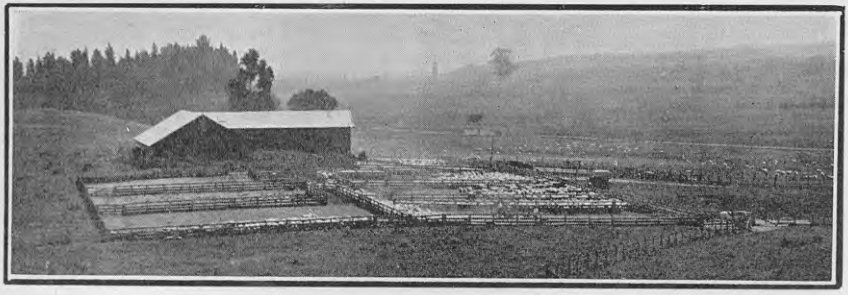

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THE GRASSLANDS OF NEW ZEALAND.

SERIES II. THE TARANAKI BACK-COUNTRY.

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2. GROWTH-FORM AND HABITS OF SECONDARY GROWTH IN RELATION TO CONTROL.

IN the control of secondary growth, or, in fact, of any weed, it is useful for the farmer to know the habits and growth-form of that weed and its behaviour under, or its response to, differential farm-practice. By a study of the life-history of the plant we often can pick out weaknesses manifest at some stage in its yearly cycle of growth which can be turned to our advantage in the control of that weed, in much the same way as in the control of insect and fungoid pests. Indeed, it may be put down as an axiom in weed-control that any weed should be attacked at that point or period of the year where and when it is most vulnerable. This article will deal more or less with the growth-form and methods of propagation and spread of the most troublesome scrub plants of the Taranaki back-country, and will endeavour to indicate the vital weak spots in each class of growth.

The secondary-scrub growths causing most of the trouble in the Taranaki back-country are hard fern, manuka, bracken-fern, water-fern, and piripiri. Of these hard fern and manuka are the most difficult to deal with.

HARD FERN.*

This fern (Fig. 20) forms a carpet-like mass 12 in. to 18 in. tall, fairly dense to the bottom, which is often filled up with dry dead fronds of previous years' growth. It spreads from out of the shelter of logs or stumps, or from points of establishment on dry open knolls. Its spread is by means of branching, wiry, dark-coloured rhizomes, which creep over the surface of the soil. In this surface-growing rhizome lies the greatest weakness of the plant. Stock injure it readily by their treading, and it is particularly liable to destruction by fire in a season when the foliage is sufficiently dry to carry a hot fire (Fig. 21). The time of burning hard fern is important. A hot fire is essential,

FIG 20. EDGE OF A HARD-FERN PATCH.

The grass sward is here very closely grazed down, a condition favourable for the outward spread of the fern.

[*Photo by E. Bruce Levy.*

and burning should not be carried out until the soil-surface is well dried out. Early spring burning is often practised owing to the fact that during a severe winter the previous year's fronds are all dried up, being killed by frost. These carry a surface fire, but the soil-surface is usually wet in the spring, so that the surface rhizomes remain undamaged and new fronds come away soon after the fire (Fig. 22).

Every endeavour should be made to get grass established on the hard-fern burns, so that stock may be enticed there and thus damage any small pieces of fern that may have been missed by the fire. The spring-time does not afford opportunities for the establishment of grass

* For botanical description and illustrations of hard fern, common bracken-fern, and water-fern see "The Bracken-ferns of New Zealand," by Esmond Atkinson, this *Journal*, January, 1923.

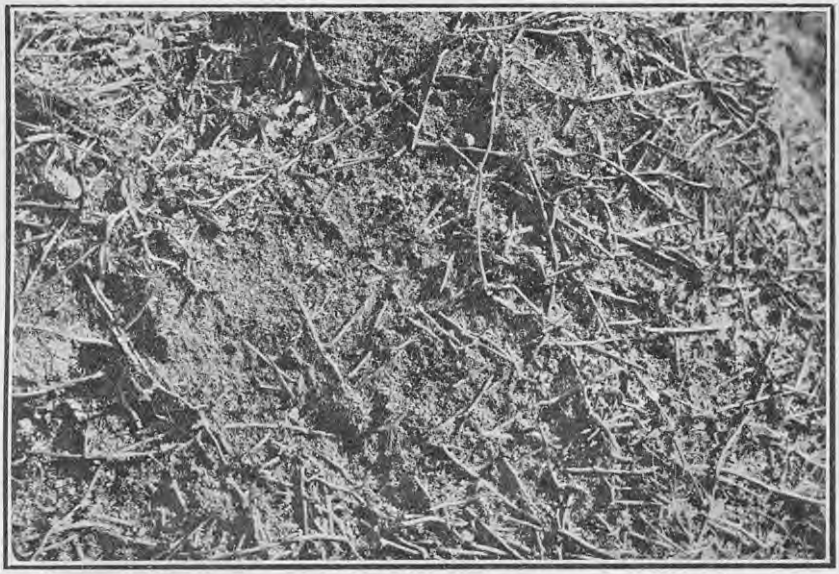


FIG. 21. HARD FERN DESTROYED BY FIRE.

The thin wiry rhizomes may be seen right on the surface. In the central portion of the photo the rhizomes have been largely burnt out by the fire.

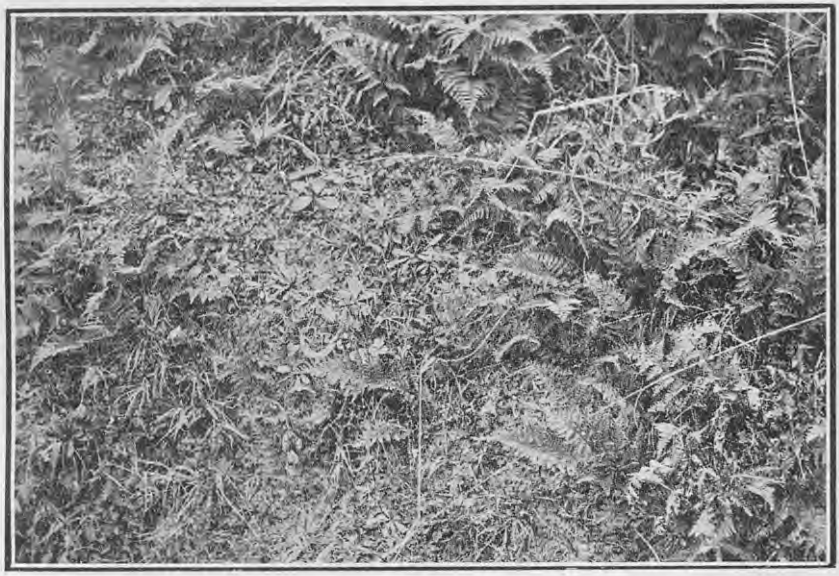


FIG. 22. NEW GROWTH OF HARD FERN AFTER A LIGHT FIRE.

