grown crops to cope with the feed problem when dairy by-products are inadequate for the requirements of the pigs on hand are within the reach of most farmers. An outline of a cropping programme is given, together with an analysis of the value and cost of the feed produced.

Just how far a cropping programme can be carried out will depend on the labour available in individual cases as well as on other obvious factors which govern the relative profit of growing or buying-in supplementary foods, but it can be stated that for average farms where soil and climatic conditions are suitable it will be found profitable to grow some crops for one or more of the above-mentioned purposes.

Choice of the Crop.

The choice of crop usually depends on individual conditions, including soil and climate, and labour available for preparation, sowing, harvesting, and feeding the crops. It should be determined, also, by the yield obtained for the effort spent. It is useless growing a crop you favour when another which yields twice as much could be grown with equal success. In cases where labour is inadequate, the choice may rest at present on a crop which the pig can harvest for itself.

The following crops are dealt with as a selection of those most suitable for pigs and applicable to the varying conditions encountered throughout the country. A variety of crops will usually be found most satisfactory, and any farmer in the Dominion should be able to select at least two or three of these crops to grow each year under a rotational system for his pigs.

The accompanying tables are inserted to help determine which are the most profitable crops. Familiarity with individual crops may have a bearing on the choice, but the average yields in tons per acre and pound starch equivalent per acre will give some indication as to whether it would be worth while trying a new crop.

Value of Grains.

Where they can be satisfactorily grown, grains—particularly barley and maize—provide an admirable means of balancing and improving, by rendering more concentrated, rations based on skim-milk or buttermilk. Bulky feeds, such as roots, are not worth using unless some meat-meal or grain is fed with them. One pound of meal per head per day makes roots worth while.

It is impossible to deal with the cropping practices in detail, as these vary from place to place according to soil and climatic conditions. They are therefore summarized in the table, and this summary should be regarded as a rough guide only. The assumed yield per acre of the various crops is on an arbitrary basis, and does not necessarily represent an average crop; it would get us no further forward if we worked on the average crop for the whole of New Zealand. Yields vary considerably not only as between districts, but according to the time and care given to the preparation of the soil, subsequent weeding, &c.

Relative Merits.

It is a simple matter to compare two crops from the aspect of relative profit, where the yields are known. Good yields are essential to profitable crop-production. By using the figures given for the arbitrary yields of starch equivalent per acre for each of the crops to be compared it is easy to work out by proportion the yield for the crops you can produce. By taking into account the production costs per acre, the respective yields of starch equivalent per acre will give a reliable picture of the merits of the crops in question.

The following table sets out the details of soil, manure, cultivation, seeding, &c., appropriate to the crops named:—

Table 1.

Crop.	Suitable Soil.	Manure required.	Cultivation.	Sowing.		
				Time.	Seed/Acre.	Spacing.
Concentrates—						
Maize	Light loam or silt	Organic, or 3 cwt. super	Fine, firm tilth; intercultivate	October	30 lb.	28 in. to 3 ft.
Barley	Light loam	1–3 cwt. super	Reasonably fine and firm	Early August on	1½ bushels	7 in. drill.
Oats	„	1–3 cwt. super	Ditto	Autumn or spring	2–3 bushels	„
Linseed	Sandy loam	1 cwt. super; 1 cwt. bonedust	Deep tilth—firmed	October	30–40 lb.	Broadcast.
Peas	„	1–1½ cwt. super; 1 cwt. lime	Fine, firm tilth	November	3 bushels	14 in. drill.
Beans	Medium	„	„	„	3½ bushels	„
Semi-bulky foods—						
Potatoes	Light loam	3 cwt. super; 1 cwt. sulphate of potash	Reasonably deep, fine, and firm	September	1 ton	28 in. to 30 in.
Artichokes	„	3 cwt. super; 1 cwt. sulphate of potash. (First year only)	Ditto	„	12 cwt.	„
Sugar-beet	Good, deep loam	2 cwt. super; 1 cwt. 30-per-cent. potash; ½ cwt. sulphate of ammonia	Fine and firm; single, and intercultivate	October	4 lb.	20 in. to 28 in.
Bulky foods (high in water or fibre)—						
Maize stalks (see Maize, above).						
Pasture ensilage	Various	2–3 cwt. (complete)	Harrowing, &c.			
Lucerne (green)	Light soils, free-draining subsoil	1 ton ground limestone; 2 cwt. super; and 2 cwt. lime	Fine, firm, and very clean	November	20 lb.	7 in. drills.
Pumpkins	Good loam	2 cwt. super	Fine, firm tilth	„	2–4 lb.	6 ft. rows.
Chou moellier	Moist loam	2 cwt. super; 2 cwt. lime	Intercultivate. „	October	1½ lb.	28 in. ridge.
Thousand-headed kale	„	„	Intercultivate. „	November	2 lb.	„
Kohl rabi	„	„	Intercultivate. „	„	2 lb.	„
Carrots	Light loam	1½ cwt. super; ½ cwt. 30-per-cent. potash	Intercultivate. Fine, firm, and clean	October–January	2½ lb.	21 in. rows.
Swedes	Alluvial loam	1 ton lime; 4 cwt. super and lime mixture	Intercultivate. Fine, firm seed-bed	November	¾ lb.	28 in. ridge.
Mangels	Deep mellow and loam	3 cwt. super; 1 cwt. 30-per-cent. potash; 1 cwt. sulphate of ammonia	Intercultivate. Fine, firm seed-bed, single. Thin young plants.	October	4–6 lb.	„
Pea haulms (see Peas, above).						

This table sets out a yield per acre, with the corresponding amount of feed produced and approximate costs per 1,000 lb. of starch equivalent; one ton (2,240 lb.) of barley contains 1,568 lb. of starch equivalent; one of pollard, 1,350 lb. :—

Table 2.

Crop.	When available.	Assumed Yield per Acre.			Approximate Cost of Production per 1,000 lb. S.E (at Piggery).	Remarks.
		Amount.	Pound Starch Equivalent.	Pound Protein.		
					£ s. d.	
Maize	June	60 bushels	2,800	275	5 0 0	See also feed value in stalks.
Barley	February	46 bushels	1,650	140	6 0 0	Requires moderate rainfall, dry harvest season.
Oats	January	40 bushels	960	120	9 0 0	„
Linseed	February	7 cwt.	940	150	9 0 0	Requires moderate rainfall, dry harvest season. (By-product for pigs.)
Peas	„	30 bushels	1,260	325	8 0 0	Pigs folded on stubble clean up shed peas.
Beans	„	30 bushels	1,180	350	8 10 0	Subject to aphis attack, &c. Soya bean useful.
Potatoes	April	10 tons	4,000	190	4 0 0	Rejects only used for pigs.
Artichokes	„	10 tons	4,000	160	2 0 0	Crop may stay down for several years.
Sugar-beet	May–June	25 tons	8,300	315	2 10 0	„
Maize stalks—						
Green	February	15 tons	3,000	235	4 0 0	Frequently used for milking-cows.
Dry	June	4 tons	2,000	150	Reduce cost of maize	See also value of maize (grain), above.
Pasture ensilage	December on	9 tons	2,250	375	2 10 0	Total production per annum.
Lucerne (green)	January	15 tons	3,000	750	2 0 0	May be grazed, fed out green, or hayed.
Pumpkins	March	50 tons	9,000	800	1 10 0	If sown among maize (after scarifying once), crops lighter.
Chou moellier	February	20 tons	3,600	600	4 0 0	Fed off in breaks or carted into pens.
Thousand-headed kale	„	15 tons	2,950	450	5 0 0	„ „
Kohl rabi	June–July	20 tons	3,500	250	4 0 0	If leaves used green, yield of root reduced.
Carrots	March	40 tons	7,850	530	2 5 0	Sow manure well below seed. Mix seed with moist sand five to six days before sowing. Hoeing essential.
Swedes	May–June	45 tons	7,350	700	2 0 0	Excellent crop where diseases, &c., not serious.
Mangels	June–July	60 tons	9,100	540	1 15 0	3 cwt. salt/ac. may be added to the manure. Ripen four to six weeks. Do not feed to boars.
Pea haulms—						
Green	January	8 tons	1,220	360	6 0 0	Feeding in green succulent state.
Dry	April on	2 tons	800	150	(see Peas, above)	May be fed as hay, allowing pigs to do the threshing.

The protein equivalent, a figure which represents the protein value of the crops, is given as a further aid to compare the relative value of the crops. This figure again corresponds to the arbitrary yield given. Protein is costly but very useful, especially in winter, and by growing some of the richer protein crops, such as peas or lucerne, the cost of protein supplements which require to be purchased when the skim-milk fails can be reduced. For the whey-feeder, protein is of great value at all seasons of the year.

In the costs of production quoted, full rent for land has been allowed, as well

as cultivation, harvesting, storing, and transport costs to the piggery where necessary, so that the costs as quoted enable a comparison to be made as to whether it really pays to grow crops or to buy-in. For example, if good-quality cereal concentrates can be landed at the piggery at £7 10s. per 1,000 lb. starch equivalent—*i.e.*, about £11 10s. per ton of barley-meal—it will not pay to grow anything that costs us more than that on the farm. On the basis of the yield that any individual farmer can expect from any particular crop he can estimate the area required to provide the winter feed for the number of pigs he wishes to winter.

Daily Requirements.

The approximate daily requirements of starch equivalent* and digestible protein for pigs of 50 lb. and 100 lb. live-weight to maintain reasonable growth are :—

Live Weight.	Starch Equivalent.	Digestible Protein.
lb.	lb.	lb.
50	1½	¼
100	2¾	½

A small quantity of protein-rich meal, such as meat-meal, pea, &c., should be used wherever roots are being fed in order to keep up the level of the digestible protein supplied. Making allowance for this, 1 ton of carrots or other roots will be just about enough to feed two pigs of the above weights for ninety days. The area required for pigs can be calculated from this. Usually it will be necessary only to add this area to that already being cropped for the dairy herd.

Planning the Supply.

A variety of crops rather than just one crop will prove best in planning the winter-feed supply. The period at which they are available varies to some extent, and this can be made use of in smoothing out feed-supplies over a longer period.

The combination of maize and pumpkins where these can be satisfactorily grown (soils with plenty of organic matter, and suitable climate) is excellent, although perhaps, not producing a higher average food supply per acre than sugar-beet or mangels. Under conditions of labour scarcity all these crops may be at a disadvantage compared with the oft-disparaged artichoke. Barley and peas can be recommended only for those districts suited to their proper harvesting, and these are usually divorced from the main dairying and pig-raising districts. In these districts the root crops which yield highly will be most successful, due regard being paid to the resistance to such pests, diseases, &c., which may be present. Meat, linseed, or pea meals, according to relative values, or else combinations of the first with either of the other two, should be used to supplement such crops.

The difficulty of harvesting sugar-beet is one which should not be allowed to hamper the proper appreciation of this outstanding crop for pig-feeding. Various types of harvesting-machines are in use in the Northern Hemisphere countries where the crop is largely grown, and similar implements would pay for their construction in this country if they enabled this crop to be utilized properly.

Carrots and Swedes.

Carrots are worthy of special mention, the guerande variety having a definite advantage in that, not having a deep tap-root, it is easily pulled, and feeding out is correspondingly easier. Swedes are an excellent crop where they can be reliably grown. Ensilage is more problematical, except for mature sows and boars. Store pigs do not take kindly to it unless it is sprinkled with molasses water and supplemented with a protein concentrate, in which case they can often be induced to take it readily.

In the growing of crops to supplement the dairy by-product consideration must be given to the soil conditions and other facilities for carrying pigs during bad weather. The combination of these factors may in some cases—at present, at any rate—render the wintering of pigs unprofitable. Supplementary crops are still useful in getting the pigs finished for slaughter before the winter sets in. On the other hand, where conditions are suitable it will be profitable to grow a sufficient crop to provide for a surplus of forward stores in the spring-time, when prices are at their best for this class of stock.

Limitation of Numbers.

Generally, it will be best to limit the number of pigs wintered to that required to cope with the dairy by-products available after allowance is made for the sows and their early spring litters. One winter store pig for every three cows in the herd should be sufficient for this purpose, and, on the basis of a 150 lb. starch equivalent per pig wintered and the yield per acre of the various crops, the following areas should be cropped for pigs on a farm carrying sixty milking-cows (wintering twenty store pigs) :—

(*a*) One-third acre mangels, carrots, swedes.
(*b*) One-quarter acre sugar-beet.
(*c*) One-third acre pumpkins and maize.
(*d*) One-quarter to one-third acre of a variety of these crops.

It would require about 6 acres in barley to produce the equivalent in food value to 1 acre of any of the above crops where yields are proportionate to those shown in the above table.

Conclusion.

In conclusion, it is quite fair to assume that most dairy-farms have some area of ground—perhaps some worn-out pig-runs—that would benefit from cultivating before regrassing, and in the process it should be worth while taking a crop off the area. This should certainly be the case if it is possible to utilize the fertility left by the pigs in their runs.

If there is a danger of this ground being infested with the eggs of pig-worms 5 cwt. of burnt lime per acre applied before ploughing (this being fairly deep) will help to reduce the danger but will not entirely eliminate it, and therefore it may be possible to feed out the crop grown in the pig-run to cattle, which will not be affected by the parasites of the pig, while the crop for the pigs can be grown on " clean " country.

Look over the farm now and see if you cannot find some area that can be improved by the use of the plough and which, simultaneously, can be made to provide for a good start for your pigs and higher net returns from them next year.

*Starch is a standard product, and the values of all feeding-stuffs are measured by it. One hundred pounds of feed in question will produce as much fat, growth, or other energy as would the stated amount of starch. Thus, 100 lb. of sugar-beet will produce as much as 15 lb. of starch, so that sugar-beet has a starch equivalent of 15. Starch equivalents for all feeding-stuffs have been determined by careful experiment, and are the best standard known for comparing different feeds.

Feeding Value of Meal for Pigs.

W. A. T. (OHURA) :—

Will you please let me know the difference between the feeding values to pigs of pollard and barley-meal? I was informed some weeks ago by a manager of a big pig farm that barley-meal was five times as good as pollard, and since then I have seen in a farming paper that there is more food value in pollard. Which is advised by the Department of Agriculture? I know barley-meal is slightly more expensive.

Superintendent of Pig Industry :—

By the international standards in use, the feeding value of pollard is approximately 60 feed units (starch equivalent) per 100 lb. of pollard, and of barley, 72 feed units per 100 lb. If prices are in keeping with these relative differences there is no choice between the feeds. Both are improved if used in conjunction with meat-meal, ¼ lb. to ½ lb. per day per pig, even when skim-milk is used. Double up the meat-meal in the absence of skim.

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Veterinary Notes for the Farmer.

Discussions on First-aid Measures.

Contributed by the Live-stock Division.

Plentiful Water-supply.

AT this time of the year it is important to see that all stock on the farm should have a plentiful supply of fresh water daily. In dry seasons, when the feed becomes more fibrous in nature, all classes of stock require and consume greater quantities of water to enable them to digest the dry food material. All milk-producing animals require more water per head than dry animals.

Cases of poisoning of stock and losses in other directions have been attributed directly or indirectly to an inadequate water-supply in the dry months of the year. A few years ago a loss of dairy cows was recorded due to animals drinking from a drain containing the caustic-soda washings from the dairy and shed. In this case a water-supply was available but was not within easy reach of the shed, and the thirsty stock drank the shed drainage.

A loss of sows at pasture in a dry season was investigated, and although poisoning was suspected it was found that the sows were suffering from acute constipation and impaction, and death was due to this cause. Inquiries showed that the animals were confined in a paddock with little or no succulent green feed, all the skim-milk being required for the young piglets in the house, where no losses occurred. In such circumstances, deep troughs containing molasses in water should be provided for sows at pasture.

Numerous instances could be quoted showing the necessity for providing a plentiful supply of fresh water for all classes of stock, but the above will suffice to draw attention to this necessity. The nature of the water-supply for grazing animals is also very important, and many owners of stock have provided watering troughs in preference to surface water. This movement has everything to commend it and should be encouraged, or, in other words, the dam or pool of water collected from surface drainage of an area cannot be too strongly condemned.

For young stock the drainage water is definitely dangerous as a source of worms, and this applies in all classes of stock, whether lambs and hoggets, calves, or even foals and young horses. These surface pools are still sometimes seen on sheep-farms as the only source of water-supply for the stock. If possible, they should be replaced by a pure water-supply. It is more important to prevent the spread of worms than to carry out the necessary treatment and dosing to eradicate them from infected animals.

The surface pools may be a means of spreading contagious abortion and Johne's disease in adult cattle. The fencing-off of areas contaminated with the sweepings from the shed has prevented serious digestive disturbances in young calves, especially indigestion, scours, dysentery, and even red-water.

Although impaction of the stomach in ruminants is not so common in New Zealand as in countries subject to drought conditions, a supply of from 10 gallons upwards of pure, fresh water per cow per day is necessary when cows are on dry feed. A scarcity of water may be a direct factor in limiting milk production under dry feed conditions.

Advisory Service on Veterinary Matters.

Farmers are invited to submit inquiries connected with the health of their stock, and the replies will be published under this heading.

Worms in Young Stock.

Farmers who have not already done so are advised to begin dosing their young stock with a reliable worm medicine and to repeat the dosing at regular three-weekly intervals until scouring or other worm symptoms have been arrested. In addition, controlled rotational grazing, together with supplementary dry feed or the use of green crops of rape, chou moellier, &c., in small breaks, where the young animals can be moved forward at weekly intervals, are most important factors in the control of the worm position.

A reliable worm drench is prepared by dissolving 1 lb. of pure copper sulphate in 5 gallons of water and adding 16 fluid ounces of 40-per-cent. nicotine sulphate. The dosage rate is ½ fluid ounce for lambs under four months, ¾ fluid ounce for lambs from four to eight months, 1 fluid ounce for lambs from eight to twelve months, 1½ fluid ounces for hoggets from twelve to eighteen months of age, and 2 fluid ounces for older sheep.

For further information the Departmental bulletin on parasites should be obtained.

"Pumice" or "Sandy" Back Lambs.

Inspection of a number of lines of lambs at freezing-works lately has shown that quite a percentage in some lines are affected with what is known as "pumice" or "sandy" back—*i.e.*, along the back, especially on the rump, there is a quantity of pumice or sand, as the case may be, mixed up with the wool. In some cases the quantity is small, but in others the pumice or sand can be shaken out in considerable quantities.

Reports on properties on which the lambs were running showed that in each case they had access to sand-banks, pumice-banks, or, in one case, a pit used for getting pumice for repairing roads, and that the lambs had been sheltering in these places during the heat of the day. In one of the worst cases the lambs were apparently infested with lice, and as a result of the irritation set up by these parasites they had rubbed along the "bank of pumice" and collected large quantities in the wool.

The wool from these "pumice" or "sandy" back lambs is hard and brittle and much depreciated in value, and the skins are affected to such an extent that they are rejected as being unfit for export.

Any farmers whose country is liable to set up the above conditions should endeavour, by fencing or other means, to keep lambs away from places where they are liable to be affected by pumice or sand, as the condition of the wool and the skin results in an economic loss that can be avoided.

Answers to Inquiries.

Pink-eye in Sheep.

" SUBSCRIBER " inquires about an eye-lotion for the treatment of sheep affected with pink-eye or ophthalmia.

Live-stock Division :—

This disease of the eyes of sheep is probably more commonly seen in the late summer and autumn months, and in many cases it arises following the movement of sheep on dusty roads. Irritation of the eyes from dust and seeded grass heads, or even from top-dressing in windy weather, may be an exciting cause of the trouble.

Affected sheep should be isolated and placed in a level paddock where blind or partially blind sheep are not liable to injury. If only a small number of sheep are affected the eyes should be bathed in a solution of boracic acid in water. A few drops of an eye-lotion composed of six grains of zinc sulphate to the ounce of distilled water should be instilled into each eye once daily until the affected eyes clear up.