It is better to lose a season than to burn while the surface of the soil is not thoroughly dry. Note the weeds that have come in on the failure to secure a take of grass.

[*Photos by E. Bruce Levy.*

on secondary-scrub burns, and this is particularly true in the case of hard fern, for the great mass of surface rhizomes and thread-like roots form a hard compact surface most readily dried out in the hot weather of summer. Autumn burning in a dry season seems to afford the only hope of combating this weed; and while it is recognized in the Whangamomona district that one cannot always rely on getting a dry season, yet it would seem wiser to miss a season or two than to attempt the burn at a time when the soil-surface is not dry. The autumn affords the greatest chance or success, not only in the burning but also in the establishment of grass on the burn.

The growing-point of the surface rhizomes of hard fern "feels" somewhat for the light, and it will not penetrate a densely shaded cover. As the rhizome grows forward in contact with the soil it sends down thin thread-like roots, and at the same time somewhat slender fronds into the air. Therefore, as in the case of a great many other weeds, in order to spread satisfactorily, the surface rhizome must contact the soil, else the new roots cannot develop. By constant grazing of the turf around the clumps of hard fern the grass is kept short, and hence light is allowed to penetrate freely to the young outspreading rhizome, which consequently keeps close to the ground and spreads, rooting as it goes (Fig. 20). There is also nothing above to hinder the upward growth of the young frond. If a fairly dense shade and competition with other plants is provided (as by a good growth of grass induced by spelling the pasture), then the rhizome tends to rise slightly off the ground so as to avoid penetrating the denser growth. When the rhizome thus loses contact with the soil-surface no roots are formed and its growth is inhibited, and what growth is formed is very liable to be destroyed by stock when these are once more turned on to the area.

From the foregoing, then, it would appear that control of hard fern centred about three practices: (1) Burning of the hard fern in autumn in a season sufficiently dry for a hot fire to be secured; (2) the sowing of these burns with suitable grass-seed; and (3) the spelling of the pasture to induce a good grass-growth about the hard-fern clumps. The spelling also enables a heavy stocking at any one period of the year when the fern is most injured by treading.

BRACKEN-FERN.

Bracken-fern has an element of very great weakness in that its frond is eaten by stock. The rhizome of bracken-fern is well below the soil-surface, usually 6 in. to 8 in. deep, but at times 1 ft. or even more on certain light sandy or pumice country. The rhizome is thick, and in it is stored an immense amount of reserve plant-food. In the early spring from this underground rhizome new fronds are formed, and these draw during the early period of their growth—that is, until they uncurl—on the food-reserve in the underground rhizome. The new fronds appear above ground as tender, brittle, curled structures, most susceptible to injury by grazing animals (Fig. 23). This curl stage is, without doubt, the weak point in the annual growth of the bracken-fern. Every frond broken off in the curl stage means a reduction in the vitality of the plant, and just as long as the process can be repeated each time new fronds appear the draw upon the

FIG. 23. BRACKEN-FERN IN THE CURL STAGE.

During this stage, and until the fern uncurls, the frond is extremely brittle, and may be rapidly broken off or eaten by stock.

FIG. 24. BRACKEN-FERN ONE YEAR AFTER THE BURN WHERE NO SEED HAS BEEN SOWN AND NO STOCK ALLOWED ON TO THE AREA.

The fern-fronds are at this stage manufacturing food to be stored in the underground rhizome for next year's growth.

[*Photos by E. Bruce Levy.*

reserve food in the rhizome becomes so great that ultimately the supply becomes depleted and no more fronds appear above ground. If the frond is allowed to get out of the curl stage it becomes tough and stringy and less palatable to stock. Again, just as soon as it uncurls it begins manufacturing plant-food, which goes to maintain the food-supply, and hence the vitality of the underground rhizome (Fig. 24).

In order to deal satisfactorily with the bracken-fern in the curl stage some food other than the fern must be provided, else the stock rapidly go back in condition. The fairly long dormant period of bracken-fern during winter usually makes it possible to get grass well established on the fern-burn before the young fronds begin to appear, which is usually in October or late September. Bracken-fern control therefore appears to resolve itself into an attack on the plant along two lines: (1) Crushing by stock in the early spring and summer, while the fern is in the curl stage, and (2) the production of pasture plants on the bracken-fern area during its dormant period—March to October—in order that this stocking may be satisfactorily carried out.

WATER-FERN.

Water-fern requires a good deal of moisture and shade in order to thrive. It is troublesome mostly around stumps and logs, or on higher-altitude farms where the rainfall is heavy. It does best in somewhat loose soil containing plenty of humus in the form of leaf-mould or rotten logs. The rhizome is well below ground, being on the average 2 in. to 3 in. deep. It is stout, but not so well supplied with reserve food as is bracken-fern. The young fronds are fairly numerous, large and fleshy, and grow for the most part in winter and spring. Frost, however, injures the growth in the winter. If stock can get in among water-fern they can be very damaging with their feet, owing to the big, fleshy, curled fronds being readily broken off. Moreover, from the fact that the rhizome does not contain the same reserve food as in bracken-fern, the plant is much more readily crushed out than is bracken. Stock also eat the herbage to a small extent even when the frond is expanded. On water-fern areas it is difficult to get a burn, so that pasture plants are introduced with greater difficulty. Water-fern scarcely ever comes out into the open, and usually as soon as the logs are removed and when the land has become more consolidated by stock water-fern ceases to trouble. On certain farms in the country under consideration, however, water-fern is still spreading considerably, forming large clumps.

MANUKA.

Manuka, once it becomes well established, cannot be controlled by stock alone and the slash-hook must be employed to fell this scrub-growth. This is a costly business, but there is apparently no alternative. To burn standing manuka that is bearing seed is worse than useless. Manuka once cut will not grow out afresh from the cut stumps (though any small branches left low down on the stump will grow), and were it not for the fact that this plant seeds so profusely its control would be comparatively easy. The seed habit may be termed almost a mania with manuka: one plant in a single season

will produce millions of seeds, all of which apparently are fertile and capable and eager to produce a young plant. This apparent readiness of germination is, as far as the writer can see, the weak point in manuka, provided the problem is attacked in the right way. Either the plant must be cut and burnt before the seed is shed, or else cut and left on the ground until such time as the seeds have germinated and have established as young plants among the cut dead manuka (Fig. 25). The seeds germinate readily in spring (end of September), and provided opportunity offers it would appear that all seeds germinate the same year that they mature and fall (this point needs more definite investigation, however), so that if a fire can be run over the whole cut surface every manuka seedling will be killed outright. Provided there

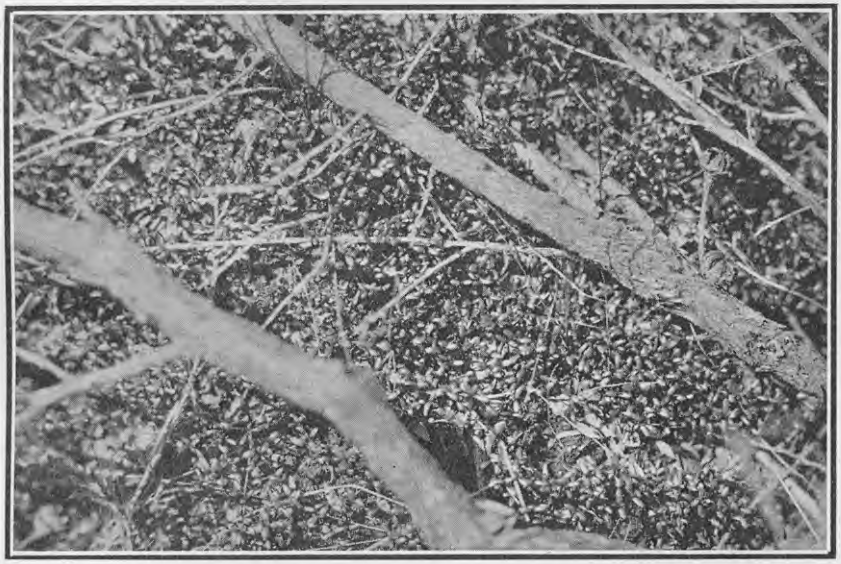


FIG. 25. GERMINATION IN MASS OF MANUKA-SEEDS IN EARLY SPRING.

The young seedlings may be noted in the cotyledon stage coming up among the strewn manuka-branches. About natural size.

[*Photo by E. Bruce Levy.*

has been a good fire one may search in vain on an old manuka burn for young manuka seedlings.

The time of cutting and burning, therefore, is very important in manuka-control. In the ordinary course of events the manuka-seed crop is ripe about the end of July, and most of the capsules have opened and have shed their seed on to the ground by the end of August. There are, however, a small proportion of capsules that do not open with the main crop. These may remain closed for a whole year or even longer, so that no matter what time of the year the manuka is cut there is always some seed on the plant. These latter capsules, so soon as the plant is killed by cutting or by fire while standing, mature, and, opening up, shed their seed on to the ground. If the

manuka is cut before spring they will have opened along with the main crop, and they will germinate along with the rest. If the manuka is left until summer before it is cut there will always be a certain number of seeds shed on to the ground that have not germinated at the time of firing, and it must be remembered that a dormant seed is much more difficult to kill by fire than is a young tender seedling. Any seeds that are not killed will, of course, readily germinate and become established soon after the fire.

Late spring burns will kill virtually all the young seedlings, but this time of the year does not offer opportunity for getting grass-seed established on the burned surface. The fact must always be borne in mind that manuka (and, for that, most weed-seeds) will not germinate and establish within a close grass sward. It is only when the grass sward opens up that such become established. Autumn burning of cut manuka not only destroys manuka seedlings, but also affords opportunity for the sowing of grass-seed with a good chance of its successful establishment. Manuka which has been cut and which has lain for long loses the greater portion of its leaves, and thus it may not carry a fire so well as when fired soon after being cut. As the winter is the most opportune time for the farmer to get out to cut his manuka, spring burning is often practised. Where there is already a certain amount of grass such as danthonia, New Zealand rice-grass, &c., among the manuka, spring burning is probably more beneficial to the grass than autumn burning would be, provided the burn is done before the new season's growth has commenced. On areas, however, where sowings of grass-seed are being made the burn should be in the autumn.

Standing manuka that is old enough to bear seed should never be fired. This is the opinion of the best farmers of the Wairarapa and Hawke's Bay districts, where they have had considerable experience with manuka. The heat of the fire is seldom sufficient to consume the seed-capsules on the living plant, and the heat really acts as a ripening process to the capsule. The latter consequently opens soon after the fire has been through, and the seed is shed on to the ash left by the fire. Here there is no competition, and the conditions are ideal for the establishment of the seedling (Fig. 26). Numerous instances have come under the writer's notice where thousands of young manuka-plants to the square foot have come up on standing manuka burns (Fig. 27).

In the Whangamomona district also patches of hard fern are usually associated with the manuka until the latter becomes dense. If such areas are burnt standing the fire sweeps over the top of the hard fern, leaving its rhizomes comparatively undamaged (Fig. 28). Felling the manuka on these areas means that a much more intensely hot fire is secured close to the ground surface, and thus the hard fern may be entirely killed out by the firing. The manuka-plant itself is readily killed by fire, and this fact can be made use of in the burning of manuka areas while the plants are still small—but only provided no seed-capsules have matured. To do this there must be some growth such as danthonia, brown-top, or paspalum present that will carry a fire.