Taken early, such cases respond readily to treatment, and the film on the surface of the eye gradually clears up. If isolation of the affected sheep is carried out and a regular inspection of the remainder of the flock is carried out at intervals, so that any affected sheep in the early stages may be culled out and placed with the other sheep for treatment, no difficulty should be experienced in controlling an outbreak.

Watering of Pig's Eyes.

W. J. S. (CENTRAL OTAGO) :—

I have a half-grown pig which has just developed trouble with both its eyes. There just seems to be a watering that has extended to about 2 in. on the underneath side of the eyes. I have washed its lids with warm water including a spoonful of boracic powder, and they seem to be inflamed. There is no regular watering, but just the dirt, which shows that watering is taking place. In every other respect the pig is normal.

Live-stock Division :—

From your description I think the pig is affected with conjunctivitis, which is inflammation of the delicate membrane which lines the eyelids. In this condition there is a distinct change in colour of the membrane, which becomes pink or reddish. There is also a discharge, which is watery at first but later may become yellowish. The animal becomes sensitive to light, and there may be undue movement of the eyelids.

The condition is sometimes induced by foreign bodies, or follows from an infection. The latter is probably the cause in this case, as both eyes are similarly affected. I think you will find the inflammation will subside in about a fortnight.

The eyes should be washed with boric-acid solution (2 per cent.), and afterwards a few drops of a 10-per-cent. solution of argyrol put into each eye with an eye dropper.

In addition, see that the pig is in clean surroundings, as free of dust as is practicable.

Feeding Meat-meal to Hoggets.

A. W. M. (NORSEWOOD) :—

I should be pleased if you could supply me with any information on the feeding of meat-meal to sheep, particularly hoggets. I understand it is somewhat difficult to get them started, and would be glad to know if molasses would be of any assistance in the early stages. I intend to feed them with chaffed lucerne hay damped with diluted molasses, but would be pleased to get your advice on the subject, also any information you have on the feeding of linseed-oil cake.

Live-stock Division :—

In one instance it was found that sheep were encouraged to take a limonite and salt lick by adding meat-meal to it. I should suggest that you start off with your chaffed lucerne, plus molasses feed, and that once hoggets are taking this regularly you then add meat-meal, at first in very small amounts, increasing to 2 oz. per sheep per day which should be sufficient, though up to 3 oz. could be fed.

Broken linseed cake is readily eaten by sheep; 2 oz. to 4 oz. per day can be fed. It should be regarded as a substitute for meat-meal, both being proteins, but will probably be more expensive, costing approximately 17s. 6d. per hundredweight as against about 12s. 6d. for meat-meal.

For winter feeding a good percentage of sugary or starchy foods is desirable, and unless you are giving the molasses in fair amount I should suggest a mixture of equal parts crushed maize and meat-meal, feeding about 3 oz. to 4 oz. of the mixture per sheep per day. Sufficient water-supply should be available.

Change from Cows to Sheep.

W. P. (SOUTHLAND) :—

I am considering changing over from dairying to sheep, and I would like to know how many ewes I could run in place of one dairy cow. I have asked numerous farmers this question, but no two are of the same opinion. Again, the number of ewes per acre I could carry seems full of doubt to most experienced farmers.

The size of the farm is 76 acres, and it has never had sheep of any kind on it for the last forty years. About half the property is river-flat; the balance cultivated ridge. With fairly heavy top-dressing I have already carried up to 37 head of dairy cows winter and summer without buying any outside feed, and have reared all replacements. My best butterfat yield per acre was 117 lb. (factory return, no allowance made for house or calf feeding).

Some of the flat ground is inclined to be wet during the winter months, but apart from this sheep should do particularly well for some years at least, even under heavy stocking.

Live-stock Division :—

The matter is a debatable one unless one had inspected the farm and had given some consideration to the sub-division of the property, the possibility of rotational grazing, and the provision of an adequate supply of winter feed.

As a guide, however, it can be taken as an average that five breeding-ewes are equal to one dairy cow. A farm carrying one dairy cow per acre would carry five ewes per acre when allowance is made for any factors not known. One would consider your farm should carry approximately five ewes per dairy cow, about 185 to 200 ewes, or about 2½ ewes per acre.

To make the best use of the river-flat at periods of flush growth of grass, sub-division of paddocks and rotational grazing would require to be adopted. This area would be liable to become worm-infested after a few years of heavy sheep stocking. The worm position would then require to be controlled by rotational grazing, medicinal treatment of sheep, and supplementary dry feeding. The cultivated ridge area, being better drained, would provide healthier grazing for young sheep, particularly hoggets.

Farm Practice and Management.

Contributed by Officers of the Fields Division.

Construction of Useful Farm Implement and Store Shed.

THE farm shed shown in the illustration provides a useful and convenient shed for a dairy-farm of 120 acres to 150 acres, and provides ample space for storing foodstuffs, seeds, fertilizers, and implements. The store shed is 15 ft. wide and 15 ft. 6 in. deep, and the walls are 9 ft. high. Windows are provided on the side and back walls, and the floor is raised 2 ft. 6 in. from the ground level, thus giving easy loading facilities. The open shed is 35 ft. long and 15 ft. 6 in. deep; the height in front is 10 ft. and at the back 7 ft., and 2 ft. 6 in. of the front wall are boarded.

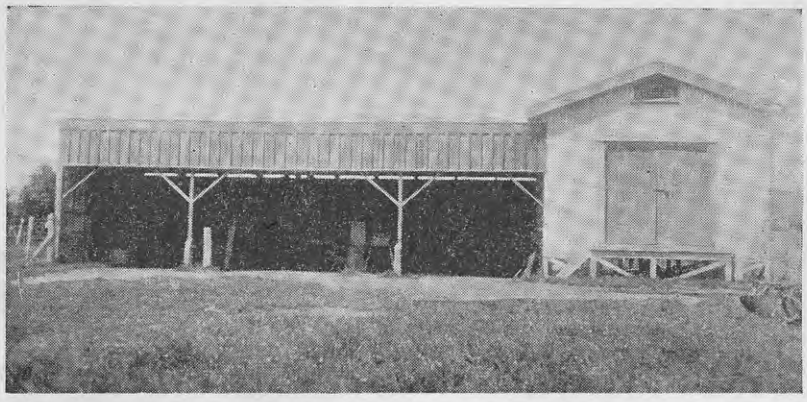


Fig. 1.—A good standard class of farm shed.

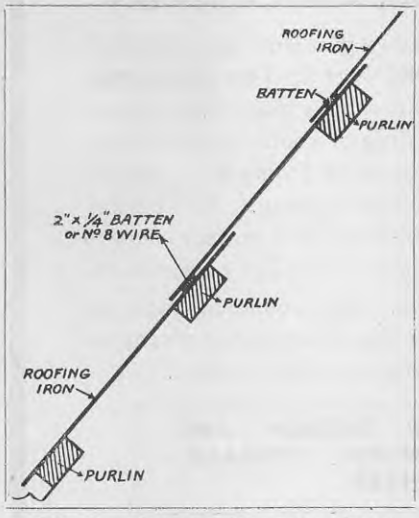


Fig. 2.—Showing the iron placed in position with battens between the sheets directly over the purlins.

This type of shed is very convenient, and the size may be varied according to the requirements of the farm. With slight alterations the buildings may be used for shearing small flocks—*i.e.*, instead of having the floor of the barn all close-boarded part may be laid with a grating floor and a doorway and ramp made leading into the open shed, where sheep may be enclosed by means of hurdles placed along the open front.

In the majority of farm sheds no lining is placed below the iron, and during frosty weather water drips from the iron and causes much inconvenience. This may be overcome by placing building paper supported by wire netting beneath the iron, but the following method is cheaper and prevents water from accumulating at the overlap of the roofing iron and purlins and thence dropping to the floor. Short lengths of roofing iron should be used—5 ft. and 6 ft. lengths being the best—and the overlap requires to be at least 8 in. In using 6 ft. lengths of iron it is advisable to rivet the side laps midway between the purlins, thus making a firm job.

As each sheet is securely nailed in position to the lower or first purlin it should be temporarily nailed in place on to the second purlin. Much care must be exercised to keep the iron in true position, otherwise when the last or topmost row is put on considerable trouble may arise through faulty alignment. When nailing the iron to the purlin the first nail should be driven through the centre of the sheet, as, if placed near the side, there is a tendency for the sheet to get slightly out of line.

After the first row of iron is made secure in this manner, and before placing the second row in position (which will overlap the bottom row at the second purlin), a 2 in. by ¼ in. batten is laid on the iron directly over the purlin for the full length of the building. No. 8

fencing wire may be used in lieu of the batten; indeed, some builders choose the wire in preference, as the batten is liable to split when nailed.

Having placed the batten or wire as mentioned, the next step is to place the second row of iron in position, the overlap covering the batten or wire directly over the purlin. Then secure the iron by nailing it down. For this purpose roofing nails ½ in. longer than the standard size are required. The additional rows of iron are placed and made secure similarly.

When completed, the 2 in. by ¼ in. batten or No. 8 wire leaves a small space between the overlap of the roofing iron, thus allowing the moisture to carry on past the usual point of accumulation (the close joint of the overlap) and drop on to the lower sheet of iron.

Figure 2 shows the iron placed in position with battens between the sheets directly over the purlins, thereby checking the consistent dropping of moisture from the roof to the floor or stores.

—C. S. Dalgliesh, Fields Instructor, Rotorua.

Top-dressing of King Country Hill Pastures.

EACH year it becomes increasingly apparent that more and more land in the King-country is going completely out of production by the increase of secondary growth. There is no doubt that a great deal of the area in question should be allowed completely to revert—the soil is poor, the rainfall is high, and the country is too steep to be farmed economically.

Actually, much of the land should be permanently forested, for land with a high elevation and a high rainfall is difficult to maintain in grass. It is indeed a pity that more was not known about the different classes of country when it was first settled; then only the better portions need have been broken in.

The land originally carried forest growth, and was sown to English grasses. The deterioration has varied according to the soil type, the management, and the type of stock carried, until at the present time there is a wide variation in the type of pasture and secondary growth on this hill country. On the steeper country to-day only the better-class soils are being farmed really successfully, and even there it means a continuous battle to keep the country clean.

Without sufficient capital it is not possible to farm this hill country, and that is one of the mistakes made in the first place. The land was cheap, and it was a great temptation to people with little capital to settle on the land—often with tragic results.

Land Worth Saving.

Nevertheless, there is much of the land that is well worth saving and bringing into better heart. Country that is still holding a certain amount of grass is by no means hopeless, and can be brought

back by top-dressing, perhaps the introduction of some seed, and adequate stocking to control the secondary growth. With country that has gone too far into secondary growth it is necessary to do much more, such as burning, resowing in a suitable grass-mixture, top-dressing and, as before, stocking sufficiently to control the secondary growth.

Cattle are undoubtedly the best medium in controlling secondary growth, but to winter them in sufficient numbers is no small problem because of the shortage of feed at that time. The wintering of more cattle is certainly correlated with top-dressing, and a hopeful avenue of experiment seems to be in the use of pampas grass as a winter fodder.

Top-dressing.

Over the whole of the King-country there occurs a medley of soil types. The country generally is based on beds of greywacke, conglomerates, limestones, and claystones covered in parts, and sometimes to considerable depths, by an accumulation of rhyolite tuff and breccia, the product of eruptions in the Taupo district. Geologically speaking, the soils of this part of the North Island are termed young soils and are recent in origin—that is, in comparison with the older and leached soils of North Auckland.

Phosphatic manuring gives the best results on all King-country soils, and this has been amply proved in many manurial trials carried out by the Department of Agriculture. Responses on grassland to lime and potash are slight generally, and farm practice and experimental evidence indicates that superphosphate is the cheapest and most efficient fertilizer for pasture top-dressing in the King-country.

Undoubtedly the best time to apply manure to pastures is in the autumn, and this tends to even out the pasture growth throughout the whole year, at the same time giving a longer feeding into the winter months. Spring top-dressing, unless for special reasons, such as hay and ensilage crops, tends to give a big bulk of feed just when it is not required. With a mild and humid summer climate, pastures in the King-country are liable to get well out of control, and the growth in the summer months is indeed rapid.

There is no doubt that the time is approaching when more thought must be given to the bringing into production of the more difficult country. It would appear that, if considerable deterioration is to be prevented from setting in as time goes on, top-dressing of the steeper country must be faced sooner or later.

—J. M. Hopkins, Instructor in Agriculture, Taumarunui.

Maintaining Healthy Seed Potatoes.

IN order to prevent deterioration or "running out" of a crop of Iron Duke potatoes because of "mosaic" virus disease a farmer in South Otago has adopted a procedure which is meeting with success and which does not necessitate an undue period of time or amount of labour.

A rapid and progressive increase in the amount of "mosaic" disease had taken place, and it was evident that unless measures were taken immediately to contend with this virus disease the parent stock would soon be useless.

Originally, the removal of all mosaic diseased haulms and tubers, as well as plants with other virus diseases, was resorted to by pulling or roguing at or before flowering, but as this resulted in the removal of a large percentage of plants the yield was proportionately decreased. After consultation with officers of the Fields Division it was decided to begin with a small area of about one-fifth acre of ground planted in large seed selected at hand-digging for freedom from virus disease and yield, and at hand-picking for type, shape, and freedom from skin and internal diseases.

Fig. 1.—A general view of the isolation plot of Iron Duke potatoes.
[A. F. Greenall, photo.

Fig. 2.—The isolation plot of Iron Duke potatoes, showing the stage of development at which the second roguing was done.
[A. F. Greenall, photo.

The ground selected was well isolated by a gorse hedge on one side and a crop of oats on the other, and was on soil not previously cropped with plants of the solanaceous family and at least a mile from adjacent farm garden potatoes or field crops of potatoes.

As soon as the shaws were well enough developed to show definite signs of mosaic disease the diseased plants were pulled out together with each immediately adjacent plant, whether diseased or not.

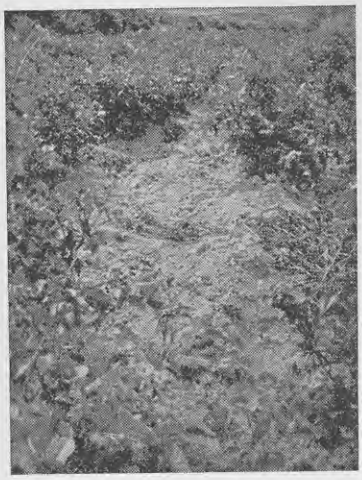


Fig. 3.—The isolation crop as it appeared after the final roguing. Note the extensive nature of the roguing. [*A. F. Greenall, photo.*

This early roguing prevented the transference of disease from diseased to healthy plants by leaf-biting insects, which were not very active at that time. Thus, possible centres of infection were removed.

At or about flowering time a second roguing was done to eliminate all plants showing signs of late-developing mosaic. This roguing removed not plants which became contaminated since the date of first roguing, but plants in which the mosaic disease had not made itself manifest at the time of first roguing. Plants infected with virus do not show signs of the disease, as a rule, until the following year unless very early infection has occurred.

As the result of roguing about 25 per cent. of the plants were removed, care being taken to remove completely all partially developed tubers from underpulled plants. At the date of hand-digging a still further selection was made for shape, tuber diseases, and yield.

The best of this seed was hand-selected and sown again in isolation with a view to following the same procedure, while the remaining seed was transferred to the area sown for commercial crop.

By this means it is hoped to replace old seed with specially selected seed, and to have a constant stream of disease-free tubers available for sowing a commercial crop.

—A. F. Greenall, Instructor in Agriculture, Balclutha.

Fields Division Exhibit at Nelson Show.

IN common with the practice of the Department of Agriculture to exhibit at the principal agricultural and pastoral shows in rural centres, an exhibit by the Fields Division was staged at the Nelson Agricultural and Pastoral Association's forty-sixth annual show.

Lack of indoor space necessitated the erection of a suitable outdoor stand. This drawback, however, was compensated for by the fact that the stand was arranged with plots to one side treated with a varied manurial programme.

While numerous turfs depicted stages in the development of permanent pasture on first- and second-class land and the effects of sowing various strains of grasses and clovers, the outdoor plots left no doubt of the effectiveness of dressings of lime and superphosphate.

Many visitors inspected the stand and adjacent plots. Their keenness and interest, together with the many questions asked, left no doubt regarding the success of this display.

—D. M. E. Merry, Instructor in Agriculture, Nelson.

Farm Lorry Converted into Mechanized Hay-sweep.

MANY methods are used for collecting hay, the basic principle being a sweep, with different forms of traction. The most popular for this motor age is the tractor or motor-lorry, or even the family car.

Fig. 1.—A view of the sweep attached to the lorry, which is ready to commence work.

The sweep illustrated in Fig. 1 has been constructed by a farmer for use with the farm motor-lorry.

The advantages of this form of traction are apparent, but the main features are simplicity, speed, and stability. The sweep is fastened to the front of the lorry by two flexible brackets and stayed in such manner that the attachment is simple yet rigid.

In operation the load is picked up and the front of sweep elevated by means of a rope passing through the pully at the end of the lever attached to the back of the sweep. With the teeth raised, the load can then be carried to the stack in the minimum of time.

Fig. 2.—The sweep in operation clearing a paddock of grubbed gorse.

As can be seen in Fig. 2, the implement can be requisitioned for sweeping material other than hay. In this case a paddock from which the gorse had been grubbed was cleared in a very short time, the material being swept into large heaps ready for burning.

—E. B. Glanville, Instructor in Agriculture, Whangarei.

Farm Shelter-belts in Nelson.

STRESS has been laid in recent issues of the *Journal* on the necessity for providing adequate farm shelter from the aspects of stock-protection, provision of farm firewood, and the better growth of pasture in sheltered situations.

Recently the Nelson District experienced a succession of strong south-westerly winds, which have dried pasture, wilted both lucerne and clover, and laid cereal crops. The work of the winds leaves no doubt that more shelter is urgently required especially on the wide open belt of plain.

Trees and effective shelter are widely differing subjects. Trees provide summer shade, while shelter-belts are designed

A line of wind-swept pines only too typical of general plantings. Close, dense shelter, obtained by underplanting the taller trees, is what is required.

to cast the minimum of shade and give the maximum wind shelter both in summer and winter.

The illustration depicts a line of wind-swept pines only too typical of general plantings. Close, dense shelter, obtained by underplanting the taller trees, is what is required.

In general, it may be stated that the direction of shelter-belts in this district should be north and south, as the least shade will be cast over pastures and protection given from strong south-westerly winds. A good shelter-belt should present a conical outline, and should deflect the wind, giving complete protection for three to five times its height and partial protection for fifteen times its height.

—D. M. E. Merry, Instructor in Agriculture, Nelson.

Grazing Value of Blue Wheat Grass.

PROBABLY one of the most valuable of our native grasses is *Agropyron scabrum*, or blue wheat grass. At one stage this was a very common constituent of most of the tussock country and was often found dominating the sward, and under these conditions it was observed to be very palatable to sheep, cattle, and horses, all of which readily fattened when grazing on this grass.

Overstocking and rabbits, however, have thinned this species down. One can find it on areas which are inaccessible to stock or only occasionally grazed by stock. On tussock country occasional plants can be found growing out of silver tussocks which have sheltered it from excessive grazing.

Under dry, hard conditions it will thrive. The average growth of foliage produced yearly is from 5 in. to 14 in., depending on the conditions under which it is growing. Two different forms are found growing under similar conditions—one is a prostrate or drooping variety, while the other is erect, the latter being the most common in Otago. The seed stalks of both grow from about 14 in. to 2 ft. 6 in. in length.

Blue wheat grass, agropyron scabrum, growing under hard conditions on a bank where stock and rabbits cannot easily obtain access to it.

The illustration shows *Agropyron scabrum* growing under hard conditions on a bank where stock and rabbits cannot easily obtain access to it.

There is evidence to show that this grass, if spelled during the spring growth, will stand hard grazing during the autumn and do stock well. Seed from this variety was saved and sown out last year at the Pisa Flat Experimental Area, where it is hoped to gain some further knowledge of it under controlled grazing conditions.

—G. G. Calder, Instructor in Agriculture, Alexandra.

Lifting the Potato Crop.

IN general, the potato crop will be lifted during March and April, and the farmer is advised to dig only when the ground is sufficiently dry to allow the potatoes to be lifted in a clean condition. To attempt digging while the ground is wet is undoubtedly looking for trouble so far as the crop is concerned, as difficulty is experienced in drying the tubers thoroughly before going into the store. Potatoes stored in a damp condition will rot quickly, especially if a spell of warm weather is experienced.

While digging try to avoid as much as possible any damaging or bruising with the fork, as damaged potatoes among a heap which is inclined to rot merely increases the susceptibility to decay.

Where possible, store in a well-ventilated, dry shed. When the pit method of storing must be used it is important that the ground beneath the pit is high and well-drained. A ditch should be dug about the pit to prevent surface water coming in contact with the pit.

Clean, dry straw or, better still, plenty of rushes should be used to cover the potatoes, and the whole should be covered with a good layer of earth, which should be built to a ridge on the top.

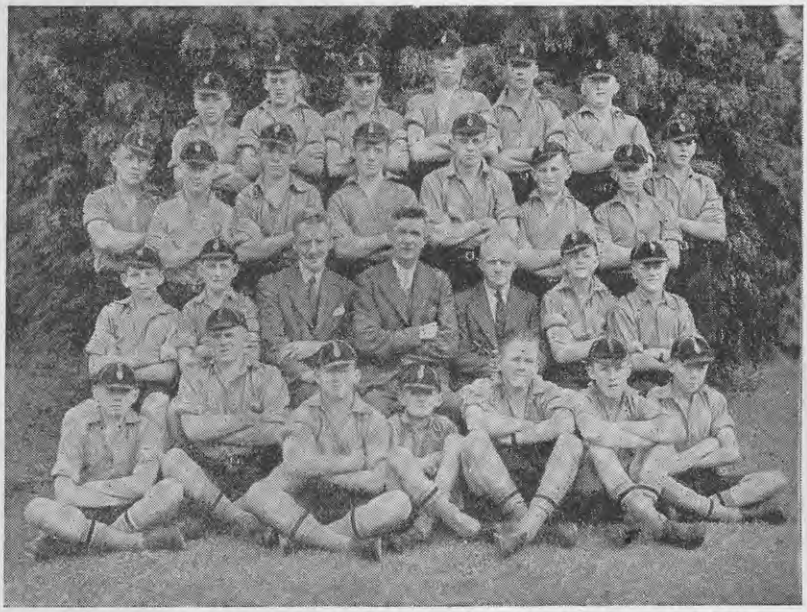
—W. L. Harbord, Instructor in Agriculture, Invercargill.

Special High School Class at Ruakura.

A SPECIAL farm school was held from 19th to 25th November at Ruakura Farm of Instruction for a class of twenty-seven boys attending the Whangarei High School. The boys ranged in ages from thirteen years to eighteen years, and comprised all of the students who are specially interested in farming and are at present taking the school course in agriculture.

The students received lectures and demonstrations in the following subjects: Pasture establishment and management, farm shelter, farm drainage, diseases of the dairy cow, feeding and management of the dairy herd, pig feeding and management, dairy-shed management, pasture top-dressing, hay- and silage-making, farm water-supply, fencing and farm layout, and fat-lamb production. They also visited cheese, butter, and casein factories, as well as local dairy-farms.

During their period at the school the boys displayed great interest in the instruction given, and many of them—quite obviously the sons of farmers—were anxious to obtain special information which would be helpful when they returned home.



The Whangarei High School students who attended the special farm school at Ruakura. *[E. R. Marryatt, photo.*

The Department will be pleased to receive applications from the headmasters of other secondary schools for short courses of this nature for their agricultural students.

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Horticultural Instruction.

Contributed by Officers of the Horticulture Division.

Orchard Notes.

Harvesting the Main Crops.

WORK during the coming month will be mainly that of harvesting the main apple and pear crop, concentrating on preparing fruit for export and for cool storage. Spraying operations for the season will be practically finished in most districts, with the exception of further applications of a fungicide for the control of black-spot on late varieties of apples should humid conditions be experienced in the late summer.

It frequently happens that a late infection of black-spot occurs on Dougherty apples, seriously depleting export quantities. It is advisable, therefore, to continue using lime sulphur 1–180 on this variety throughout March and perhaps into April if heavy rains are being experienced.

Red mite may still cause trouble, and consequently a very close watch should be kept on apple-trees so that steps may be taken to prevent a serious attack developing. A heavy attack of red mite may be so damaging as to cause a premature defoliation and fruit dropping before full maturity is reached. Summer oil 1–100 will destroy mite.

However, the general experience is that it is difficult to cover a tree so completely with spray as to destroy every mite present. Sufficient numbers may be left after a first spray still to produce a heavy infestation. A second application seven to ten days later will give comparative freedom from further serious infestation, and such procedure is the best to follow.

Handling the Export Crop.

The main apple and pear crop is harvested over a comparatively short period, and good organization is required at every point to handle the product successfully and have it shipped in the best possible condition. The necessity for avoiding delay from the time fruit is picked until it is placed in cool storage prior to shipping or delivery straight to the ship cannot be too strongly emphasized. Short delays must inevitably occur at points between the grower's shed and the final delivery into the store. It therefore becomes imperative that no delay should occur in packing and delivering fruit to the inspection point after it is picked.

With such tender varieties as Cox's Orange, and particularly with pears, the grower should aim at having each day's picking delivered to the inspection point the following day. Much may be done in the orchard and packing-shed to ensure that the fruit is delivered in the best possible condition for shipping.

It is important in the first place to remove at one picking all fruit which has attained sufficient maturity, irrespective of colour, and have it graded correctly. High colour and higher grading should not be secured at the risk of impairing condition. During hot weather extra care should be exercised by stacking the newly-picked fruit in the shade of the orchard trees while awaiting cartage into the packing-shed. At every point efforts should be made to keep fruit in cool positions, whether awaiting packing or packed, in order that as much heat as possible may be thrown off. Packing-sheds should be well ventilated. It is most important in grading to reject all fruit showing skin injuries, whether through stem-punctures, insect-bites, or other causes, as such injuries are a prolific source of wastage in export fruit through fungal rots developing at the points of injury. Export cases should be kept under cover and preserved in a clean, dry condition. For the sake of attractiveness of package and get-up cases should not be stacked outside, as they soon take on a weathering and lose their bright, new appearance.

Reworking by Budding.

Budding is used as a means of reworking stone-fruit trees which do not readily respond to grafting. The whole operation of budding consists of taking a fully-developed wood-bud from a shoot of the current season's growth and making a T-shaped incision near the base of a new shoot forced from the older tree previously headed down, inserting the bud in the incision, and then binding with raphia.

It is important to observe the following points if budding is to be a success. Buds should be selected from the middle portion of a shoot and rather nearer the base than the top. It is necessary to use only wood-buds, and these are distinguishable by being more pointed and thinner than fruit-buds. Treble buds of peaches and nectarines should be selected, as the centre bud is always a wood-bud and should produce a shoot.

Shoots from which buds are being secured are prepared by cutting off the lower and upper portion and removing the leaves, but leaving about ½ in. of the petiole or leaf-stalk. The shoots thus prepared, known as bud-sticks, must be kept fresh. It is advisable to perform the operation as soon as possible after the bud-sticks have been selected.

An examination of buds is necessary a month after the operation, and if the growing stock is causing the ties to cut in it is necessary to run a knife through

(Continued on page 168.)

Citrus Notes.

Sowing Down the Cover Crop.

IF the 3 per cent. summer oil has not yet been applied to citrus trees it should be done as soon as possible, as March is the last month of the current season for a thorough application of oil sprays to control scale insects.

The pruning of lemon-trees should be carried out before the onset of the colder months. By experience with "bare poled" trees it has been noted that the best months for pruning are from November to March, and now that the trees are practically clear of heavy crops a suitable opportunity for pruning is provided. At whatever time of the year pruning is done on a lemon-tree some fruit must be sacrificed, but a well-pruned tree will carry a better crop of rub-free fruits.

In view of the winds experienced in all citrus districts it is extremely difficult to shelter an orchard adequately. This can be overcome to some extent if the leaders and laterals in a tree are well spaced, the vigorous upright "sucker" branches in the centre of the tree removed, and the long, slender, lateral branches cut back to stronger wood which is capable of carrying a crop without its being blown around by every wind or weighed down and swept along the surface of the ground.

Adequate Pruning.

Too much stress cannot be laid upon the necessity for adequate pruning. If New Zealand grapefruit or sweet-orange trees are inclined to bear small fruit pruning at this time of the year, if not too drastic, will prove beneficial. Few growers neglect manuring, but many neglect pruning.

During the next few weeks citrus orchardists should endeavour to sow down the "green manure" or cover crop. In young orchards the blue lupin is an extremely useful crop for regular use each winter until the citrus trees come into bearing. This is one of the best soil-bearing crops, and is vital in the young orchard. Sow at the rate of 2 bushels to 2½ bushels per acre and 4 cwt. to 5 cwt. superphosphate per acre.

In some districts the soil appears to become lupin-sick and it is necessary to turn to some other cover crop. This is also the position when trees begin cropping heavily, as it is difficult to pick the crops from June to August when a good stand of lupins is in the orchard. It is sound practice to sow alternate lands one year and the bare lands the following year. By this method pickers and implements can work between the trees without adversely affecting the green-manure crop.

An alternative method is to sow a green-manure crop which does not grow to any height and which is not much affected by the monthly picking operations. Such crops are Austrian winter peas, vetches, red clover, and *Lotus angustissimus*. The last two are equally suitable as permanent cover crops. When small seed is used it is best to mix it with the superphosphate before broadcasting. Whatever green-manuring crop is chosen, February-March is the period for sowing down. Sow at approximately the same rate as lupins for the peas, and at 10 lb. per acre for *Lotus augustissimus* or red clover.

Permanent Sward.

Some of the leading citrus-growers, especially on the lighter soils or on slopes, are putting their citrus groves down in permanent sward. This is to be recommended if a leguminous crop is sown down and kept cut during the summer months whenever dry conditions set in during any season. Humus or organic matter is essential to the successful growing of citrus fruits, and the sowing-down of a permanent crop can be safely recommended in established groves, especially when trees are of such a size as to impede cultivation implements. If such "cover crop" be kept cut and the trees mulched the tilth of the soil will be improved.

Soil-erosion will be reduced and the nitrogen content in the soil will be built up instead of being depleted.

It is well to remember, however, that the above is not a recommendation towards rank weed-growth in an orchard. Weed-growth during the winter months is better than clean cultivation, but weeds generally induce nitrogen starvation in the trees. Whatever method is adopted by a grower, the aim must be the improvement of the tilth of the citrus-orchard soils, and this can best be done by a leguminous cover crop in some form or other.

—L. Paynter, District Supervisor, Auckland.

Viticulture.

Phylloxera-resistant Stocks.

(Continued from December issue.)

The Solonis.

THE Solonis or Novo-Mexicana, according to Viala, is a natural hybrid Riparia-Candicans. Millardet thinks its origin is more complicated and that Riparia, Candicans, and Rupestris composed its make up.

It is found along the banks of the Red River, a tributary of the Mississippi, in the north-west of Texas and in New Mexico in regions belonging to the cretaceous formation. It is also found in Colorado. Along the Red River it grows in very rich, red, sandy soil—very often wet and always damp. In the Panhandle of Texas, quoting Viala and Pechoutre, the soils in which the Solonis grow vigorously are dark to blackish-red and fine and sandy, with numerous flakes of mica distributed through it. The subsoil is formed of flaked yellow clay. The Solonis under these soil conditions develops a very vigorous growth and thick trunk.

The Solonis played a very important role in the reconstitution of the French vineyards during the first periods of the phylloxera crisis. Its vigorous growth and relative resistance to chlorosis in calcareous soils, combined with its tendency to root and take grafts easily and its affinity for vinefera (European sorts), led to its being adopted in many of the vineyards.

After a time it was found that the Solonis was not sufficiently resistant to

phylloxera in soils very favourable to the propagation of that insect, and in consequence it was gradually abandoned in favour of stocks having more resistance, especially the Solonis x Riparia, 1616 (Couderc), which is more resistant to phylloxera and accommodates itself, like the Solonis, to wet and brackish conditions.

According to Viala and Pechoutre, the principal ampelographic characteristics of the Solonis are as follows: Vigorous spreading habit, trunk thick; rods long, smooth, cylindrical, with tufts of whitish hair near the nodes, purple in the herbaceous state and light brownish-grey when lignified; leaves medium size, entire, two series of acute teeth, a few longer ones indicating the terminals of the lobes; those of inferior lobes converging towards the axis of the leaf, which forms a gutter with the lower extremity curved downwards; petiolar sinus shallow and very open; smooth on both faces, stiff whitish hairs along the veins on the under face, and a few shaggy flakes of fluff on the petiole and the upper face of the leaf, which is greyish-blue, the lower face being somewhat paler.

A number of the hybrids bred from the American vines described in this and preceding issues have been in use for some years in New Zealand, and others, containing some of the same blood, are being tried out for adaptation, affinity, and resistance.

A complete collection of the stocks selected from the early types in the past and those under observation at the present time exists in the vineyard of the Horticultural Station, Te Kauwhata. These will be described in later issues of the *Journal*.

—J. C. Woodfin, Vine and Wine Instructor, Te Kauwhata.

Cool Storage Notes.

Handling and Precooling Export Pears.

WHEN harvesting this season's crop it is well to keep in mind that the maturity of fruit when picked plays a most important part in its post-cool storage quality and appearance.

At the beginning of the 1939 season no better suggestion could be put forward than that methods for the handling and precooling of export pears be adopted which will definitely prove beneficial by ensuring their arrival on overseas markets in a uniformly sound condition. The method recommended is as follows:—

(1) All pears should be placed in cool storage within twenty-four hours of picking and held at a temperature of 30° to 32° F.

(2) Pears should not be packed for longer than fourteen days prior to loading on the overseas vessel.

The present system of handling pears is not satisfactory, as it is very difficult to obtain uniformity of condition in a case of packed pears. The Fruit Inspector is unable to detect a slight tendency toward maturity in the pears at the point of inspection, as, when fruit is delayed after picking for grading and packing, some of the fruits, by virtue of their position on the tree, &c., are more fully matured than others. It is this fruit that is responsible for much of the deterioration mentioned in reports from overseas markets.

The method recommended is designed to lengthen the pear-export season by improving the conditions of handling and precooling export pears prior to loading the overseas vessel. This improved condition will enable the London Manager of the New Zealand Fruit-export Control Board to avoid selling on glutted markets by being able to hold the pears in cool storage overseas, and also to allow for further distribution to more distant European markets.

Placing pears in cool storage in orchard boxes immediately after picking and before packing will check maturity, provided the fruit has been harvested in a firm, green, yet matured state. Holding the pears in orchard boxes in cool storage until ten to fourteen days prior to loading the overseas vessel will enable faults in the fruits to develop before packing, and will therefore tend to lengthen the pear-export season, as any bruised or faulty fruit is rejected and only fruit that has been cool stored under good storage conditions and is in the same firm condition as when harvested will be packed for export.

The supervision of cool-storage conditions is also necessary to ensure that the systems of cooling and stacking the cases in cool storage and the temperature control are up to the required standard.

Cool-storage facilities are required in many districts to enable pears to be precooled. In these districts delays in pears reaching cool storage should not be longer than thirty-six hours after picking. It would be beneficial for the pear producers to organize in each area with a view to adopting improved methods which would fit in with the cool-storage facilities available for the immediate cool storage of all pears intended for export.

All export pears handled and packed on the lines mentioned should be labelled "Precooled Pears."

Apples, such as Cox's Orange, when picked, should be packed as soon as possible and placed in cool storage to check the further maturing of the fruit.

When picking pears or apples into orchard boxes for precooling for export or for long holding, newspaper should be used to line the boxes, as it has a tendency to check marking and bruising.

Granny Smith apples for long holding should be picked into orchard boxes and held in the orchard for from two to three weeks in a cool, dry position, the stack being well opened up for ventilation. The date of picking should be about the 16th to 20th April, although the date will vary with local seasonal conditions.

No fruit should be held out of cool storage after being packed, as deterioration develops from blemishes and other causes more quickly when it is held in the packed case without being cooled.

When stacking fruit in cool-storage chambers allow adequate space for air-circulation, as good ventilation is one of the most important features in obtaining satisfactory results with fruit in cool storage.

—A. Powell, Cool Storage Officer, Wellington.

ORCHARD NOTES.

(Continued from page 166.)

them at the back of the stock. The cutting-down of the stock to the bud is not done until the end of the winter, and it is not then advisable to do it early enough to force the buds into growth at a time when frosts are sufficiently intense to damage the tender shoots.

—N. J. Adamson, District Supervisor, Nelson.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticulture Division.

Vegetables for the Winter Season.

THE full enjoyment and economical use of many vegetables depend not only on a wise selection of varieties and careful culture, but sound consideration must also be given to harvesting and storage if there is to be no loss in quantity and quality and the stocks are to be available over a maximum period. Under most conditions in New Zealand such crops as celery, parsnips, salsify, Jerusalem artichokes, autumn-sown carrots, and beet may be left in the ground during the winter with quite satisfactory results, and lifted in dry weather, as required, until about August, when growth is about to recommence.

What remains must then be lifted and stored where the conditions are cold, well ventilated, and not too dry. Main-crop carrots, maturing about April, split if they are left in the ground and become coarse and fibrous, as do main-crop beet maturing at that time. These should be lifted in fine weather as soon as they mature and given the storage conditions mentioned.

A lean-to shed with a southerly aspect is often a suitable place for storing produce of this kind, especially when shaded by plantation trees and having ample means for ventilation in the higher part of the roof. Such a place is also suitable for potatoes stored in bins, sacks, or boxes if it is clean, well drained, and dark, but not so dry as to cause the tubers to shrivel.

Considerable losses from decay occur if the stocks are contaminated by the presence in the store or its vicinity of decayed tubers or waste carried over from a previous season. This can readily be avoided by the methodical disposal of decayed waste at all times and a thorough annual clean-up of the store, which may very well include a careful spraying of the interior with a reliable fungicide.

Losses from decay may also occur through infection caused by decayed tubers being overlooked when bagging up in the field. Or an abundant crop, to all appearance sound, may be placed in the store and in a month may be in a useless condition due to the attack of the potato-moth (*Phthorimaea operculella*).

This attack, which is most likely to occur in warm, dry localities and seasons, may be avoided by picking up and bagging the tubers the same day as they are dug and placing them in a clean store. In this way the night-flying, egg-laying moth is unable to deposit on the tubers those eggs which later hatch out into caterpillar larvæ which tunnel the flesh and make the tubers an early prey to organisms of decay. Doubtful stocks should be picked over after a month or two in storage, and if infection is fairly extensive they should be used up as soon as possible.

Potato Storage.

Large quantities of potatoes stacked in a compact manner are liable to heat and sprout, especially in warm districts and in a store where attention to ventilation is neglected. In such localities they may be stored satisfactorily in slatted bins to a depth not exceeding 3 ft. or 4 ft., but in colder districts 6 ft. may be a maximum depth so long as good ventilation is provided, except when there is danger of injury through frosts.

Where stocks are large and storage accommodation limited a quantity for late use may be satisfactorily held in a pit or clamp outside if the tubers are quite sound. For this purpose a well-drained, cool position should be chosen and the potatoes piled as high as possible in a ridge 5 ft. or 6 ft. wide and as long as desirable. The tubers are then covered with clean straw to a depth of about 6 in., and to keep this in position it is covered with soil at least 3 in. deep.