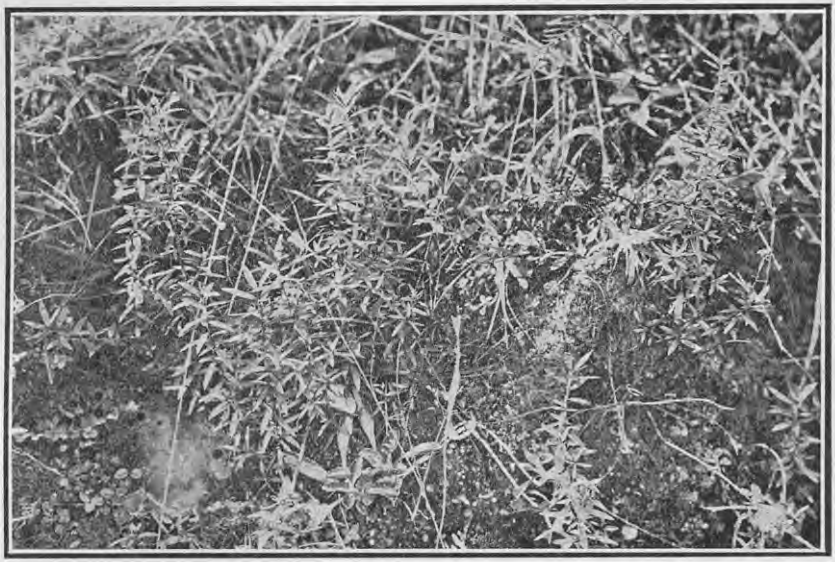


FIG. 26. MANUKA SEEDLINGS, ONE YEAR OLD, ESTABLISHED AFTER A STANDING-MANUKA BURN.

The unopened capsules on the tree are ripened by the fire, and they then shed their seed on to the ashes of the burn.

FIG. 27. STANDING-MANUKA BURN ON A PEAT-SWAMP.

Thousands of young manuka-plants were here established on every square foot of soil-surface.

[*Photos by E. Bruce Levy.*

The burning of standing manuka on country where the bracken-fern has not been killed out before the incoming of the manuka almost invariably leads to an immediate pure bracken-fern association. On all that country where bracken-fern forms a phase in the forest succession this return of bracken is likely to happen so soon as the growth that replaced the bracken in the succession is destroyed by fire (Fig. 29). It would appear that the rhizome of bracken-fern is capable of remaining in a dormant state in the soil for many years, and once the shade of the top growth is removed the bracken once more springs into being. On the second-class soils where bracken is not thriving luxuriantly manuka will often come into the standing fern, and in the course of eight or more years will so overtop the bracken that its growth is subdued, and the association to all intents and purposes becomes a pure manuka association. Now, should this manuka be burnt standing, the growth that follows immediately is not manuka but bracken-fern, which holds sway until such time as the manuka seedlings, established after the fire, again grow through the fern and once more begin to overtop it.

This alternation of manuka and bracken-fern associations is not very common in the Whangamomona County, for usually the bracken-fern is killed out before the incoming of the manuka, and here, in a state of nature, manuka does not form a phase in the succession, the soil being sufficiently good to carry either a wineberry-lacebark-fuchsia successional association, or else one of tutu-veronica-fivefinger-karamu-kohuhu, &c. Manuka there comes only after the soil has become considerably depleted.

Manuka-control, it will be seen, is largely an attack on the plant in the seedling stage; and the regulation of practice, both in the felling and in the burning, should be towards effecting the most damage at this stage. Spelling the pasture while the manuka is young, so as to get sufficient grass-growth to carry a fire, attacks the plant in another vitally weak spot.

PIRIPIRI.

This weed demands for its spread and prosperity a turf closely grazed by an animal that will not eat its foliage. Sheep-grazing alone fulfills these conditions almost perfectly. The plant in its habit of growth comes into the group of pasture-weeds that spread by means of an overground runner which clings close to the ground, rooting as it goes. Hard fern, it will be noted, also belongs to this group. The surface runner of piripiri is drawn up to the light by shade-forming plants much more markedly than is hard fern, and in this character lies the greatest weakness of piripiri as a plant. Cattle beasts also will eat it. The conditions of the dry knolls, which are usually the point of establishment of piripiri in a new burn, favour the spread of this plant because the grass-growth there is usually too poor to completely cover the ground. Consequently the runner of piripiri is able to keep contact with the ground, and thus the plant spreads to the edge of the knoll. The better grass-growth surrounding the knoll usually inhibits further spread until such time as this grass becomes closely grazed down.

FIG. 28. GROWTH OF HARD FERN AND MANUKA AFTER A STANDING-MANUKA BURN.

FIG. 29. BRACKEN-FERN ASSOCIATION APPEARING IMMEDIATELY AFTER A YOUNG SECONDARY-FOREST BURN AT TAHORA.

[*Photos by E. Bruce Levy.*

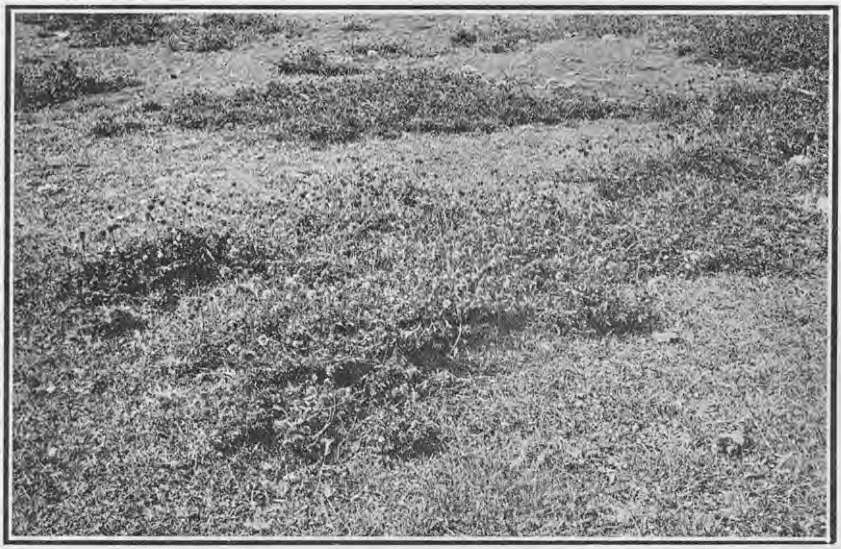


FIG. 30. PIRIPIRI IN A CLOSELY GRAZED PASTURE.

Showing how sheep keep the grass-turf close immediately bordering the piripiri patches. This favours the spread of piripiri.