In doing this a trench is formed about the pit to drain it adequately during wet weather. To allow surplus moisture to be given off and to prevent the potatoes heating the pit should not be completely sealed for the first few weeks, but should be covered up to within a foot of the ridge only. When this object is achieved sealing should be completed and the depth of the soil covering increased as may be found desirable. If these conditions are observed and the crop is carefully dug in fine weather as soon as ripe and allowed to harden off afterwards for a few hours before gathering it will be used to best advantage.

Special care is required in storing seed potatoes. They require light, without being exposed to the sun, and plenty of air. They are best stored in crates. If in sacks they should not be piled up, and a space should be left between each row to allow air to circulate. At intervals the sacks of seed should be turned bottom side up to ventilate and dry off.

They are sometimes spread on the floor with satisfactory results, and special lots may be spread in wooden trays stacked in tiers to sprout in preparation for planting. Any of these methods will prevent sweating and the formation of unseasonable, excessive, and useless growth. "Certified" seed should be obtained as soon as it is available and carefully stored in order to obtain the best results.

Curing and Storing the Onion Crop.

The onion crop requires somewhat similar storage conditions to that for the potato, the chief difference being a drier

atmosphere. The bulbs should be lifted as soon as ripe—this is of special importance in districts inclined to be humid and warm—and placed in windrows, consisting of five or six rows of bulbs, until the tops wither completely. If wet weather is experienced the windrows are turned over by means of a wooden rake. When the tops and roots have dried off the bulbs are trimmed with shears, bagged up, and placed in an open shed for a few weeks to cure thoroughly before storage or shipping.

When cured, the bulbs are cleaned by removing the dry outer scales; bulbs which are split, have "thick necks," or are damaged in any way are removed, and the remainder graded for size. They will then store satisfactorily if placed in a comparatively dry atmosphere and given thorough ventilation at all times except in wet or humid weather.

If packed in slatted boxes they are stacked, like fruit, with 1 in. space between tiers and rows to permit of circulation of the air; or they may be spread 6 in. or 8 in. deep on slatted shelves; or small quantities may be "strung" in the old-fashioned manner and hung in a dry, airy place. The third method is particularly suitable for shallots held over for another planting season. All bulbs of this class deteriorate very quickly in a close atmosphere.

Pumpkins and Kumaras.

Vegetable marrows are best used in a green state when of a suitable size, but pumpkins and what are known in America as winter-squash, such as the Hubbard varieties, should not be harvested until they are thoroughly ripe, but before they have been frosted. They are cut with a portion of the stem attached and left in the field to mature before carting. They must be handled and carted with care, as it is easy to injure them seriously at this stage. When they have been stored in a warm, dry, airy place for a few weeks their shells harden, and they can then stand somewhat lower temperatures and rougher handling if that is necessary.

In the warmer districts, especially where there is also a heavy annual rainfall, the ordinary late potato crop is rather difficult, but the sweet potato, or kumara, generally grows well. For this and other reasons it is increasing in popularity in such areas. While the crop is best left growing as late as possible, it must be lifted before there is any frost; otherwise the tubers immediately under the crown are liable to injury. If frost kills the vines the kumaras should be dug immediately, as decay sets in on the dead vines and may pass down to the tubers.

Digging must be done with the greatest care, as the slightest damage at this stage prevents the tubers from keeping, and storage losses are due chiefly to faulty handling before curing. Curing, which occupies about a week, is usually done by gathering the tubers into heaps and covering them with sacks every night to dry them thoroughly before storage in a warm, dry chamber which can be ventilated in suitable weather. Small quantities may be kept successfully by storing in sand, so long as it is perfectly dry.

In the southern States of America where sweet potatoes are grown on a commercial scale, the tubers are stored in crates and stacked to allow ample ventilation, and to enable the air to circulate through them, in chambers that are heated to a temperature of about 80° F. for the first fortnight or so of the storage-period. When the roots are well dried off the temperature is allowed to drop to 55°, and is held there for the rest of the storage-period, giving ventilation freely when weather permits. In this way, the garden, together with fresh vegetables, such as celery, savoys, cauliflower, broccoli, leeks, &c., and also dry beans, pickles, and chutneys, makes valuable contributions to the larder during the winter as well as the summer months.

Onions for Salads.

To provide young spring onions for the season when salads are so much in demand a sowing should be made during March—towards the end of the month in the warmer districts. For this purpose the Rocca or Tripoli types are most suitable because of their mild flavour and tender flesh. In warm districts with a considerable annual rainfall the sowing should be extended to provide young plants for setting out in early spring that ripen their bulbs about January. This is more satisfactory under such conditions than sowing the main crop in early spring, as is done in the drier districts. The land selected for the seed-bed should be well drained and thoroughly cleaned of weeds by shallow cultivation for some time before sowing.

When the tomato crop is of considerable importance it is sometimes advisable to select the seed under local conditions, so that while the fruit is of a type suited to one's requirements, the plant is also thoroughly acclimatized. Time and careful consideration should be given to the selection of plants from which seed is to be taken. They should be free from serious disease (including mosaic), of good constitution, and carrying crops that are as satisfactory as possible in regard to quantity and quality.

Fruit that is likely to be coarse or small should be removed from the bunches and the remainder allowed to ripen naturally on the plants, which should be flagged to enable them to be readily recognized. When the fruit is ripe it should be cut open and the pulp dropped into a vessel containing a little water. This should be stood in a warm position, and as soon as fermentation commences it should be poured into a strainer and washed well under a tap of running water until only clean seed remains. The seed is then placed in a position where it dries quickly, meanwhile stirring it frequently to prevent the seeds sticking together.

If the seed is stored afterwards in tins or other airtight containers it is as well to redry it after a short period to make sure of its condition. It should then retain a high germination percentage for at least five years. When conditions are favourable for a good seed harvest a generous supply should be taken to provide against contingencies.

Another method of saving tomato-seed is to scoop the pulp from the fruit and let it drop on to sand which is quite dry and has been passed through a fine sieve. The mixture should be well rubbed through the hands for some time and then spread to dry. When it is dry it should be rubbed again and sieved to remove the sand.

—Wm. C. Hyde, Horticulturist, Wellington.

Trees and Shrubs for the Planting Season.

WHERE trees and shrubs for shelter or ornamental purposes are to be purchased, a visit to the nurseries should now be made and the requirements carefully selected and ordered for delivery as soon as they are ready for removal, which will generally be towards the end of May. They can then be planted at once with great advantage or they may be "heeled in" and so be ready for planting whenever the weather or other circumstances permit.

Most spring-flowering bulbs are planted during the first four months of the new year, but the earlier this is done the better so that they may be well rooted before winter sets in. Exceptions are hyacinths and tulips, which appreciate a period of warm storage, and also anemones and ranunculus tubers. These are usually planted during April, and are all partial to a soil well supplied with lime. Many plants of this class provide an early

(Continued on page 172.)

Work for the Month in the Apiary.

Final Extracting for Main Honey-flow.

FEBRUARY will probably see the end of the main honey-flow in most districts, and beekeepers will be wise to remove the last of the honey before the colder nights arrive. Once the honey in the hives has been allowed to become thoroughly chilled there is little prospect of its becoming warmed again when uncertain weather sets in.

Wherever it is inclined to be thick the honey will be found exceedingly difficult to extract unless it is warm, and the beekeeper who delays too long will find that he will have to return to the hives combs almost as heavy as when they were removed. Thin honey extracts best when it is warm, but it is imperative that thick honey be not allowed to cool before extracting.

Condition of Brood-chamber.

One of the principal matters to be attended to when the last of the honey is being removed is the condition of the brood-chamber. Many prolific queens keep the brood-chamber so full of brood throughout the season that the bees have very little room to store honey in it. Consequently, if all the honey in the supers is removed such colonies stand a chance of being starved out before the end of the winter. These colonies should not be reduced to less than two stories, and on no account should their stores be less than 30 lb. to 40 lb.

It must be borne in mind that all the brood in the hive will hatch and must be fed, and that in addition the queen will continue laying for some months to come, while in some districts breeding may continue throughout the winter. To ensure the colony coming out strong in the spring it must be left with ample stores to carry it through the months of dearth. Unless there is ample evidence of an abundant autumn flow the beekeeper would be wise to leave his hives over-supplied rather than undersupplied.

Use of Bee-escapes.

For the comb-honey producer a bee-escape is an invaluable aid in the removal of his crop. Removal of comb-honey by the ordinary method of brushing, &c., is apt to result in the piercing of many cell-cappings, with constant leakage, but by the use of this simple little appliance, fitted in a board the size of a super, comb-honey can be removed without any disturbance of the colony. The super or supers should be prized up from the brood-chamber, two or three puffs of smoke driven into the hive, and the board gently slipped into place with the round hole of the escape uppermost. If this is done in the afternoon the super will be empty of bees by next morning.

Prevention of Robbing.

The taking of the last of the honey is the time when the beekeeper must display endless caution to prevent robbing. A bad attack of autumn robbing is, next to disease, about the worst thing a beekeeper can experience. Before starting the day's work he should have all appliances handy, have formed a plan of how the work is to be carried out, and should, if it is satisfactory, adhere to that plan throughout the day. A light barrow fitted with a tray to catch honey-drips and two or three cloths of a size to cover the whole of a super are some of the things which will obviate much trouble.

As the combs are removed from the supers they should be brushed and shaken as free of bees as possible, placed in an empty super on the barrow, and covered with a damp cloth. Every hive should be closed as soon as it is finished with and the combs removed to the honey-house, which should be bee-proof. At the close of the day the wet combs should be returned to the hives as expeditiously as possible, and by morning the apiary will be found to be in its normal condition. No pieces of wax, spilt honey, or anything likely to attract the attention of the bees should be left uncovered.

If the bees show a tendency to pounce on any particular hive the entrance should be contracted considerably and wet grass piled in front of the hive. If working in one portion of the apiary should cause robber bees to become too attentive it is advisable to shift the scene of operations to another part. It must be borne in mind that autumn robbing, once commenced, is hard to check, and also that it is usually brought about by careless manipulation of the hives.

Weak Colonies.

As far as possible weak hives should not be tolerated during the winter months. During the warm days these stocks rarely escape the attention of robber bees, and are easily molested. Once they are attacked it is exceedingly hard to save them, and in spite of the efforts of the beekeeper they eventually get robbed out. It is usually the presence of weak hives in the apiary that starts autumn and winter robbing, and it is by far the best plan to unite them with stronger colonies in the apiary and avoid the risk of creating a disturbance among the bees when normal winter conditions should prevail.

If weak colonies are not detected until late in the season a good plan to follow when uniting them is to put the weak hive on top of a strong one, placing a piece of newspaper between the two hive-bodies. In the course of a few days the bees in the weaker hive will eat their way through the paper and unite peaceably with the bees in the stronger hive. The surplus combs may subsequently be removed and the hive made snug for wintering. If weather conditions permit it is advantageous to destroy the queen in the weaker hive prior to uniting.

Preparations for Winter.

As soon as the last of the honey is removed the beekeeper should see that the colonies are in good order for wintering. The first matter for attention is that of stores, which, as already indicated, should be abundant; the second, that of the queen's condition. After these two important matters are settled the beekeeper should satisfy himself that his hives are watertight and draught-proof, and also that his apiary is well provided with shelter in the form of good hedges or other wind-breaks.

With regard to the queen, autumn is the time when strict attention should be paid to weak and failing queens. None but the best queens should be allowed to go into winter quarters. Poor queens should be destroyed and either superseded by young and vigorous ones or their colonies united with those of the better queens before the winter sets in. No queen should be tolerated which cannot provide the colony with an abundant supply of young workers before the cold weather arrives.

It is quite certain that the queen which goes back in the autumn will be in a worse condition after the winter and will not produce enough workers to provide a surplus in the following season, even if she does not fail entirely before the spring or develop into a drone-layer as soon as brood-rearing commences.

—*E. A. Earp, Senior Apiary Instructor, Wellington.*

Honey-producing Flora in Canterbury.

THE flavour and colour of honey gives a true indication of the floral source and determines the commercial value. Other natural elements are subject to changes which, at times, result in a general improvement of the product, but to bring about any alteration in either the colour or flavour is, as yet, beyond individual producers, so that we still possess what might be termed a key to identify the floral source of honey.

The word clover has developed into a trade name, and is generally associated with honey of various standards of quality. This may be the result of the greater part of the output being gathered from this source, but we have completely overlooked the value of our native flora as an advertising medium to popularize the product.

Climate and Temperatures.

Climatic conditions and temperatures have an important bearing on nectar secretion, and consequently the quality or type of honey changes in given areas from year to year. The product of the Canterbury Plains reaches a high standard of quality during a normal season, as 80 per cent. of the crop is gathered from white clover. A wet season, however, generally gives heavier crops, but the colour is generally reduced to a lower white or border-line. The flavour is also more pronounced, but the variation in either case is not sufficient to react on the value for local sales.

Extensive areas of native bush are still found on the lower slopes of the ranges and foothills, with isolated patches on the rolling downs and plains, but the dense areas have failed to attract producers, as good pasture land, which is usually more accessible, is still available in white-clover districts. The absence of early spring flora is certainly a problem, but this can be overcome by making the necessary provision for stores during the autumn.

First Honey Flow.

Keeping in view the main producing centres in the province, the first honey flow of any volume is from willow, and as this is well established on all river-banks and extensive areas have been grown to provide shelter both for stock and buildings there appears to be no dearth of nectar for spring requirements. Weather conditions are far from settled at this season, and producers anticipate a flow from this source, but experience has proved that this must not be relied upon.

Wild turnips (*Sinapis arvensis*) and rape (*Brassica napus*) follow in late October and November. The latter is grown on a fairly large scale and is of great value, as it begins to yield just before the clover. The honey is in the light-amber class, but it is seldom stored in sufficient quantities to warrant extracting or the provision of necessary additional super accommodation. Clover blooms about mid-October, and in warm and sheltered locations when the soil is dry a light flow will begin at the end of the month, but this is not sufficient to supply even immediate requirements, and, at times, is extremely misleading. Colonies should be at peak strength at this season, and if the food-supply is not maintained brood-rearing will, as a result, be restricted.

The owering-period covers practically five months, and during a dry season is reduced to nine or ten weeks, with the main flow beginning in December and closing early in January. The secretion from clover is subject to a temporary check at any time, and if this occurs during the main flow any other source of nectar will be readily worked. Eucalyptus is not grown to any great extent in the province, but a few trees within flight range will give a heavy flow. This, of course, is not a welcome addition to the crop, as the flavour is strong and, if worked for any length of time, tends to lower the grade.

Flowers in January.

Cats-ear (*Hypochaeris radicata*), hawksbeard (*Crepis capillaris*), hawkbit (*Leontodon hispidus*), and dandelion (*Taraxacum officinale*) flower towards the end of

TREES AND SHRUBS FOR THE PLANTING SEASON.

(Continued from page 170.)

display of blossom of excellent quality with little labour, and thus deserve every consideration. In addition to high culture in special beds, many kinds may be planted in grass or the foreground of shrubberies, where they will flourish for many years before requiring attention.

Established lawns may now be given any extra attention that is necessary, such as returfing worn places and loosening-up hard places with a fork, or thoroughly raking the whole area and, after cutting, sowing such grass-seeds as may be desirable before applying a light top-dressing composed of fine soil and manures. Where the lawns have been in constant use for games this attention is urgently needed and should be begun as soon as the playing-season is finished, so that the most may be made of the interval between seasons, which is generally all too short for this purpose.

A sharp look-out should be kept for insect pests. This is the season when serious damage may be done to lawns by the common earth-worm or subterranean caterpillar (*Porina*), or grass-grub (*Odontria zealandica*). Damage is best avoided by giving the matter prompt attention as soon as the attack is perceived.

—*Wm. C. Hyde, Horticulturist, Wellington.*

January and, during a dry season, somewhat earlier. These plants or weeds are somewhat similar in appearance, and are of great value to producers on the plains. The honey is in the light-amber class, and has a distinct and pleasant flavour. When packed in glass it proves most attractive in appearance, and finds a ready sale.

It is quite obvious when the bees are working these small yellow flowers, as the combs become stained a light golden colour and a mild and pleasant aroma appears to permeate the hives. The volume of the flow varies according to the season, and if unfavourable conditions continue for clover secretion for any length of time a considerable quantity of honey is reduced in colour from white to light amber.

The final flow of the season is from thistle (*Cirsium conceolatum*), and in view of the reduction in colony strength this is not worked to the fullest extent. The quality of the honey, however, is good, and if favourable weather rules a fair quantity will reach the extractor with the late crop.

Ragwort (*Senecio jacoboea*) and St. John's wort (*Hypercium perforatum*) are not prevalent in the district, and although small areas are established in parts of North Canterbury the flavour has been detected in only one line of honey sent forward from that part of the province. Vipers Bugloss (*Echium vulgare*), frequently called blue borage, is found in the same district and is rapidly spreading on the light soil and dry river-beds. The honey from this source is said to be of a high quality, so that it should, in time, prove of great value to producers operating in that area.

Not a Great Variety.

These remarks have been confined to the producing centres that are now finding favour, and it will be seen that there is not a great variety of flora. The few who operate adjacent to native bush certainly overcome the difficulty of spring food-supply, but the main flow in such locations does not reach the volume of the plains, as the higher rainfall, together with a heavier type of soil, requires considerably more settled weather than is usual in this province during a normal season. These locations carry practically the same native trees and plants that are found in other parts of New Zealand, and in the early honey crop the predominating flavour is usually identified as fuschia (*Fuschia excorticata*). This is a bright honey with a pleasant flavour, but, unfortunately, only small quantities reach the market.

Ti-tree (*Leptospermum scoparium*) is abundant in parts of the province, mainly in the region of the foothills. This gives a low-grade honey, so that producers endeavour to keep their apiaries out of flight-range. The early spring flow is mainly from five-finger and kowhai (*Sophora tetraptera*), but in view of the unsettled weather at this season the honey stored only meets requirements for brood-rearing.

Cabbage-tree (*Cordyline australia*) and flax are not worked freely by the bees. The honey is of a low grade, and a surplus from either source would prove difficult to dispose of in districts where consumers are supplied with mild-flavoured honey.

The absence of minor honey-producing plants and trees during the spring no doubt calls for greater effort from producers, but if good, clean pasture country which will give a main crop of first-quality honey is covered any additional labour or expense necessary to bring the bees up to peak strength is more than justified.

—W. J. Fix, Apiary Instructor, Christchurch.

Poultry-keeping Section.

Protrusion of Oviduct.

POULTRY-KEEPERS frequently ask advice regarding protrusion of the oviduct and vent-picking among their birds when early-hatched birds are coming into profit.

In many cases the root of the trouble is really due to a weakness of the muscular walls of the oviduct, which are not strong enough to stand up to the strain of great egg-production.

At times the lower portion of the oviduct becomes everted and a mass of red tissue projects from the vent. This is what is known as prolapse of the oviduct, and the immediate cause may be either straining to lay a very large egg or straining to lay when there is an obstruction in the oviduct (egg-bound). Constipation may also cause the condition. The rectum may become full of hard fæces, and in the effort to expel both the egg and fæces the oviduct becomes everted.

If this is discovered in time—and before other birds have picked at the projecting parts—the mass may be gently pushed back into place, in which case the bird will often be saved. Should any dirt be on the projecting part it should be thoroughly but gently washed with warm water and then greased with vaseline. It is also advisable to grease the fingers before replacing the mass into the body. After doing this it is advisable to fasten the bird by the legs and place it in a dark box for a few hours with the back part of the body slightly raised.

If the trouble reappears, or if the projecting mass is picked by other birds or has turned a purplish dark colour before it is discovered, it is better to kill the bird at once.

The overfeeding of such foods as milk, meat, or meat-meal is at times held responsible for some ovarian disorders.

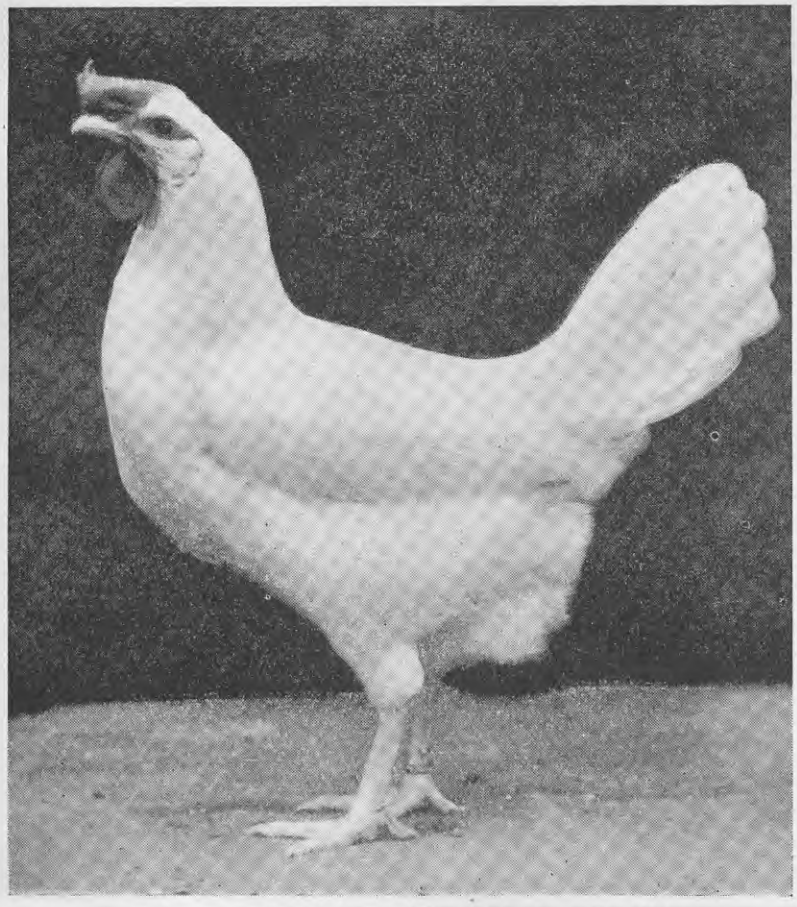

Fig. 1.—A good specimen of a utility White Leghorn pullet.

Vent-picking and Bleeding.

VENT-PICKING and bleeding is another form of trouble which seems to be increasing. It appears to give more trouble among flocks which have been brought up to a very high pitch of production, and usually occurs among early pullets when coming into profit or among first-year hens during October and November, when production is at the peak.

At times the act of laying causes a hæmorrhage, even in spite of the fact that the eggs are normal in size and shape. The fundamental cause is, no doubt, a weakness in the walls of the oviduct.

If the feeding methods have been correct the condition may indicate that the aim for great egg-production has been carried far enough and that more care should be taken regarding constitution when selecting breeding-stock, and that some fresh blood is required.

Vent-picking.

When a bird is on the point of expelling an egg the oviduct protrudes and presents a highly flesh-coloured appearance. At times, especially if nests are too shallow or exposed, other birds will pick at the exposed part of the oviduct, which causes severe bleeding. Other

birds in the flock pick at the bleeding parts, and often a cruel death results.

Birds will frequently be seen walking along in front of the nests waiting for an opportunity to attack a bird in the act of laying.

If only one or two birds have been attacked and the culprit can be detected it should be eliminated from the flock at once, and probably no further trouble will be experienced.

Where a number of birds have acquired this cannibalistic habit, however, it is advisable to darken the nests or make them sufficiently deep so that the back part of the birds will not be seen when in the act of laying.

The food question should also be looked into, for experience has shown that this vicious habit or craving for blood is at times brought on by certain birds not getting sufficient animal food.

With some flocks of pullets where animal food has been withheld in order to check them from coming to lay it has quite frequently been found that certain birds get a craving for blood, and a real epidemic of vent-picking has been experienced. In such cases the trouble has often been checked by placing a shallow box or tin of half meat-meal and half bran (by measure) in the houses, so that the birds may help themselves and so satisfy their appetites for animal food. It is also well to make sure that a regular and liberal supply of succulent green food is given each day.

Treatment of badly picked birds has not been very satisfactory, and preventive measures as suggested should be adopted at the *first* sign of this annoying trouble.

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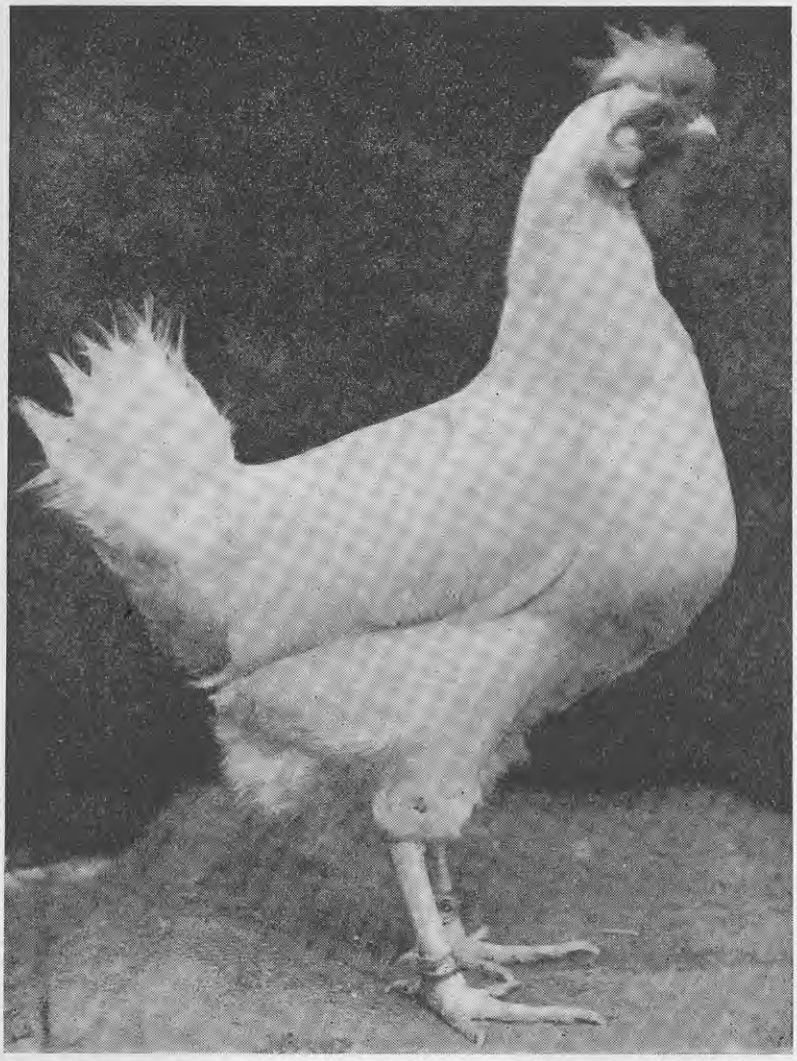


Fig. 2.—Showing all the visible characteristics of a good utility White Leghorn breeding female.

Standard Requirements for Selecting Leghorn Hens.

THE New Zealand Utility Standards give the following as the chief characteristics of good Leghorn hens :—

Head.—Skull round and moderate in size.

Beak.—Stout, the front standing well clear of the front of the comb.

Comb.—Single, of fine texture, medium size, not overgrown, falling gracefully over to either side of the face (but must not obstruct sight), free from thumb marks and side sprigs, deeply and evenly serrated, with from three to seven spikes, but five preferred, the spikes broadening at the base.

Face.—Bright red (without any trace of white), smooth, and of fine texture, and free from wrinkles or feathers.

Wattles.—Moderately long, thin, and of fine texture.

Ear-lobes.—White, medium in size, and rather pendant, equally matched in size and shape, smooth, open, and free from folds.

Eyes.—Bright, large, and prominent.

Sight.—Perfect.

Neck.—Medium to thin at head, and medium length.

Body.—Deep, oblong, forming wedge-like appearance, and widening from shoulders to thighs, showing ample feather, tight and dense, back wide and medium to long, and tail carried fairly close and at an angle of 45 degrees.

Abdomen.—Full, deep, broad, and plenty of space between the breast-bone and pelvic bones, which must be fine in quality.

Breast.—Full in front (at crop.)

Keel.—Short and straight.

Wings.—Large and carried close to the body.

Legs, Shanks, and Feet.—Legs, strong and medium length, thighs set wide apart, bone flat.

Toes.—Four, straight and well spread, toe-nails medium length.

Carriage.—Very alert, vigorous, and well-balanced.

Weight.—Hens, 5 lb. to 6½ lb., pullets, 4½ lb. to 6 lb.

Colour.

Plumage.—Pure white (straw tinge to be avoided).

Eyes.—Red.

Legs and Feet.—Brilliant yellow.

Toe-nails.—Horn or nearly white.

Beak.—Yellow or horn.

Ear-lobes.—White.

Comb and Face.—Bright red (without any trace of white).

Wattles.—Bright red.

The colour given above for legs and beak is for well-matured pullets. It will be found that good laying hens at this time of the year are pale in legs and beak, and have often a slight straw tinge in the feather.

Scale of Points.

Skull, beak, neck, face, and eyes	12
Comb, lobes, and wattles	10
Type and carriage	30
Tightness and density of feather	20
Legs and feet	3
Tail	5
Condition and size	10
Colour, including plumage, beak, eyes, face, feet, and lobes	10
Total	100

A study of the above scale of points will show that the chief characteristics to look for when selecting utility breeding birds are type and carriage and tightness and density of feather, for it will be seen that these characteristics are of sufficient importance to be given 50 points out of 100.

The full text of the standard has been given in order to assist the beginner, as, if he is to become a successful selector, he must first know the Standard requirements of the breed in which he wishes to specialize and have a definite model to guide him.

Figure 1 shows a good specimen of a utility White Leghorn pullet and the class of bird that should do well at an egg-laying competition and then make a good breeder.

Figure 2 shows a fine specimen of a utility White Leghorn. The photograph was taken at the end of a heavy laying season, when the bird was about eighteen months old. This bird possesses all those visible characteristics of a good breeder, the chief of which are purity of blood, vigour and constitution, and capacity to produce and reproduce, and is a very useful guide for the beginner to take as a model when selecting Leghorn breeding hens.

—C. J. C. Cussen, Chief Poultry Instructor, Wellington.

Use of Phosphatic Guanos.

STRICTLY speaking, a "guano" should contain a small percentage of nitrogen, but owing to the climatic conditions existing where many of these deposits occur any nitrogenous content is leached out. One of the true guanos is Peruvian guano, which is found on the rainless islands off the coast of Peru. Similar deposits are also found off the coast of West Africa. Such guano contains about 10 per cent. of water-soluble nitrogen and about the same amount of insoluble phosphoric acid.

The phosphatic guanos come from deposits built up over many centuries and which now exist in the form of a brown soft, friable rock. The nitrogen content is under 1 per cent., and there are also present small amounts of lime. The principal sources of supply are the Seychelles Islands, in the Indian Ocean, and the neighbouring island of Juan de Nova, St. Pierre, and Astove. The brown product from these sources is in a fine state of subdivision and contains 25 per cent. to 27 per cent. of water-insoluble phosphoric acid.

Walpole Island, in French Caledonia, produces a soft guano containing about 20 per cent. of water-insoluble phosphoric acid and a certain amount of lime. Several other Pacific islands also produce guanos, but these are only imported occasionally.

Uses of Rock Phosphates.

The phosphate of rock phosphates is but slowly soluble in water, though it is more soluble in soil solution. There are no reliable tests for the availability of rock phosphates in the soil. Their fineness of division, the acidity of the soil, the presence of organic matter, and the presence of lime are all factors influencing availability, and the best advice that can be given to a farmer is that he undertake an experiment himself.

Rock phosphates are in all instances finely ground, and this is particularly true of guanos. Climatically, results tend to show that they do better in high rainfall areas, where the soil has a fairly high moisture-retaining capacity. Recent trials at Marton indicate that though rock phosphate was inferior to slag and to super yet the margin was not very great, and as the trial progressed the difference was gradually being made up. Such a result gives food for thought. In the absence of any long-term experiments, it seems feasible to suppose that the slow-acting phosphate may, over a period of years, prove the equal of other forms of phosphate in replenishing the supply in the soil.

However, unless there is pronounced superiority it is not likely to oust either superphosphate or basic slag.

Rock phosphate is seldom used as a straight fertilizer, though this may possibly be a development of the future. Its principal use in agriculture to-day is in various crop mixtures where it supplies slow-acting phosphate and is not detrimental to germination.

Book Review.

"The Cultivation of Mushrooms."

By Dr. W. F. BEWLEY and J. HARNETT.

FIRST published in July, 1934, the present edition has been revised and enlarged by incorporating the results of the latest investigations and the liberal addition of illustrations. The treatment of the scientific and practical sides of the subject are well balanced, so that it forms an excellent manual for the commercial grower.

There are still problems to be investigated, but available knowledge on all phases of the subject are supplied in a straightforward manner. Even cooking recipes are included, the quality of which should make them excellent advertising for mushroom sales.

"The Cultivation of Mushrooms," edition 2, 95 pp., is published by the Anglo-Scottish Press, Ltd., price 3s. 6d. net.

—Wm. C. Hyde, Horticulturist.

N.Z. Federation of Young Farmers' Clubs.

Edited by S. Freeman, Dominion Organizing Secretary.

North Canterbury Club's Field Day.

D. COLEMAN, Amberley Club.

THE North Canterbury Club's annual field-day, which was held on 17th October, was an outstanding success in every way, and provided a variety of interesting and instructive events.

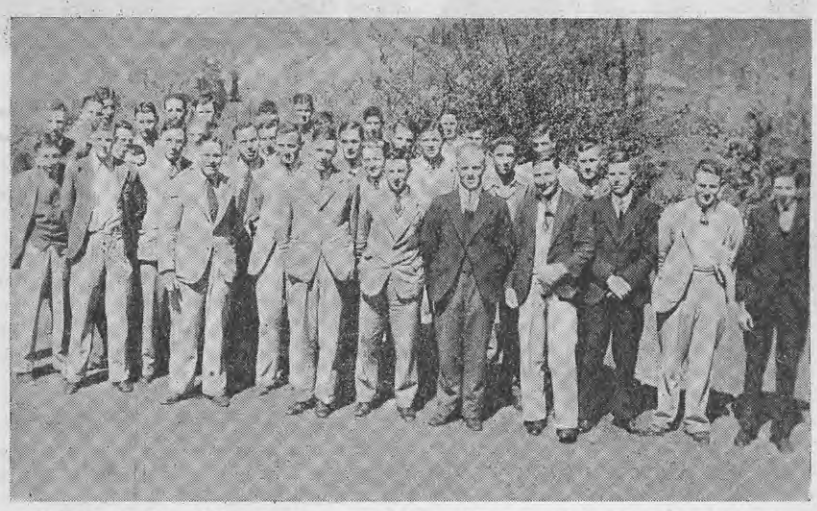
The party, which comprised about fifty members of the Oxford, Cust, Amberley, and Scargill Clubs, assembled in the Amberley Domain at 9 a.m., and the programme began with Mr. J. Wyllie giving a demonstration on a Clydesdale, which was lent by Mr. A. Hislop. Following this, Mr. R. Peach demonstrated the points to be desired in a Milking Shorthorn cow, which was lent by Mr. J. Breen

Sheep-judging.

The annual sheep-judging competition was the next event, and it was pleasing to note the greatly increased interest which was shown. We were indebted to Mr. E. S. Taylor for the use of some of his English Leicesters for the competition, and for the demonstration which was given after the judging by Mr. D. Sidey, of Lincoln College. A challenge cup, given by the Chairman of the District Committee, Mr. H. G. Parish, for the winner of the judging competition, was won by W. Croy, of the Oxford Club.

At the invitation of Mr. J. B. Bowker, the party visited his property, "Claremont," where a picnic lunch completed the morning's activities.

After lunch, Mr. Bowker conducted the party over his farm, pointing out his convenient type of sheep-dip and showing his range of implements. Because of the uncertainty of turnips in this district Mr. Bowker has abandoned this crop, and now uses lucerne hay for all the supplementary winter feeding.



North Canterbury Club members assembled on the lawn at Mr. J. Bowker's farm, "Claremont," Waipara.

Inspection of Pastures.

A fine stand of lucerne was inspected, and large reserve stacks of baled hay showed that ample fodder is grown for the wintering of all stock. All the pastures appeared to be well established, and Mr. Bowker explained the different treatments the various paddocks had received. Superphosphate is used to some extent for top-dressing, but although the property is all on limestone country Mr. Bowker considers that his land needs liming, and he intends to carry out a comprehensive liming programme in the future.

One grass paddock showed obvious signs of the presence of *porina grub*, which has been causing some trouble in the district recently. The various formations and types of limestone were explained, and an enjoyable visit concluded with a visit to "The Bishops Head," one of the finest specimens of freak limestone formation.

The concluding event was a visit to the Amberley Limeworks adjacent to Mr. Bowker's property, where the party were the guests of the directors at the opening ceremony of the new works.

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Fig. 1.—A general view of the Young Farmers' Club National Shearing Competition in progress.

National Y.F.C. Shearing Competition.

G. S. ROBINSON, District Secretary, Manawatu.

THE first National Y.F.C. Shearing Competition was held on 5th November, 1938, during the Manawatu Agricultural and Pastoral Association's Show at Palmerston North. The competition was held under the auspices of the New Zealand Federation of Young Farmers' Clubs, and the whole of the arrangements were undertaken and carried out by the Manawatu District Committee.

At the 1937 Royal Show held at Palmerston North the previous November a national stock-judging championship was arranged, and was used as the basis of selection for the Y.F.C. team which toured Australia for ten weeks in the early part of 1938. The Y.F.C. attraction on this latter occasion was the shearing competition and championship, prize money to the amount of £60 being donated by the Manawatu Agricultural and Pastoral Association, which materially contributed to the success of the undertaking.

Entries were received from clubs throughout the Dominion, and the competitors numbered ninety-four, both islands being represented. Elaborate arrangements were necessary to cope with this large number of entries, and also to make provision for the general public to view the contest. The committee was fortunate in having at its disposal a large hall at the agricultural and pastoral showgrounds capable of allowing several thousand spectators to be present at a time.

Thrilling Contests.

Along one side of this hall ten machine-shearing stands were erected, and in each heat ten competitors went down together and made a race of it. This proved very popular with the public, which was provided with thrilling contests throughout the day. Speed, however, was not the only factor in the competition, style and neatness being also taken into consideration.

The following is a list of the prize-winners in each class :—

Championship.

R. Hutt, Onga Onga Y.F.C. (£21), 1.
I. Brown, Te Puke Y.F.C. (£7), 2.
W. Thompson, Rangiwahia Y.F.C. (£3), 3.

Intermediate.

D. Carman, Tinui Y.F.C. (£12), 1.
G. W. Blixt, Pohangina Y.F.C. (£5), 2.
R. L. Meads, Waituna West Y.F.C. (£2), 3.

Learners.

J. Meads, Hunterville Y.F.C. (£2), 1.

Eight prizes of £1 each were awarded to the following : G. T. Thind, Shannon Y.F.C. ; E. J. Osborne, Apiti Y.F.C. ; P. G. Thevenard, Kimbolton Y.F.C. ; D. Simmons, Dannevirke Y.F.C. ; W. J. Cooper, Masterton Y.F.C. ; H. H. Cooper, Masterton Y.F.C. ; S. Hay, Tinui Y.F.C. ; A. Stewart, Bunnythorpe Y.F.C.

J. Meads, Hunterville Y.F.C., also won Mr. J. A. Mitchell's special prize of £1 for the neatest shearer in the learners' class.