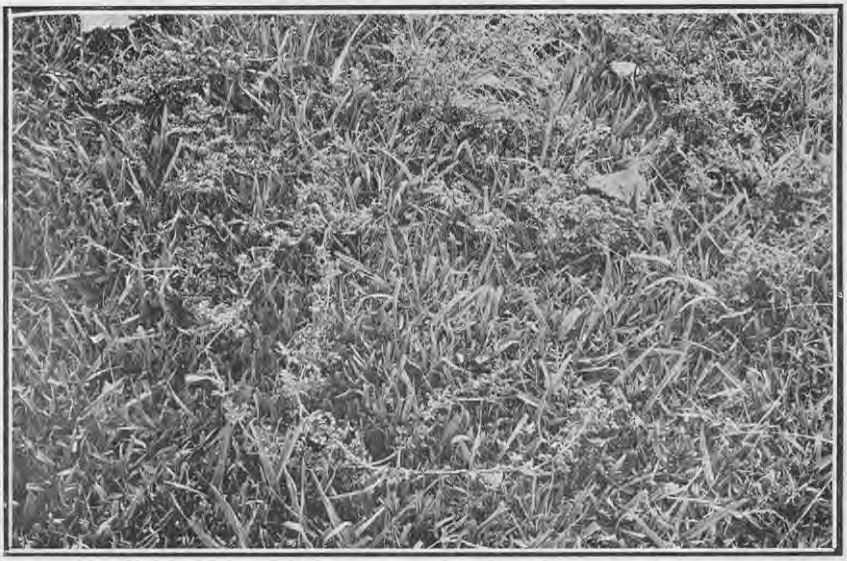


FIG. 31. PIRIPIRI BEING KEPT UP OFF THE GROUND BY A GOOD SWARD OF GRASS.

Note the two long runners in the centre of the photo, some 3 ft. long without a single root. The grass-turf is one of paspalum.

[*Photos by E. Bruce Levy.*

Piripiri itself is almost entirely neglected by sheep, and they will not browse among it unless forced to do so by lack of feed elsewhere. The sheep, however, graze close up to the edge of these piripiri patches, keeping the grass here extremely short (Fig. 30). Thus light is allowed into the overground runners, and the outward spread of the plant is assured. If these edges of the piripiri clumps are shaded (such as by spelling the pasture as in the case of hard fern) the runners may readily be made to leave the ground, the new growth turning upwards in order to reach the light. When this happens the runners no longer send out roots into the soil, but travel along the surface of the grass as loose trailing stems most susceptible to injury by the grazing and treading of stock (Fig. 31). Cattle eat the piripiri to some extent, and they have not the aversion to going among it that sheep seem to have.

The facts that cattle will eat the plant and that the growth-form may be altered considerably to its disadvantage by stimulating shade-forming plants among and around it suggest the following methods of procedure in its control: (1) Spelling the pasture to shade the overground runners of the plant so that these lose contact with the soil, being drawn up to the light; and (2) the grazing of these spelled areas by cattle.

GENERAL.

From the foregoing it will be seen that the habits and growth-form of a plant are big factors in deciding what methods should be employed to successfully control that growth. The importance of the grass sward and of the stock capable of being maintained by means of that sward are manifest throughout. These really are the two great weapons available to farmers for the control of most weed-growth, and any method for the control of weeds that does not take these two important factors into consideration must, in the writer's opinion, be economically unsound. It is realized that the farmer in the Taranaki back-country is up against the great difficulty of securing this grass sward and in getting it to hold, and this is one of the first phases of study and experiment we are undertaking in our work in Whangamomona County.

(To be continued.)

Brown-top Seed.—Special investigation work into the possibilities of extension of our export seed trade to America in brown-top (*Agrostis tenuis*) seed was carried out at the Department's Biological Laboratory during the past year, and possibilities of extension in this direction have opened up. Collections of the various *Agrostis* species have been made throughout each district in New Zealand, and these have been studied and the dominant forms determined as to species. The dominant form of *Agrostis* in New Zealand has now been determined by Dr. C. V. Piper, Agrostologist, United States Department of Agriculture, as being brown-top (*Agrostis tenuis*), for the seed of which he reports there is, in his opinion, an extensive market in America. The outcome of this research will have quite an important bearing on the economy of grassland farming on our first-class short-rotational grassland soils.

LAMB-BREEDING FOR THE MEAT TRADE.

WHITE-FACED BREEDS AND CROSSES.

J. G. COOK, Live-stock Division.

IN the *Journal* for January last (page 50) were published some notes by the writer on the Down breeds and crosses for the fat-lamb trade. Other sheep breeds and crosses represented in New Zealand are dealt with in the present article.

It will be well to emphasize, in the first place, the importance of selecting breeds or their crosses suitable to the climatic and land conditions of the locality or farm. A great deal depends on whether the land is heavy or light, swampy, arable, or tussock, or bush-burn country, and so on. Raising sheep or lambs under conditions which are in their favour will, as a rule, yield satisfactory returns, whereas the reverse will be the result if it is attempted under conditions which do not allow the sheep a fair chance of doing the best they are capable of. The consumer is not concerned about the breed of the lamb or mutton he buys, but looks for meat of good quality and colour, with a large proportion of lean.

In New Zealand we have several of the white-faced, longwool breeds—namely, Romney Marsh, Lincoln, English Leicester, Border Leicester, and Wensleydale. Cotswolds and Cheviots were kept some years ago, but it was found that conditions did not suit them, and their breeding was consequently abandoned. Rams from each of the breeds named were mated with Merino ewes in several provincial districts, with the object of ascertaining which cross would produce lambs with a carcase most suitable for the frozen-meat trade.

LINCOLN CROSSES.

The Lincoln ram mated with the Merino ewe produced good results, the progeny being called half-breds. The lamb is of good frame but compact, and, although it takes more time to fatten when compared with some other lines, this cross is greatly in favour in one or two important sheep districts. If not sold as a fat lamb the animal usually develops into a fine hogget, and cuts a good fleece of shafty combing-wool. If topped off after shearing it will make a good freezing carcase, and always sells well. The ewes of this cross are always of value, as, having normally a very sound constitution, they grow into a really good line.