Accommodation Taxed.

Sufficient seating accommodation was arranged by the local district committee to enable more than a thousand people to witness the contests. From 10.30 a.m. until about 5 p.m. the hall was packed, and the tiered seats held many more than was expected of them, in addition to which crowds of spectators were standing. It is estimated that fully two thousand people watched the shearing all day.

The competition required the help of many hands to keep everything on schedule. A keen sub-committee was responsible for the preliminary arrangements, and a band of sixty stewards undertook the many duties requiring attention during the running of the

competition itself. Special mention must be made of Messrs. E. W. Barnett and K. Mitchell, who were at the microphone announcing the heats and results, &c., and giving a running commentary on the competition. Mr. Lawson, sen., of Kimbolton, and Mr. D. Rowland, of Kairanga, acted as chief sheep-penning stewards.

The wool-classing and baling was in the capable hands of Messrs. L. Little, A. Nielsen, and I. Fraser. The ten timekeepers were under the supervision of Mr. Richardson, of Kairanga. Messrs. B. Irvine and A. Puplowski were responsible for the carrying and droving of the sheep, which were kindly lent by the Palmerston North City Council. The sheep, 400 in all, were an even line of four-tooth wethers which were grazing on the aerodrome, and were shedded at Mr. A. W. Sutherland's farm, Kairanga, and at Massey College.

Judges' Difficult Task.

Probably the most difficult task of all was that of the judges. Unenviable though their duties were, they carried them out to the satisfaction of all. The three supervising judges were Messrs. A. W. Hudson, P. de Malmanche, and K. Duncan, and the junior judges were Messrs. J. B. Chrystall, H. M. Linklater, A. H. Guy, D. Scott, and R. Linklater.

One of the highlights of the day was a shearing demonstration by Mr. P. de Malmanche, former world's champion machine-shearer. Demonstrations were also given by Messrs. Hopi and Pine with the machines, and Mr. S. Green with the blades.

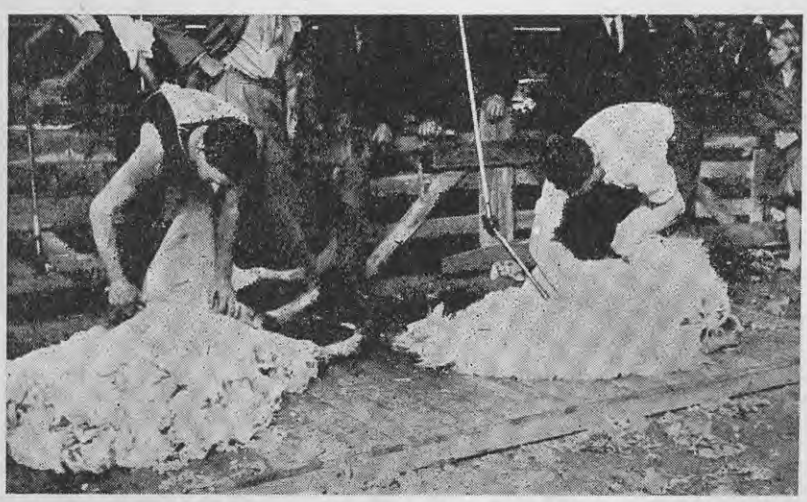

Fig. 2.—A close-up of two of the competitors at work.

The day concluded with a Young Farmers' Ball, at which there was an attendance of over three hundred. The success of this function was due largely to the excellent arrangements made by the Ladies' Committee consisting of representatives of the Women's Division of the Farmers' Union, the Women's Institute, and the Y.W.C.A., with Mrs. J. A. Russell as convenor. Mr. H. J. Lancaster, Chairman of the Manawatu District Committee, presented the prizes for the shearing competition, and thanked all who had helped to make the day such a success. Mr. J. Hodgens, M.P., and Mr. A. E. Mansford, Mayor of Palmerston North, were present and also spoke.

The ball was a fitting conclusion to one of the most successful activities held by the Young Farmers' Clubs throughout the Dominion.

Scargill-Omihi Club's Field Day.

CLUTHA McKENZIE, Advisory President, Scargill-Omihi Club.

ON 10th December the Scargill-Omihi Y.F.C. held its first club field-day at Happy Valley at the property of Mr. D. S. McKenzie. Invitations were extended to patrons, parents, and farmers interested in the club, in addition to a small party of students from Lincoln College, and in spite of late shearing and delayed haymaking preventing many from attending there were between fifty and sixty present.

The party assembled at the homestead at 10 a.m., and after morning tea inspected the home paddocks. Ninety acres of swedes were ridged this year, and scuffling operations were witnessed. Some good pastures were then inspected—a 60-acre paddock which had recently been broken in from heavy scrub, and several old pastures which had been brought back by liming and top-dressing.

After lunch Mr. D. Sidey, of Lincoln College, gave an interesting talk and demonstration on the Corriedale sheep and on sheep-covering. The party then inspected the lime-crushing plant on the property, after which brief talks on the effect of liming were given by Mr. McKenzie and Mr. Nash (Department of Agriculture).

Some obviously beneficial results from lime, which is applied at the rate of 30 cwt. to 2 tons per acre, were then viewed, followed by further inspection of paddocks, during which Messrs. Flay and Bevin, of Lincoln College, gave talks on pasture establishment, grazing, &c. After seeing some virgin land, formerly covered in manuka scrub, being swamp-ploughed the party returned to the homestead for afternoon tea at 4.30 p.m.

The main points of interest on the property were the results of extensive liming and pasture establishment, as well as much development work in breaking-in scrub country. The farm buildings, shelter-belts, &c., were also of great interest.

Thanks are due to Messrs. Sidey, Flay, Bevin, and Nash, whose talks were greatly appreciated, and also to Mr. and Mrs. McKenzie for their kindness and hospitality.

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Members of the Gisborne Club with the Poverty Bay Efficiency Shield and Football Cup. Back row: O. Phillips, — Morris, J. Tietjen, D. Whitters, — Tattersfield, N. L. Cooper, P. Lindsey, R. Duncan, T. White. Middle row: — Cameron, R. W. Smith, W. Drummond, R. Tietjen, A. Walters, M. D. Richardson, P. Livingston, L. Munro, T. Langford. Front row: E. M. Bates (District Secretary), G. H. Cooper, R. Field, H. Cooper (Advisory President), K. W. Cooper (Chairman), G. W. Smith (Secretary), R. Matthews, R. Pilmer, R. H. Nelson. In front: E. Cameron and G. Cameron.

Progress of Y.F.C. in Poverty Bay.

K. W. COOPER, Gisborne Club.

THE Gisborne Y.F.C., the pioneer club in the Poverty Bay district, was formed on 17th July, 1935, with ten members. Since then steady progress has been made. The membership is at present fifty-four, and a number of clubs have been formed in the district. Until recently meetings of the Gisborne Club were held in the office of Mr. W. E. Chamberlain, Secretary of the A. and P. Association, but this eventually became too small to accommodate the number. Meetings are now held in the Repertory Society's Hall, which is very satisfactory for the purpose, having comfortable accommodation, a fireplace for cold nights, and a stage fitted with floodlights.

At the time the Gisborne Club was formed it was suggested that it was perhaps not desirable to bring young men into town for the meetings. This, however, has proved an advantage rather than a disadvantage, because in addition to having excellent hall accommodation, arrangements have been made with a restaurant for members to have private suppers before going home after meetings.

"Mock Dinner."

To mark the termination of last year a very successful "mock dinner" was held immediately after the annual general meeting. The main object of the dinner, which was conducted on formal lines, was to give members a slight education on the functions of such a gathering. There were fourteen toasts on the toast list. Each was proposed by a club member, and the person honoured, who was in some way associated with the movement, was called upon to reply. A general invitation was extended to the friends and parents of members to be present at the function.

The club won the efficiency shield donated by Mr. E. M. Bates, District Secretary, for competition among clubs in the Poverty Bay district.

A club library has been formed, and although it is not very large at present it is hoped that it will soon be extended as more funds become available. The original books in the library were mainly donated by club members. Mr. L. Munro was elected to take charge of the library.

Competitions.

Among competitions being conducted in the club is one for the best-kept farm diary. A mangold-growing competition has been conducted each season by a seed firm, and the winner this year was G. W. Smith, with 144 tons per acre, K. W. Cooper, with 134¾ tons per acre, being second. The competition was judged by Mr. E. M. Bates, Department of Agriculture. Points were allotted for weight, cultivation, size, weeds, workmanship, and records. Smith scored 151 points and Cooper 148 points. Interest was taken by other competitors and members in the different methods used in the production of the crops, and much valuable information was obtained in this manner.

At the last Poverty Bay A. and P. Show members undertook to conduct a sheep weight-guessing competition as a means of raising funds, and the efforts by the members were well rewarded. At each show members have had the opportunity of acting as stewards in classes in which they were interested.

In addition, last year three members were privileged to assist as associate judges.

Great enthusiasm has been maintained at all meetings, and members are taking advantage of every opportunity available to them. At each meeting a number of members volunteer to give short talks, some demonstrating points by means of diagrams, blackboard drawings, and models. Last year more subjects were covered by members than by outside speakers. Debating has proved an interesting feature, and at the October meeting two debates were held, eight members taking part in each debate. The subjects were "That the Horse is Preferable to the Tractor for Farm Power," and "That the Present Livestock Embargo should be Lifted." The adjudicator was the Rev. K. Liggett.

An account has been opened in a local trading bank, which will not only facilitate the paying of accounts but will also give a number of members the opportunity of gaining experience with the handling of cheques.

Next Year's Programme.

An interesting and comprehensive programme is in hand in the Poverty Bay district for the coming year, and I hope to have the opportunity at a later date of reviewing in these pages another successful season. Members generally are realizing the great value of the Y.F.C. movement, and there is no doubt that it has come to stay.

These notes have been written with the aim of creating interest between one district and another. It is only by discussing and publishing news of our activities that we can get fresh ideas. I shall be pleased if this effort of mine results in other club members sending in notes about their club activities.

Lincoln College Scholarship Awarded.

THE announcement that George Osborne Fallow, of Thornbury, Southland, has been selected out of twenty applications received from members of Young Farmers' Clubs throughout the South Island to hold the Canterbury Agricultural College Old Students' Association Scholarship for 1939 is made by Mr. A. C. Cameron, Chairman of the Otago-Southland Council of the New Zealand Federation of Young Farmers' Clubs. The Scholarship is available for one year at Lincoln College.

The successful applicant is a son of Mr. John Fallow, a well-known farmer in Thornbury, Southland. He is twenty-three years of age, and is the present Chairman of the Thornbury Young Farmers' Club, in which he has taken a very active interest since its inception some years ago. He has also served a term as Secretary of the club, and, in addition to being its representative on the Southland District Committee, he is one of the Southland representatives on the Otago-Southland Council of the Federation.

At all times he has proved himself to be an able and conscientious delegate, possessing a strong personality and sound common-sense.

In addition to the work he has done for the Young Farmers' Club movement, Mr. Fallow has taken an active interest in various activities in his district. He is a member of the Anzac Memorial Committee, the Thornbury Public Hall Committee, the Thornbury Presbyterian Bible Class, and the Thornbury Miniature Rifle Club. He possesses fine personality and physique, and is also a particularly good debater.

He has been working on his father's sheep and dairy farm at Thornbury since

December, 1931, and prior to that had three years' secondary education at the Southland Technical High School.

High Standard of Applications.

The selection committee, Messrs. Alan Grant (Dominion President and Chairman of the Canterbury Council), R. McGillivray (Fields Superintendent, Department of Agriculture, Christchurch), J. M. Smith (Fields Superintendent, Department of Agriculture, Dunedin), and A. C. Cameron (Chairman of the Otago - Southland Council), report that, generally speaking, they were satisfied with the standard of applications received this year, some of them being outstanding.

Several promising applications had to be passed over because the members concerned are young and have not had much opportunity to prove themselves in Young Farmers' Club work, but in the opinion of the selectors one or two of these young farmers will have to be considered during the next year or two. Generally speaking, the standard of the Southland applicants was higher than elsewhere in the South Island.

In the opinion of the selectors, the qualifications of several of the applicants warrants an endeavour being made to obtain additional 1939 scholarships for the Southland and Canterbury Provinces, and steps will be taken in this connection early in the New Year.

Stock-judging Competitions at Invercargill Show.

SEVERAL sheep-judging competitions open to Young Farmers' Club members were held at the Invercargill Show. Fifty entries were received for the two main events—thirty for the Romney Marsh sheep, and twenty for the Southdowns.

The high standard attained by the competitors was commented on by the judges, Messrs. J. M. Watson and S. Ayson. Both classes were very keenly contested.

The following are the prizewinners in the two competitions :—

Romneys.—L. Middlemiss (Woodlands), J. Clark (Tussock Creek), J. Drummond (Five Rivers), and A. G. Anderson (Waimatuku), first equal. Special prizes: L. Middlemiss, J. Clark, and A. G. Anderson.

Southdowns.—G. H. McIlwrick (Otapiri), first; W. Clark (Woodlands), A. Campbell (Woodlands), A. J. Edwards (Otikirama), R. McPherson (Invercargill), and R. McIlwrick (Winton), second equal. Special prizes: A. Campbell and M. W. Clark.

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Ashburton's First Inter-club Debate.

V. P. BOOT, District Secretary, Ashburton.

THE Ashburton district's first inter-club debate was held in the Anglican Hall, Methven, on 28th November. Teams representing the Ashburton, Hinds, Mayfield, and Methven Clubs took part, the subject debated being " That the Young Farmer of To-day has Greater Opportunities than his Grandfather."

Mr. C. Wightman, Chairman of the Methven Club, introduced Mr. R. J. Low, the club's Advisory President, who welcomed the large gathering of visitors from all parts of the Ashburton County. The judge, Mr. E. J. Woods, outlined the conditions of the debate, and the contest opened with the Mayfield Y.F.C. team supporting the affirmative and the Methven Y.F.C. team supporting the negative. Following this, the Hinds Y.F.C. team took the affirmative and the Ashburton Y.F.C. team the negative.

The speakers for the various clubs were as follows—Ashburton Y.F.C. : G. Moorhead (leader), D. Cretney, and D. Middlemiss. Hinds Y.F.C. : L. Watson (leader), J. Tait, and D. G. Tait. Mayfield Y.F.C. : R. Mulligan (leader), L. Doyle, and C. Sewell. Methven Y.F.C. : R. Penny (leader), J. Vallance, and C. Wightman.

The competition was closely contested, the Methven team being declared the winners by a small margin.

Judge's Congratulations.

At the conclusion of the debate the judge congratulated all the speakers on their fine efforts, and pointed out that the speeches were particularly meritorious in view of the fact that several of the young farmers had had no previous debating experience. He further congratulated the Young Farmers' Clubs for supporting the competitions, which fostered in their midst one of the most important of the cultural arts—public speaking. The points raised during the debate showed a sound knowledge of such matters as the scientific developments in agriculture, diseases in crops and stock, the early history of the county and the land-development therein, and the trends of land values, prices, &c. In a constructive criticism of the speeches Mr. Woods laid the foundation for a high standard of public speaking in the Young Farmers' Clubs in the Ashburton County.

Votes of thanks were passed to the judge, to Messrs. Low and Kingan, who acted as chairman and timekeeper respectively, and to Mr. V. P. Boot, the District Secretary, who organized the debating competition. The votes of thanks were moved by Messrs. C. Chisnall, T. Mulligan, and J. Fleming.

At the conclusion of the debate the visitors were the guests of the Methven Club at an excellent supper.

During the evening Mr. Boot announced that members of the Ashburton Rotary Club had shown their interest in the welfare of the young farmers of the county by donating a challenge cup for annual competition in the inter-club debating competition. This cup would be presented to the winning Methven team at a Rotary Club luncheon to be held in the New Year, when the team and representatives of the District Executive Committee would be the guests of the Rotary Club.

This generous gesture was greatly appreciated by the members, and wholehearted applause greeted the announcement. The cup should provide additional incentive, and so assure the success of the competitions next year, when the Hinds Y.F.C. will be the hosts for the evening.

Field Day at Waimana, Bay of Plenty.

C. R. TAYLOR, District Secretary, Whakatane.

Members of the Waimana Club taking part in the judging competition at the field-day on Mr. T. W. Wardlaw's farm.

[C. R. Taylor, photo.

THE Waimana Club recently held a successful field-day on Mr. T. W. Wardlaw's farm. Fifteen members competed in the judging of dairy cows in preparation for the selection of a stock-judging team to represent the district at a competition to be held annually between teams from Eastern and Western Bay of Plenty and Rotorua.

The inter-district competition is scheduled to take place this year at the Whakatane Agricultural and Pastoral Association's show on the 21st February. Next year the competition will be held either at Rotorua or Tauranga, the object being to give the Y.F.C. organization in each district the opportunity of arranging the activity. A trophy has been donated for the competition by Messrs. Wright, Stephenson, and Co., Ltd.

An inter-district bacon-pig competition has also been arranged, but details of a special trophy, &c., have yet to be finalized.

The awards at the Waimana field-day for the dairy-cow judging competition were as follows: D. Rae, 1 ; L. Macdonald, 2 ; F. Mitchell, 3.

Canterbury Clubs' Stock-judging Competition.

L. W. BLACKMORE, District Secretary, Christchurch.

VERY keen interest was displayed in the Young Farmers' Clubs' stock-judging competition organized by the Christchurch District Committee and held at the Canterbury Agricultural and Pastoral Show at Christchurch on 11th November. In all, thirty-nine members, representing thirteen clubs, took part—six teams from the Christchurch district, four from the North Canterbury district, and three from Mid-Canterbury.

Three breeds of stock were judged, the English Leicester, the Ryeland, and the Milking Shorthorn, the Lincoln College system of judging being used.

The support given and the active interest taken by the members of the Agricultural and Pastoral Association the various breed societies, and Lincoln College was greatly appreciated, and augurs well for the success of future competitions. Trophies were given by the Milking Shorthorn, Ryeland, and New Zealand Sheep Breeders' Associations for the competitors gaining the highest scores in the judging of the individual breeds, and Mr. L. W. McCaskill presented a challenge shield for the club in the Christchurch district with the highest aggregate.

In addition, three prizes, each of two guineas, were given by the Canterbury Council for the members of the winning Canterbury team, and three miniature cups by the Christchurch District Committee for the members of the winning district team.

The Darfield Club is to be congratulated on winning both the district and provincial competitions.

Mr. Allan Grant, Dominion President was present at the prize-giving. He stressed the great value of such competitions, and congratulated the clubs on the excellent support they had given.

Results of the competition are as follow :—

Club Team Competition (all Canterbury).

Darfield (J. Reid, J. D. Gallagher, D. Selby), 60 points, 1. Ladbrooks (S. McKenzie, D. McLaughlin, M. Meyer), 59 points, 2. Ellesmere (G. Rennie, M. Brooks, D. Hurford), 53 points, 3.

Open Competition.

English Leicester: S. McKenzie, Ladbrooks Y.F.C., 23 points, 1. Ryeland: R. Reid, Darfield Y.F.C., 22 points, 2. Milking Shorthorn: D. A. McLaughlin, Ladbrooks Y.F.C., 22 points, 3.

Christchurch District Competition.

Darfield Young Farmers' Club, 1.

LETTERS TO THE EDITOR.

Brightening up Meetings.

To the Editor,
Y.F.C. Section.

SIR,—

At a recent meeting of the Manawatu District Executive Committee a number of suggestions were put forward with the idea of brightening up the monthly meetings of Young Farmers' Clubs.

There is little doubt that the attendance at many club meetings would be greatly improved if the business section of the evening were made more interesting and club affairs more keenly and fully discussed by members. Club officials should remember their responsibilities in encouraging the more "silent" members to take part in discussions rather than leave all the talking to the lecturer or speaker for the evening.

Some of the suggestions put forward at the above-mentioned meeting were (*a*) a social evening twice a year; (*b*) the fostering of inter-club visits; (*c*) open meetings; (*d*) the instituting and enforcing of the apology system for absence from meetings.

The fostering of inter-club visits is an idea that has great possibilities, and if neighbouring clubs would take it up much good would come of it. A social evening with a programme of musical, vocal, and instrumental items and dancing is already a regular feature with some clubs. It is essential that evenings such as these should be free.

In conclusion, I would suggest that an endeavour be made to have a regular correspondence column in the Y.F.C. section of the *Journal of Agriculture* in which members could air their views and criticisms of Y.F.C. activities.

I am, &c.,
D. T. ROWLAND,
Kairanga Y.F.C.

It is hoped that the above letter, written by a club member, will be the forerunner of many others and so result in the establishment of a regular correspondence column in these pages. There are many aspects of club work that warrant free discussion and many problems that could be brought to light in this manner. Members generally are invited to avail themselves fully of opportunity to express their views per medium of this column. Mr. Rowland is Chairman of the Kairanga Y.F.C., situated in the Manawatu district.—*Editor.*

Among the Clubs: Reports on Activities.

IN order to make room for other matters of interest to Y.F.C. members it has been decided to publish the full list of clubs, with the names and addresses of secretaries, quarterly in future instead of monthly.

Because of the seasonal activities throughout the Dominion, particularly in the South Island, very few meetings have been held recently, and in consequence only a small number of reports are to hand. Club secretaries are urged to forward reports through the usual channels as soon as possible after each meeting.

Wairarapa.

Carterton (Secretary: Ian Thompson, Carrington, Carterton).—District fleece competition; arrangements for dance. Lecture by Mr. N. Lamont, Department of Agriculture, on "Grass-seed Mixtures."

Greytown (Secretary: V. H. Gates, Greytown).—Discussion on district fleece competition. Talkie films on the wheat industry and plant-life, &c., exhibited by Mr. N. Lamont, Department of Agriculture.

Manawatu.

Apiti (Secretary: F. V. Viles, Feilding).—Discussion on the judging competition at Feilding Show. Programme of the Apiti Y.F.C. Show read and approved; donations for the show received from Mrs. D. Swift and Messrs. H. W. Watson and H. L. Osborne. Lecturettes by club members as follows: "Control of Bracken Fern" (H. Viles); "Care of Farm Implements" (D. Kearney); "Dehorning with Caustic" (L. Logan); "Choosing Rams" (A. Cowan); "Horse-breaking" (K. Cowan); "Lambs from Hoggets" (C. Elliott); "Roping a Young Horse" (M. McKay); "Feeding Dogs without Meal" (H. McIntyre); "Slag on Bracken Fern" (E. Osborne); "Stock Judging" (C. Spence); "Bloat in the Dairy Cow" (V. Wildbore). There were thirty-seven members present and the talks were followed with great interest.

Bunnythorpe (Secretary: A. Stewart, Ashhurst Road, Bunnythorpe).—Lecture by Mr. Hart, of the Feilding Agricultural High School, on "Stock-breeding."

Colyton (Secretary: R. J. Shortall, Spur Road, R.D., Feilding).—Selection of competitors for the judging competition at the Feilding Show; ten members entered for the competition. Mr. G. S. Robinson, District Secretary, spoke on the judging competition, and urged members to give it their support. Mr. H. de O. Chamberlain, Department of Agriculture, also stressed the value of stock-judging competitions.

South Taranaki.

Alton (Secretary: W. K. Saggers, Alton).—General business; discussion *re* the appointment of an assistant club secretary.

Eltham (Secretary: A. Jenkins, Rawhitiroa, Eltham).—Radio lecturette to be prepared for broadcasting from 2YA on 21st February, the subject to be "Fertilizers." Debate arranged with Pukengahu Club. Impromptu speeches to be given by members at the next meeting. A club debate was held, the subject being "Have the Young Farmers of To-day as Good Opportunities as their Grandfathers?" The teams were led by L. Sultzberger (affirmative) and M. Tarrant (negative). The judge, Mr. C. Carncross, gave the decision to the team supporting the negative. At the previous meeting Mr. P. O. Veale, Chairman of the South Taranaki District Committee, gave an interesting address on "Public Speaking and Debating."

Hawera (Secretary: C. J. Washer, Inaha, Hawera).—Arrangements for a club debate. General discussion on matters of farming interest; some time was spent by members speaking for and against sheep-farming and dairy-farming respectively. At previous unreported meetings lectures were given by Mr. Leslie, M.R.C.V.S., on "Fertility of Stock," and P. McGregor. M.R.C.V.S., on "Parasitic Infection of Stock."

Pukengahu (Secretary: R. Bremer, Wingrove Road, Stratford R.D.).—Cricket team picked to play Cardiff Y.F.C. Arrangements for debate with Eltham Club in February. Address by the Advisory President, Mr. F. Mehrens, on "Modern Sawmilling."

North Taranaki.

Karawaka (Secretary: L. Oliver, Lepperton).—Decided to hold a field-day. Club debate, the subject being "Tractor *v.* Horses." The speakers were as follows: L. Oliver, B. Brooking, and R. Old (tractor); M. Loveridge, J. Julian, and P. Blyde (horses). The judge, Mr. G. A. Blake, District Secretary, gave the decision by a small margin to the tractor supporters.

Okau-Tongaporutu (Secretary: Owen Collins, Tongaporutu, via Waitara).—Arrangements for a dance; discussion on future activities. Address by Mr. A. Hamblyn, dairy-factory manager, on "Buttermaking." The District Secretary, Mr. G. A. Blake, spoke on the proposed District Y.F.C. tour.

Southern Hawke's Bay.

Onga Onga (Secretary: Clive W. Masters, Box 18, Onga Onga, H.B.).—General business; decided to combine with the Takapau Club in a field-day to be held in Hastings. The Dominion Organizing Secretary, Mr. S. Freeman, gave an address on Y.F.C. matters in general. A lecture was given by Mr. J. W. Palmer, Department of Agriculture, on "Fertilizers."

Northern Hawke's Bay.

Meeanee (Secretary: Lester L. Griffiths, Meeanee, Napier).—Forthcoming sports meeting discussed. Election of new members. Annual general meeting held in December, but officers retained for three months and balance-sheet carried over in order to fall in line with the general financial Y.F.C. year concluding at 31st March throughout the Dominion.

Nuhaka (Secretary: N. J. Alexander, Nuhaka).—A paper entitled "The Cost of Hill Country Top-dressing," compiled by Messrs. Peren, Hudson, and Morton, of Massey College, was read and discussed by members. At the previous meeting Mr. F. Hankin addressed members on "Subterranean Clover" and "The Growing of Forest Trees."

Putorino (Secretary: E. Smyth, Raupunga).—Members nominated to fill vacancies on the executive committee as follows: G. Phillips, D. Hayes, and E. Hayes. Arrangements for social and dance left in hands of the committee. Address on "Dairy-farming" by Mr. Ross Lange.

Poverty Bay.

Te Karaka (Secretary: A. D. N. Manuel, Te Karaka, Gisborne).—Report on club finance by the honorary treasurer, showing a very satisfactory credit balance. Decided that at the next meeting short talks by members would be given on subjects of agricultural interest. Lecture by Mr. G. Sefton on "The Making of Ensilage."

Tolaga Bay (Secretary: M. Robison, Tolaga Bay).—Lectures by Mr. W. Sadler on "The Proper Way to Dip Sheep," and Mr. W. J. Lee, Government grader, on "Cream Grading." Papers were read by club members as follows: "The Natural Control of Weeds" (M. O'Connell) and "The Farm Water-supply" (C. O'Connell). Decided to visit the Gisborne Club in February and provide three lectures for their meeting.

Taumarunui.

Taumarunui (Secretary: L. G. Smith, Patunga, Taumarunui).—Arrangements for a field-day. Lecture by Mr. J. M. Hopkins, Department of Agriculture, on "The Development of Pumice Lands."

Western Bay of Plenty.

Katikati (Secretary: R. F. Walford, "Foxbro," Katikati).—Address by Mr. A. M. W. Greig, Department of Agriculture, on "The Home Orchard." The speaker outlined the necessary details in the establishment of a home orchard, and stressed the care that should be taken to preserve the trees from blight, &c. He recommended varieties of trees, the worth of which had been proved by the Department.

Omokoroa (Secretary: H. Emery, Omokoroa).—Arrangements for card evening and picnic. Lantern lecture on "Hillside Farming," by Mr. A. V. Allo, Department of Agriculture.

Waihi (Secretary: B. Thornton, Waitekauri, Waihi).—General business. Arrangements for visit to Te Aroha dairy factory.

Kaitaia.

Broadwood (Secretary: B. Rogers, Broadwood, Hokianga).—Field-day held at Broadwood Showgrounds in conjunction with the North Hokianga Boys' and Girls' Agricultural Clubs. A stock-judging competition was held, and Mr. G. Irvine demonstrated his method of judging dairy cows.

Kaitaia (Secretary: H. Hooper, Box 26, Kaitaia).—Address by Mr. J. Donnelly on "The Electric Fence"; this was of particular interest, as members attending a recent field-day had seen an electric fence in operation. Mr. Donnelly explained fully with diagrams the theoretical side of electric fences, and the ways in which fences could be erected. A lecture was given by Mr. R. Hanaes on "Farming in Sweden." The speaker detailed the differences between Swedish and New Zealand farming. In Sweden the animals have to be stabled for six to seven months of the year, he said. Every inch of the land is made to produce as much as possible in the summer months, and crops such as mangels, carrots, swedes, and clover hay are grown and stored for the winter. The roots are harvested in the autumn and stored in wedge-shaped stacks, being covered with straw and earth as a protection from frost. On most farms cows are tethered in the summer and shifted three times a day. Instead of the cows being driven to the shed to be milked the milking-plant is brought out to the cows on a wagon. In the winter the cows are bedded down on straw or peat. This is gathered up with the stable manure, and is used for growing the crops and top-dressing the pastures, little or no artificial manure being used. As there is no cropping work in the winter most of the time is spent in cutting blocks of ice from the lakes and in cutting timber and firewood. The ice is stored in large stacks with sawdust to insulate it against heat. In the warmer months this ice is used in the dairies. A number of questions were asked, and both speakers were accorded hearty votes of thanks.

Umawera (Secretary: K. R. Webber, Umawera, Kaitaia).—Details arranged for the formation of a pig club. Club debate, the subject being "That Ploughing is Superior to Discing as a means of Pasture Establishment in this District." The speakers were as follows: K. R. Harrison and L. Chapman (affirmative); K. R. Webber and W. Postleweight, jun. (negative). The affirmative side won by a narrow margin because of the clearness with which they stated their points.

Health Notes for the Farm.

Contributed by the Department of Health.

Prevention of Food Poisoning.

THE Department of Health from time to time receives reports of instances where a person has suddenly become ill with severe intestinal symptoms. Investigation may show that all of those affected attended a certain dinner or banquet, or it may develop that those made ill have not eaten at any one particular place and that their places of residence may be widely separated one from the other, or, on the other hand, the cases may be confined to members of a certain household.

In all such instances the Department, if promptly notified by the medical attendant, takes immediate steps to survey all the circumstances, a most important point being to obtain specimens of the food or drink in question. The sooner notification is received the more chance the Department has of possibly limiting an outbreak and discovering its cause.

The results of such investigations have shown in some cases that the affected persons were suffering from what is known as food poisoning, by which is meant attacks of illness due to some injurious property in food and drink. There were thirty-seven of these cases notified to the Department in 1937.

"Ptomaine" Poisoning.

The old-fashioned name for food poisoning was "ptomaine" poisoning, and, like surgical operations, most of us have either had it ourselves or know some one who has had it. Food poisoning must be as old as man himself.* In the days of his dawning intelligence when, driven by hunger or the delights of the eye to experiment with strange foods, he no doubt learnt by bitter practical lessons that death and illness lurked in many foods, and by painful experience acquired a knowledge of good and evil as it applies to food.

In later times, with more detailed knowledge as to foods, death still lurked in the pot, but it was, frequently enough, a deliberate death induced by malice, and the very widespread institution in ancient historical times and in the Middle Ages of official food tasters to king and princeling is a witness to the prevalence of the practice of wilful food poisoning.

On the other hand, in an age in which sudden death was always mysterious and suspect, food was no doubt frequently considered to be poisoned when it was not and when death was due to other causes. Over-indulgence in food was probably far more frequently a cause of death than deliberate poisoning. Many of the classical writers refer to mushroom poisoning. It is only within the last fifty years, however, that great attention has been given to the various aspects of this subject.

Causes and Types.

There are several causes of food poisoning, and there are several types. The principal cause is food infected with bacteria, or germs as they are commonly called. These germs are really tiny little plants which under favourable conditions multiply rapidly in moisture, in food, and in a warm place. The colder it is the slower they grow. That is why food will keep well in cold storage.

By means of various small refrigerators now in use cold storage has been brought within the reach of many households and small shops. They should be operated according to the instructions, for, like a sewing-machine or a motor-car, they give the best results when best understood. However, food poisoning is often caused as a result of the growth of bacteria introduced into food. The poison produced by bacteria in food is that which makes us ill when the food we eat is spoiled.

On the other hand, some foods are themselves of a poisonous nature or poisonous to certain persons. "One man's meat is another man's poison" is sometimes literally true. Good, wholesome food may actually "poison" some persons who are hyper-susceptible to such foods, and, again, certain digestible and nourishing foods may be injurious because of some condition of the body. Thus, sugar and starch may be poisonous to a person with diabetes, and meat and other protein foods may be harmful to a person with Bright's disease. Hence the importance of persons suffering from such diseases following carefully the advice of their physician.

Effect on Individuals.

Certain foodstuffs, such as crabs, lobsters, and shrimps, are prone to produce nettle-rash and even intestinal disturbances in certain individuals. Some people cannot eat strawberries without being similarly affected. The trouble in such or similar cases is not due, as already indicated, to any fault with the food, but to a defect in the person. Such foods, of course, should not be eaten by persons so affected, however strongly they may be tempted to indulge.

On the other hand, there is a rare occurrence of poisoning from certain

*"Food Poisoning and Food Infections": William G. Savage, B.Sc., M.D.

fruits and vegetables. This generally results from accident and mistake. Thus the poisonous berries of the deadly nightshade (a weedlike plant with white flowers) or hemlock, commonly known as "fools parsley" (a stout, branching, very poisonous plant growing from 3 ft. to 5 ft. high with purple stem and many white-flowered umbrellets) may be eaten by children, as also may be poisonous fungi such as toadstools.

New Zealand Poisonous Plants.

Among New Zealand plants of a poisonous nature are the tutu (*Coriaria Sarmentos*) and the karaka (*Corynocarpus Laevigata*). There are on record a few cases in which human beings have lost their lives from eating the shoots or berries of the tutu.* It is a small tree, with shining apposite leaves and long, drooping, grapelike clusters of tiny, greenish flowers. The flower petals become red and fleshy while the seeds are ripening, and are filled with purple juice. The karaka is a tree with entire leaves, small white flowers in terminal clusters, and somewhat plum-shaped fruit.

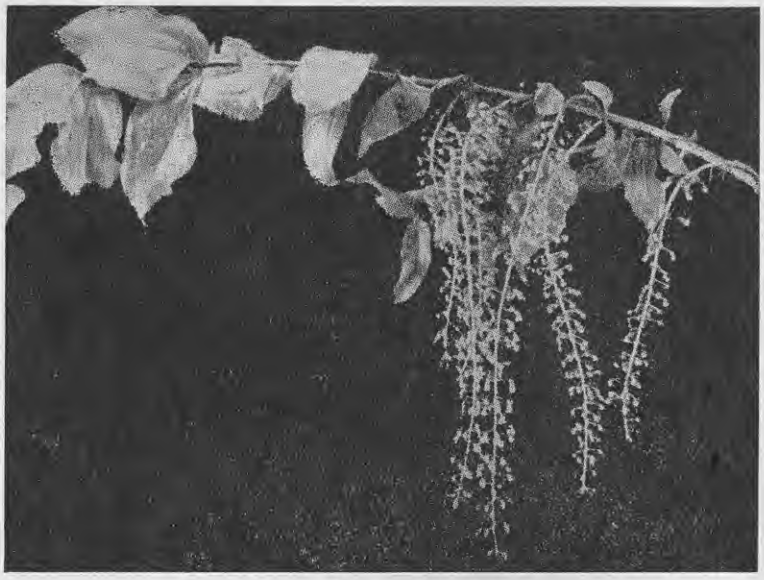
The kernal of the karaka berry is known to be poisonous in the raw state, but if suitably prepared by cooking and subsequent soaking forms a staple article of Maori food.†

It is not easy to lay down definite rules for the recognition of harmless fungi, while, unfortunately, some of the most dangerous are also those of commonest growth. However, it is always safe to observe certain general indications. All fungi should be avoided when they are overripe or when they have been attacked by slugs. Those which soften easily are usually dangerous, and the same is true of fungi which grow in dirty situations, such as dunghills, for the plants have a great tendency to absorb poisons from the medium in which they happen to be growing. Lastly, all those which have a disagreeable smell or taste should certainly be avoided.

Warning to Children.

Children should be warned against eating the attractive looking berries of many plants. Rhubarb leaves used as a vegetable during times of food shortage have been known to cause death, but this has generally been due to cooking the leaves with soda, causing the formation of oxalic acid. Deaths have occurred in New Zealand from eating raw the small apple-like pods which grow on the sprouting potato stalks.

* "Plants of New Zealand": Laing and Blackwell.
† "Transactions of the New Zealand Institute," 1901: Easterfield and Aston.



A branch of the tutu plant.

There is also the danger of poisonous substances finding their way into food or drink through accident, ignorance, or carelessness. For instance, "copper salts" have been used to "green" vegetables, while arsenic has been mistaken for baking-powder, and so on. Care in the manufacture, preparation, storage, and handling of foodstuffs is of great importance. Housewives should be particularly careful to see that anything of a poisonous nature is kept in a separate cupboard and clearly labelled.

Food poisoning from canned foods is possible, mainly due to infection of the contents before the food is put in the tins, or at least before the tins are hermetically sealed. The precaution against outbreaks from this cause is, in the main, the problem of preventing infection before or during manufacture, adequate sterilization, and the utilization of only perfectly sound foodstuffs for canning, scrupulous cleanliness, and the rejection of every canned or potted article showing evidence of spoilage.

Home-canned Foodstuffs.

Manufacturers of canned foodstuffs are, as a general rule, alive to their responsibilities in regard to scientific and safe canning methods. Nevertheless, housewives should be extremely critical of the condition of home-canned foodstuffs served for human consumption. If a home-canned product has a disagreeable odour or shows any indication of spoilage, however slight, it should be discarded. Spoilage in some cases can be detected by the swelling of the cans.

In justice to manufacturers of canned foods it should be stated that food-poisoning cases sometimes reported in the press as ptomaine poisoning have, as a rule, no connection with canned products. Food poisoning from commercially canned products in New Zealand is extremely rare, being almost unknown.

Rosenau, an accepted authority, informs us that there is also a mistaken notion that, once opened, the contents of the can should be emptied into some other vessel. It is generally believed that food kept in an open tin may acquire injurious properties. This is a fable, like the souring of milk due to a thunderstorm. On the other hand, canned food may become contaminated or infected after opening, and the same care as to cleanliness and refrigeration is necessary with canned food that has been opened as with any other food in the kitchen.

Symptoms of Poisoning.

The symptoms of food poisoning are fairly definite. They vary very much in severity; it is, in fact, common to find in the same outbreak some consumers who entirely escape, others who are mildly ill, and still others who suffer to the point of death. The attack usually begins with abdominal cramps, in common language a severe stomach-ache, which may be accompanied by diarrhœa and vomiting. There may be dizziness, and in severe cases there may be disturbances of vision, sweating, extreme nervousness, anxiety, and prostrations.