This class of ewe can be mated with a half-bred ram if it is desired to keep to the half-bred line, but, if desired, ewes can be mated back to the Lincoln ram. The progeny from the latter crossing is termed three-quarter-bred—that is, three-fourths longwool and one-quarter Merino. This is a good line, but, coming back to the longwool, the meat is somewhat coarser in the grain than that of the first cross. Experience, too, shows that the three-quarter-bred takes longer to fatten than the half-bred.

The three-quarter-bred ewe can be mated with a Southdown ram, the progeny making an excellent freezing line. With the first cross (half-bred) and the second cross (three-quarter-bred), the lines throw to the Lincoln ram in the length of the wool. Further, they keep the wool on well, as the tip is harder and stands a good deal more knocking about than with some other crosses.

ENGLISH LEICESTER.

The crossing of English Leicester rams with Merino ewes gives a very fine line of lambs, also termed half-bred. This lamb catches the eye on account of its well-shaped head (which also makes the lambing easier), well-sprung ribs, nice broad back, and full rump and short legs, with meaty hind quarters. It was on this cross that Canterbury Province mainly built up its world reputation for "prime Canterbury" in both lamb and mutton, and it will always hold good.

If not required for slaughtering as lambs, but intended for sale after being shorn as hoggets, the animals should be kept in a progressing condition up to the time required, when with but a little topping-off they are ready for the market. When intended to be kept on the place until four- or six-tooth they can be grazed on the higher country, and, according to the feed available, kept there until about eight or ten weeks before selling, when they should be brought in, put on to good feed, and finished. This line will always cut a good fleece of shafty combing-wool which is sought after by buyers. The ewes are valuable, and if it is desired to keep to the same line they can be mated with half-bred rams. If mated with the English Leicester ram the progeny will be three-quarter-breds. Wether lambs should be sold off as soon as they are fat enough for the market.

If the ewes of the line are kept and classed out the coarser-woolled animals should be mated with Southdown rams and the finer-woolled with the Shropshire. In either case the line produced will be a good freezing one, and the quality of the wool more even than would be the case if the ewes had not been classed out and mated with one breed of Down ram only. Any lambs produced by using Down rams are best sold off the place as soon as ready for market, because their strong point is meat and not wool-production. None of the Down cross should be allowed to get in among the breeding-ewes, as by keeping the breeding-flock separate the class of rams required are easier worked than if there was a mixture of all breeds throughout the ewe flock.

BORDER LEICESTER.

The progeny of the Border Leicester rams and the Merino ewe —again termed half-bred—is rather a smart-looking lamb with ears nearly always pricked, showing that the animal is on the alert. These lambs are good travellers, and meet with a ready sale. They fatten fairly quickly, throwing to the Border Leicester in that respect. They have to be got away fairly early, as later on they are inclined to run to leg, which, when killed, shows a bit long in the shank-bone, making the carcase look longer. The meat, however, is of a good, clean-looking colour. There is also commonly a fault as regards the wool, which is somewhat on the light side. This becomes more apparent

as the sheep ages, and is termed "going off in the wool." If the ewes of the half-bred line are kept on the place, and it is desired to keep to and breed the same line, they should be mated with the half-bred ram. If the ewes are mated with the Border Leicester ram the progeny will be three-quarter-breds. The whole line may be sold off as fat lambs, but if any ewes are retained they can be mated with either Southdown or Shropshire rams. After the subsequent lambing, when ewes and lambs are ready for market they should be sold off.

The Border Leicester ram is used a good deal in Canterbury and north Otago for producing half-bred lambs. In the rest of Otago and in Southland the ram is used a great deal to mate with Romney ewes. The lambs from this crossing are good doers, and they usually kill out at high weights.

CHEVIOT, WENSLEYDALE, AND COTSWOLD.

In the past Cheviot rams were sometimes mated with Merino ewes, and for a while this cross progressed in one or two of the southern districts, but as time went on, and the Border Leicester, Romney, English Leicester, and Lincoln breeds and their crosses were found to be more suitable, the Cheviot was dropped.

Some years ago the Wensleydale was mated with small numbers of Merino ewes, but this cross was not kept going like the other lines mentioned. The half-bred lamb produced was somewhat similar to the English Leicester ram and Merino ewe cross, but the few farmers who had the line did not keep to it. They might have done so had the importation of the rams been more frequent or numerous.

Mating of the Cotswold ram with Merino ewes produced rather a good lamb, but there was a good deal of trouble in lambing, and the cross is now practically out of existence as far as New Zealand is concerned. In the "sixties" and "seventies" there were a fair number of them in this country.

ROMNEY.

The Romney Marsh ram mated with the Merino ewe gives a good strong lamb. The progeny (half-bred) mature fairly quickly, but they have not been bred to the same extent as the Lincoln-Merino, English Leicester - Merino, or Border Leicester - Merino crossings. It was with the Romney ram and Merino ewe progeny that the late Mr. James Little first tried inbreeding. The Romney is mostly used for crossing with other longwools, more especially in the North Island and the Westland and Southland Districts, where it gives very satisfactory results. The Romney is the predominating breed in New Zealand.

RYELAND.

The Ryeland breed is also suitable for the fat-lamb or mutton trade, the body being square, compact, with a good loin and well-filled leg. The line matures quickly, thus coming to hand early, and there is a good percentage of lambs sold direct off the ewes. Needless to say, when this can be done with any breed or cross it lowers the cost of production to the grower. Then, there is the first-cross produced by mating Ryeland rams with ewes of other breeds. The progeny

of the cross with any of the Down ewes make an excellent line and mature quickly. Mated with half-bred or Corriedale ewes the line produced is a good one, but takes slightly longer to fatten than the Down cross. The progeny of the cross with Romney, Border Leicester, English Leicester, or crossbred ewes is usually very suitable for the meat trade.

DORSET HORN.

The Dorset Horn is another breed suitable for either fat lamb or mutton. Only a few have been imported into New Zealand at different times, and thus there has not been enough of the breed about to make it conspicuous. It has been noticed, however, that when the rams were mated with other lines of ewes the progeny came to hand early and gave a suitable carcase.

CORRIEDALE.

Finally, reference must be made to a breed of purely New Zealand origin, the Corriedale. Owing to the strain of Merino in it, this breed takes a little longer to fatten than some others, but when ready it makes a very good carcase. The meat is nicely fine in the grain and pleasant to the palate. If unable to fatten the lambs in time they can with safety be held over. The hogget gives a fleece of splendid wool, after which it can be fattened and sold. If the ewes are held for breeding purposes they may be counted on for a lamb and a good fleece every year as long as their teeth last.