In any suspected food-poisoning case medical advice should be obtained immediately. A purgative is indicated, but it is better to have a doctor's advice as soon as possible. It is then the duty of the doctor to notify the Department of such cases, as food-poisoning is a notifiable disease under the Health Act.

Prevention.

To prevent food poisoning be careful in the selection of food, be careful in cooking it, and especially in handling it after cooking. If food is to be kept from one day to another—and herein lies the greatest danger—be sure to keep it cold until ready for use. Preparations such as Spanish cream, made of gelatine, milk, and eggs, which do not entail thorough cooking, should not be kept long before being eaten. As already pointed out, bacteria or germs grow very rapidly once they gain entrance to suitable food, and the longer the time elapses before such foods are eaten, and the warmer the weather, the greater may be the danger.

Preserved eggs, particularly if preserved for some time, and duck eggs, although quite safe for cooking purposes, are not altogether suitable in a raw state, as used in Spanish cream. Sound, new-laid hen eggs should be used. It must not be understood that poisoning by bad eggs is common; in fact, it is very rare, but cases have been reported to the Department.

Leaves and berries of the karaka.

Cook the food thoroughly. Fertilizers sometimes adhere to lettuce, celery, radishes, and such things as grow near the ground, and these, together with raw fruit, should be washed in running water. Milk should be handled with care, and blancmanges, custards, and the like should be protected from possible contamination, as they are a suitable medium for the growth of bacteria. Home-canned goods should be carefully prepared and inspected before use. Learn to distinguish plants that are poisonous, and train children to recognize them.

An important objective of public-health service is pure food. It may be stated in theory that food cannot be too pure, and every effort should be made to attain such an ideal through cleanliness in production or preparations, in transit and storage, and in handling and cooking in the home.

New Zealand Woollen Industry.

Contributed by the Department of Industries and Commerce.

THE farmer contributes a large share towards the total of national wealth, and he is naturally vitally interested in price recessions or advances, and in overseas markets. The dairy-farmer is protected against the exterior influences of price-recession on the world's markets by the guaranteed price. What, however, about the woolgrowers?

While overseas prices must give concern to the woolgrower, there is another and greater danger confronting the sheep-farmer. For some time past British manufacturers have been including, roughly, 25 per cent. of a synthetic material called "fibro" in the manufacture of worsteds which are marketed as pure wool. The most experienced men in the woollen-manufacturing industry can detect the presence of fibro in these worsteds only after a very careful and searching examination. The woolgrower, therefore, is faced with a problem there—the attrition of his market due to the use of synthetic materials. The British manufacturer has not found it necessary to install new plant or to go to any capital expenditure to incorporate fibro with wool—it is woven on machinery designed for wool and it is freely advertised in trade journals.

The use of wood fibres and milk products in the woollen industry in the United Kingdom and in Europe must affect the wool industry, both primary and secondary, in the Dominion. The Institute of Standards is doing useful work in setting standards, but extensive educative work is required before the public will realize that goods made in New Zealand are of excellent quality and, so far as woollens are concerned, are 100 per cent. wool. In the woollen-manufacturing industry there are the skilled operatives and the plant to produce anything required. The industry is not working at top pressure. Expensive plant is lying idle, representing economic wastage of the worst kind.

The policy recently enunciated by the Prime Minister, the Right Hon. M. J. Savage, and the campaign launched by the Hon. D. G. Sullivan, Minister of Industries and Commerce, is the practical answer to a perplexing problem. A demand must be created for New Zealand goods, and the place to institute that demand is within the Dominion. The farmer, and the town dweller, too, must learn that the first step on the road to increased production is an increased demand. Each individual, by specifying "New-Zealand-made, please," will be creating a demand. An insistence on goods made in New Zealand, with a refusal to accept any other where New Zealand goods are available, will do much to create an increase in production. The manufacturers would gladly brand their goods "Made in New Zealand," or "All New Zealand Pure Wool," and so on, if the consumer would insist on asking for them.

There must be increased production along ordered lines, and when, and only when the farmer and the townsman specify (with determination to get it) "New-Zealand-made, please," will the internal market be built up. There is room for a very material expansion—the manufacturers will meet the demands, the workers have the skill, the woolgrowers want the market. All-round co-operation will produce benefits for all.

Eventually we will reach the goal where "Made in New Zealand" will be the watchword and slogan, and the manufacturers will be able to use more and more of our primary products. Not until New-Zealanders are fully New Zealand minded can we hope to reach the optimum output from our mills and factories, and use a maximum quantity of our own primary products. Let your slogan be "New-Zealand-made goods for New-Zealanders." That is the first step necessary to build up internal prosperity.

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The Farm Home and Kitchen.

Contributed by the Association for Country Education.

Hints for Preserving Vegetables.

IN the interest of health no family can afford to stint the quantity of vegetables served. Every housekeeper knows that she should buy and use what is in season. Even so, some people seem to have the same meal year in and year out and never modify their diet in accordance with the provision of material.

This is poor economy in every way, as, quite apart from money wasted through failure to buy the foods when they are cheap, there is the greater danger of such people gradually suffering hidden starvation for lack of some food elements which their monotonous diet lacks—the result is, in the long run, sickness and expense. It is good economy to eat all the fruit and vegetables you can while they are procurable, and so to replenish any deficiencies that may be produced during the rest of the year when these foods are too costly for frequent use. In New Zealand we are fortunate that it is possible to get fresh green vegetables almost all the year round, but we cannot all afford to pay big prices.

Vegetables in the Diet.

To keep us healthy and properly nourished our diet must supply vitamins and minerals procured through eating fruit and vegetables in addition to milk, butter, protein, and whole-grain products. The amount of vegetables required works out at a liberal serving of a root vegetable and a green vegetable once a day in addition to potatoes.

Those fortunate enough to have ground to grow their own vegetables will have been spending much time in the garden lately, and how proudly they will now be viewing potatoes, cabbage, green peas, beans, carrots, radishes, lettuce, spinach, and silver beet all ready for use.

None of these vegetables should be wasted, and what cannot be used fresh can easily be bottled, pickled, and dried for use in the winter, when fresh ones may not be so easy to obtain.

When buying food in hot weather it is advantageous to do shopping as early in the day as possible, and naturally to buy perishables in as small a quantity as circumstances permit.

By going to market early one can secure vegetables fresh from the market garden. Those who have their own gardens are well advised to pick their day's supply of vegetables in the cool of the morning while the lettuces are crisp, and the peas, beans, &c., cool and firm. All vegetables should be unwrapped, picked over, and spread out to permit the air to circulate around them. This will help to prevent bad smells, wilting, sweating, fermentation, and the growth of mould, which so often develop in peas, beans, and cabbages which are not so treated.

Preserving Tomatoes.

First of all, we shall talk about tomatoes. They can be preserved by the hot or cold pack method, blanched and done just as fruit, substituting for syrup boiling water and one to two teaspoonfuls of salt per quart jar, and then processed in a hot-water bath or oven at 250° F. for twenty to thirty minutes.

Another way is to make purée, which, by the way, is excellent for soups, sauces, and savouries. To make purée, blanch the tomatoes by plunging them first into boiling water and then into cold water. Remove the skins, cut the tomatoes into quarters, allow one teaspoonful of salt to 2 lb. tomatoes, and boil them down until they reach half to one-third their original volume. Then pour this pulp into sterilized jars and seal (a very little sugar may be added during cooking to bring out flavour, and also onions and celery, *but no soda*).

The preservation of tomato-juice is another method of utilizing the high vitamin C content of this valuable vegetable. The juice may be extracted from the tomatoes in either one or two ways—by the use of a juice-extractor, of which several types are now on the market or by the following method: Wipe the tomatoes, cut in pieces, and cook gently in a saucepan with no additional water until they are soft and puffy. Then press through a fine strainer. When the juice has been obtained bring it to boiling-point, pour it into hot jars, adjust the lids almost but not quite tight, and boil or steam the jars for five minutes (no longer). Remove from the water, screw the lids tight, and allow to cool. Juice prepared by this method may be used for tomato cocktail, for sauce, for oyster cocktail, for soup, and for seasoning all kinds of dishes.

Peas and French Beans.

Now peas and French beans. Bottling consists of destroying any bacteria and mould or their spores that may be on the food, or, if all are not destroyed completely, in making the condition so unsatisfactory for them that they will not become active. Heating is, of course, the process by which they are destroyed; added sugar hastens the safety stage.

The acid of fruits is very helpful in this work of germ-destruction, and consequently shorter cooking is needed to sterilize fruit than is needed to make non-acid foods equally safe. Peas and French beans are not acid and cannot be bottled in a sugary syrup, so that

special treatment is required. We have to add acid and salt—*i.e.*, lemon or vinegar and salt. The fewer bacteria that are present the simpler they are to destroy, so let your peas and beans be as fresh, clean, and uncontaminated as possible, and have absolutely sound jars, well scalded and new, and clean rubbers and lids.

Bottling Green Peas.

Peas should be bottled immediately after they are brought from the vines—before the sugar in them has had time to change to starch. For satisfactory results select foods that are well developed and green. After the pods have begun to wither and the peas are hard it is too late to bottle them.

Shell, blanch—*i.e.*, pre-cook in boiling water in a saucepan for five minutes, plunge into cold water and drain—and pack in hot jars within 1 in. of the top. Add hot water to cover, 1 teaspoonful of salt and 1 tablespoonful of vinegar to a quart. One teaspoonful sugar may be added. Place a new rubber on each jar, adjust the cover of the jar, and screw the lid on tightly and then give one half-turn backwards to allow for expansion of the contents of the jar. Place in a water bath in sufficient water to cover the top to the depth of about 1 in.

The temperature of the water should be the same as that in the bottle. If this is observed there should be no fear of breakage. Do not begin to count the time until the water boils over the jars. Two hours are sufficient for young peas. Allow two and a half hours for peas which have been bought and are not strictly freshly picked. Immediately on removing jars from sterilizer, screw down lids tightly and invert them to cool. Avoid draughts on the jars, but cool them as rapidly as possible. Wash the jars thoroughly, label, and store in a cool place.

A cloudy appearance of the liquid in the jar after a few days does not necessarily mean spoilage, but means that the peas were carelessly handled, breaking the capsule which encloses the starch and allowing this to be set free.

If large quantities of peas are picked in the heat do not allow them to stand in boxes or baskets. The flavour is spoiled by heating while standing in bulk. They should be spread out on tables until shelled, as they will heat through rapidly and be unfit for bottling.

Bring to the boil in fresh water before serving.

To Bottle French Beans.

Wash the French beans well and drain, then remove ends and fibres in the usual manner and cut into long strips. Blanch in a colander over a saucepan of boiling water until wilted enough to bend without snapping, and pack closely into the jars. Then treat as for peas, using one teaspoonful of salt and two tablespoonsfuls vinegar per quart jar and hot water to fill. Affix the lid, not quite securing it, and cook for 180 minutes. Screw on the lid and allow to cool, inverted.

A season-to-season supply of spinach is invaluable, particularly where there are children, so use the same method as for French beans, but we advise the bottling of small quantities—say, pint jars—for blanched spinach packs densely, and even a long processing period may not be sufficient to heat right through large dense quantities.

Preservation and salting is a big subject, but the common method of salting without fermentation is simple and is seldom unsuccessful, except when too little salt is used. Always wash French beans carefully, even use a vegetable brush to be thorough, and dry them lightly before packing into jars.

Vegetables Spell Health.

More vegetables spell better health for your family.

To quote from the report of the world dietary experts to the League of Nations Committee on Nutrition: "For perfect nutrition, children from three years upwards to adolescence need 3½ oz. to 11 oz. of green vegetables and from 3½ oz. to 11 oz. of root vegetables, while adults need 3½ oz. of green and 9 oz. of root vegetables daily."

Broiled Hamburg Steak on Onion Rings.

Ground lean beef, 2 cups.
Ground suet, ¼ cup.
Fine breadcrumbs, 1 cup.
Bacon, 7 strips.
Onion slices—½ in.—7.
Chopped parsley, 1 tablespoon.
Butter, 3 tablespoons.
Onion-juice, 2 teaspoons.
Salt, ½ teaspoon.
Pepper, ⅛ teaspoon.
Water, 1 tablespoon.

Method.—Lay slices of onion in a buttered shallow baking-dish. Pour over them two tablespoons of melted butter, sprinkle with salt and pepper, add the water, cover closely, and bake in a moderate oven (360° F.) for thirty minutes, or until tender. In the meantime, cook the chopped parsley in one tablespoon of butter and combine with the beef, suet, crumbs, and seasonings. Knead until thoroughly mixed. Mould into seven flat cakes and wrap each with a slice of bacon. Place each cake on an onion slice in the baking-dish, and broil under direct heat for five minutes on each side. Baste occasionally with the drippings. Serve at once from the baking-dish. If it is not convenient to broil the meat cakes by direct heat, pan broil them in a hot skillet and serve on onion slices.

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Recommended Recipes.

Stewed Kidneys.

Kidneys.
Butter, 2 tablespoons.
Brown stock or water, ⅔ cup.
Onion, ½.
Lemon, ½.

Method.—Skin kidneys and cut in slices. Melt butter in a hot frying-pan, put in kidneys and cook five minutes. Dredge thoroughly with flour and add the stock or water (hot). Cook five minutes. Season, add lemon juice, and serve on toast.

Steamed Brains with Parsley Sauce.

Brains, 2 sets.
Flour, 1 tablespoon.
Butter, 1 tablespoon.
Milk, 1 cup.
Parsley, ¼ teaspoon.

Method.—Soak the brains in brine for a few minutes. Pull off the skin. Steam for twenty minutes or till soft. Make a parsley sauce and serve garnished with parsley and paprika.

Brain Fritters.

Brains, 2 sets.
Egg, 1.
Breadcrumbs (dried).
Salt.
Pepper.

Method.—Soak brains in salt and water for a few minutes. Peel off the skin—season and press so that a good, firm shape is obtained. Roll in egg and breadcrumbs. Sauté and serve with tomato sauce.

Rice and Mince Surprise.

Meat (raw or cooked), 1 lb.
Cooked rice.
Salt.
Pepper.
Onion-juice.
Tomato juice or stock, ¾ cup.

Method.—Mince meat, season highly with salt, pepper, and onion-juice. A small quantity of pickles may be added. If the meat is uncooked, sauté or stew. Add stock or tomato-juice. Line moulds with rice and fill with meat mixture and a layer of the cooked rice, and steam or bake for half to three-quarters of an hour.

Stewed Rabbit.

Rabbit, 1.
Fat, 2 tablespoons.
Onions, 2.
Flour, 2 tablespoons.
Salt, 1 teaspoon.
Pepper, ⅛ teaspoon.
Vinegar, 2 tablespoons.
Stock or water, 1 cup.

Method.—Wipe the rabbit with a damp cloth and dismember. Sauté the chopped onions in the hot fat and remove when light brown in colour. Roll the pieces of rabbit in the flour mixed with the salt and pepper, and sauté until brown. Remove to stew-pan or casserole, add the onions, vinegar, and stock or water. cook until tender one and a half to two hours. If cooked in stew-pan, temperature should be 185° F. (simmering-point); oven-temperature for casserole cookery, 350° F. Serve hot on a platter, and if desired surround with a border of well-cooked rice. To provide variety in flavour, one teaspoon of ground ginger may be added to the above ingredients.

Witches' Broth.

2 lb. apples.
6 tablespoons sugar.
2 egg-whites.
Lemon juice.
Sliced fresh fruit.
Whipped cream.

Method.—Bake the apples till very soft, remove peel and core, and rub through a sieve. Whip the egg-whites stiffly, add sugar and lemon juice, and gradually fold in the apple pulp. Put in a glass dish and garnish with slices of fresh fruit and whipped cream.

Apples with Rice.

Method.—Line small buttered cups with cooked, boiled rice, and then fill the centres closely with slices of cooked apples. Cover the apples with more rice, rounding the tops slightly. Place in a steamer or cook in the oven, standing in a dish of hot water for about fifteen minutes. Turn out from the cups on to a serving dish and serve hot with cold boiled custard, hard sauce, or lemon sauce.

Apple Salad.

1 cup red apple cored and diced.
1 cup very finely shredded cabbage (use only the crisp leaves).
½ cup toasted chopped peanuts.

Method.—Mix with salad dressing and serve on lettuce.

Dutch Apple Cake.

2 cups flour.
4 level teaspoons baking-powder.
½ teaspoon salt.
1 tablespoon sugar.
¾ cup milk.
2 oz. butter.

Method.—Sift the dry ingredients into a bowl; rub in butter and add the milk gradually. Spread the mixture ¾ in. thick in a buttered round or oblong pan. Cover top with wedge-shaped slices of apples, pressing the thin edge into the dough. Sprinkle with sugar and cinnamon. Bake in a moderate oven (350° F.).

German Apple Pie.

Filling—
Apples, 1¾ lb.
Dates, ¼ lb.
Sugar, 2 tablespoons.
Butter, 1 oz.
Cinnamon, 1 teaspoon.
Ginger, ¼ teaspoon.

Paste—
Flour, ½ lb.
Sugar, 2 oz.
Cream of tartar, 1 teaspoon.
Soda, ½ teaspoon.
Butter, ¼ lb.
Egg, 1.
Milk, ½ cup.

Method.—Filling: Peel and core apples and cut into small pieces. Put into a saucepan with rest of ingredients and stew till soft. Beat all together and allow to cool. Paste: Cream, butter, and sugar. Add beaten egg and then sifted dry ingredients. Mix to firm paste with milk and roll out. Line dish with paste, put in filling and cover with another layer of paste. Bake in a moderate oven.

Founders of Modern Agriculture, No. 14.

J. W. WOODCOCK, Crop Experimentalist, Fields Division.

Thomas Brydone.

NEW ZEALAND has made a generous contribution towards the advancement of modern agriculture, and one of the outstanding individual contributors was Thomas Brydone, who represented the New Zealand and Australian Land Company in this Dominion from 1867 to 1900.

The rapid development of the New Zealand meat and dairy industry began when the first shipment of frozen meat left these shores on the sailing-ship "Dunedin" in 1881, a venture conceived by Mr. W. S. Davidson, general manager of the Land Company in London. The latter made all the necessary shipping arrangements and instructed Thomas Brydone to erect a killing-shed, secure first-class butchers, and prepare for the loading of a cargo of attractive sheep.

Thorough Arrangements.

The shed was erected on the company's Totara Estate near Oamaru, where a memorial cairn now stands, and the thoroughness with which Brydone carried out these preliminary arrangements contributed largely to the success of the scheme. Davidson came out from London to complete the shipping arrangements, and with Brydone's assistance personally stowed the frozen carcasses on board the "Dunedin" at Port Chalmers.

Brydone, foreseeing the possibilities of dairying in the Dominion, used his influence to arrange for a quantity of butter to be included in the cargo. Thus began the Dominion's large export trade of meat and dairy products. On arrival at Smithfield the excellent condition and quality of the meat aroused intense interest. Of the whole cargo of more than four thousand carcasses of mutton only one was condemned, the balance being sold readily.

Thomas Brydone.

As further shipments of meat and butter took place Brydone took the deepest interest in the export trade of these two commodities, and he had enormous faith in the possibilities thus opened up.

Dairy Factories Established.

Under his direction the New Zealand and Australian Land Company continued to develop successfully large tracts of land in Otago and Southland and to establish dairy factories. One of the earliest factories at Edendale was built in 1882, Brydone supervising the erection and layout. This factory was established not only for the manufacture of cheese, but we are told that it was also an experimental station and a training school for cheesemakers.

Such a venture was bound to have a marked influence on the dairy industry of New Zealand, which from that time continued to develop under the stimulus of the export trade opened up by the "Dunedin" shipment.

Thomas Brydone retired in 1900 after having exerted a considerable influence on New Zealand farming, and in 1904 he died in London.

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Table of Contents—February, 1939.

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