INCIDENCE OF THE FAT-LAMB INDUSTRY.

In order to give an indication of the extent and distribution of fat-lamb raising in New Zealand the gradings of the lambs slaughtered during the 5⅓ years' period of the Imperial meat requisition (1915–20) are here set out as follows:—

Specially prime and Canterbury quality: North Island, 543,546 carcases; South Island, 5,804,527; Dominion total, 6,348,073.

First quality, 42 lb. and under: North Island, 4,411,941; South Island, 1,734,913; Dominion, 6,146,854.

First quality, over 42 lb.: North Island, 257,459; South Island, 1,125,842; Dominion, 1,383,301.

Second quality: North Island, 987,882; South Island, 1,938,142; Dominion, 2,926,024.

Of the above aggregate total for the Dominion of 16,804,252 carcases the number killed at the freezing-works in the Canterbury Province was 7,158,149, graded as follows: Specially prime and Canterbury quality, 5,029,994; first quality, 42 lb. and under, 279,029; first quality, over 42 lb., 677,399; second quality, 1,171,727. This leaves 9,646,103 which were killed at the remainder of the meat-export works in the Dominion.

NOTES ON SOME LITTORAL AND OTHER SOILS.

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

FROM time to time for various reasons soils have been analysed fully in the Department's Chemical Laboratory, although this is not the practice unless the work is required in connection with some special investigation upon which departmental officers are engaged, or unless on request from some member of the public who is willing to pay the fee for such work, which is £5 5s. per sample. As a number of soil surveys are at present in progress in various parts of the Dominion, under the control of different chemists, publication of the results of analyses of miscellaneous samples made by this Department during the last three years may be useful to those engaged in the study of the science of the soil, and are here recorded mainly with that object.

LITTORAL AND SALTY SOILS.

O 809 and 810 (see tables) are two samples, collected under the direction of the district Fields officer, from the Little Shoal Bay Reserve, at Northcote, a tidal reclamation of 30 acres on the Auckland Harbour north shore, which it was desired to convert into a playing-field. O 809, taken among rushes, was a dark soil containing much organic matter. O 810, taken from the middle area, was a composite sample of a light-coloured soil with little organic matter. Analysis shows that the soils, which are sandy loams, are well supplied with total potash, and available potash is present in excessive amount. The percentage of available and total phosphate is low. The amount of salt present is not on that ground sufficient to deter an attempt to grass the area after it has been protected from further sea submergence. The amount of salt present is under a half of 1 per cent. (0·5 per cent.). Most farm crops, according to Sir A. D. Hall, will grow on a soil which contains one-quarter of 1 per cent. (0·25), and in Egypt grasses grew freely when there was as much as 1 per cent. of salt in the soil. Success with treatment of salty soils in New Zealand is mentioned on page 104 of this Department's annual report for 1907.

A more serious proportion of salt is contained in M 636, a fine sandy loam, collected under the direction of the district Fields officer from Park Island, an island of 100 acres at Napier, containing land subject to flooding by sea-water at high tides. The amount of the salt in this soil was 2·8 per cent. All plant-foods are present in very high proportion, especially the available phosphoric acid. It will be interesting to learn at what rate the salt will decrease in the soil when the stop-banks which it is proposed to construct have fully shut out the flowing tides. If this is successful no doubt it will be possible to grow such crops as mangolds and asparagus, and eventually, when the salt has diminished, the whole will become a fertile garden.

O 816 and 817 are two coarse sandy soils, forwarded at the instance of the district Fields officer, from a littoral area at Wharenui, Cape Campbell, Marlborough, between the Wharenui Railway-station and the sea, and about 4 chains from it. These soils are well provided with all mineral plant-foods, but suffer from the extremely coarse texture common to sandy soils. The high content of available phosphoric acid will be again noticed—a frequent character in sea-littoral soils. Improvement methods should be based on an attempt to improve the coarse texture by applications of organic manure or by green-manuring, or by applying soils of finer texture, such as those containing finer particles.

M 651 and 652 are samples from the Te Arai Settlement, Gisborne, Section 5, Block IX. These are soils of very fine texture. M 651 would probably be very hard to cultivate, from the large percentage of fine silt and clay and low percentage of coarse and fine sand. M 652 has a much better texture. The amount of salt present is small, and affords no reason for suspecting that the land would prove infertile from this cause, although further inundation from salt or brackish water might increase the amount of salt present. Owing to the absence of any lime requirement and the high amount of all plant-foods present, this land should grow excellent pasture. The high amount of available potash and phosphoric acid present should be noted.

ORCHARD SOILS.

P 1245 and 1246 are soils from the Huapai Orchard Settlement, North Auckland. P 1245 was a sample of the stiffer soil of the district, considered especially suitable for apples. P 1246 is a much more friable soil found in patches and considered more suitable for citrus fruits. (The occurrence of patches of good soil is most noticeable in all poor gum-land soils. May not each patch mark the previous site of some gigantic kauri-tree, which is known to shed bark and leaves and so build up a mound of decaying organic matter within the circumference of its spread of branches?) The analyses of these soils disclose the fact that available and total phosphoric acid is present only in traces, while the other essential plant-foods, especially nitrogen, are present in fair proportion. The application of phosphatic manure must therefore be an essential feature in any fruit-farming operations.

P 399–402 are some orchard sandy-loam soils from the Te Mata Road, Havelock North, Hawke's Bay. The outstanding feature of these soils is the deficiency of available and total phosphoric acid. Application of phosphates must form an important part of any scheme of improvement.

SOILS OF FINE TEXTURE.

L 974, a fine sandy loam from Tokirima (Wanganui River basin), is an interesting soil, as it is from a country originally growing fern, and therefore easily brought in to pasture, but which, notwithstanding, grows very good pasture. There are many thousand acres of this type, and it probably owes its low primitive type of vegetation to the fact that the soil is derived from recent volcanic-mud showers.

As one would expect from its high total nitrogen content and low phosphate content, the soil produces excellent yields of all leafy crops, but fruiting-crop yields are not so good. The application of phosphatic manures will tend to balance the inequality which at present exists.

L 973 is a fine sandy silt from the flats on the Ohura River, a tributary of the Wanganui River. This is a very fertile soil, derived from an esteemed kind of papa rock (mudstone), and it contains good amounts of plant-food.

P 272 and 273 are fine sandy silts from Ruatorea, a little-known district near the eastern limit of the North Island. The deficiency of this soil is one related to texture, which is manifested by a drying-up in summer. Green-manuring will probably be the means by which these soils may be ameliorated, as applications of clay are not feasible.

M 362, a silty loam from Claudelands, Hamilton, is a poor soil with a high lime requirement and a low phosphate content.

O 759 is a fine sandy silt from low terrace land by the Rangitikei River, at Bull's. It was complained that young sheep do not do satisfactorily on pasture grown on this terrace. Plant-foods and lime are present in good proportion except phosphoric acid, which is decidedly deficient, and the writer considers that this is sufficient to account for the ill success experienced with the stock. Good dressings of phosphatic manures were therefore recommended.

O 714, 715, and 716 are a series of soils—fine sandy loams—from an area near Palmerston North. O 714 was a virgin soil taken in light bush, and bears a marked similarity to the sample K 387 taken in the Palmerston North Esplanade Gardens, in similar small forest (see *Journal*, Vol. 21, 1920, p. 112). The other samples, O 715–6, were taken in grassed paddocks upon which a curious malnutrition disease had developed in horses. The grassed paddocks adjoined the area containing bush, and therefore the soils were probably at one time of the same composition.

SOILS OF COARSE TEXTURE.

R 58 and 60 are sandy silts from the Parihaka Soldiers' Settlement, collected for me by the District Inspector of Stock. R 58 was a top soil taken from flat ground of an old Maori clearing. R 60 was from the top of a mound about 40 ft. or 50 ft. above the level of the flat ground. These are sandy silts, apparently deficient in available phosphate. The high amount of lime soluble in hydrochloric acid suggests that superphosphate would effect a considerable increase in the productiveness of this settlement.

P 341, from Waiomoko, Gisborne, is a pumiceous sandy soil of a dark colour, due to the organic matter present. It is well supplied with plant-food, especially that present in an available form. The lime requirement is high, and liming is therefore recommended, especially for rape and turnip crops, which are found to fail after initial crops have been taken.

Mr. L. D. Foster, Analyst, efficiently carried out the chemical and Mr. R. E. Grimmett, B.Sc., Analyst, the mechanical work described in this article.

LITTORAL AND OTHER SOILS.—CHEMICAL ANALYSES.

(Results, except *, are percentages on soil dried at 100° C.)

Laboratory No.	Locality.	Volatile Matter.			Total Nitrogen.	1-per-cent. Citric-acid Extract, Dyer's Method, Hall's Modification ("Available" Plant-food).				Hydrochloric-acid Extract ("Total" Plant-food).				Lime Requirement (Percentage $CaCO_3$).		Sodium Chloride.
		* On Air-drying.	*At 100° C.	On Ignition.		Lime, CaO.	Magnesia, MgO.	Potash, K_2O.	Phosphoric Acid, P_2O_5.	Lime, CaO.	Magnesia, MgO.	Potash, K_2O.	Phosphoric Acid, P_2O_5.	On Air-dried Soil.	On Soil dried at 100° C.	
O 809	Little Shoal Bay Reserve, Auckland ..	..	7·06	12·69	0·325	0·135	0·116	0·114	0·007	0·52	0·50	0·30	0·06	0·33	0·36	0·30
O 810	" " " ..	..	4·64	4·46	0·115	0·066	0·082	0·148	0·009	0·25	0·42	0·33	0·05	0·24	0·25	0·46
O 816	Wharenui, Marlborough	..	1·74	4·50	0·088	0·237	0·039	0·035	0·040	1·17	0·80	0·25	0·10	0·02	0·02	..
O 817	" " "	..	1·66	6·32	0·168	0·195	0·049	0·022	0·027	1·05	0·86	0·31	0·09	0·05	0·05	..
M 636	Park Island, Napier	..	5·76	11·60	0·473	0·397	0·199	0·214	0·060	1·28	1·37	0·74	0·15	0·04	0·04	2·81
M 651	Te Arai Settlement, Gisborne ..	..	7·80	7·86	0·495	0 216	0·099	0·063	0·032	0·84	1·32	0·71	0·13	−0·05	−0·05	0·08
M 652	" " " ..	..	7·86	3·26	0·097	1·774	0·184	0·081	0·014	2·43	1·46	0·54	0·09	−0·13	−0·13	0·26
R 58	Parihaka Block, New Plymouth ..	..	7·32	22·52	0·822	0·212	0·076	0·027	0·009	2·01	0·80	0·16	0·14	..	..	..
R 60	" " " ..	..	7·80	18·14	0·547	0·151	0·039	0·023	0·002	1·39	0·64	0·20	0·05	..	..	..
P 1245	Huapai, Auckland	..	1·94	6·05	0·117	0·045	0·011	0·012	Trace	0·13	0·25	0·22	Trace	..	..	..
P 1246	" " "	..	7·70	13·32	0·191	0·031	0·020	0·014	"	0·17	0·20	0·14	"	..	..	..
P 399	Te Mata Road, Hawke's Bay (subsoil) ..	11·0	3·78	2·28	0·066	0·126	0·052	0·009	"	0·62	0·50	0·35	0·01	0·01	0·01	..
P 400	" " (top soil)	18·0	2·91	6·34	0·225	0·132	0·043	0·020	0·002	0·55	0·39	0·29	0·08	0·21	0·22	..
P 401	" " (subsoil) ..	10·0	3·28	2·87	0·084	0·140	0·058	0·013	Trace	0·57	0·51	0·40	0·01	0·04	0·04	..
P 402	" " (top soil)	17·0	3·75	6·82	0·221	0·150	0·066	0·017	0·002	0·66	0·45	0·30	0·05	0·18	0·19	..
L 973	Ohura River Flats	5·0	14·56	4·45	0·095	0·102	0·033	0·031	0·018	1·05	0·98	0·42	0·06	..	..	..
L 974	Tokirima	4·0	23·36	17·51	0·388	0·173	0·068	0·036	0·007	0·69	0·70	0·41	0·08	..	..	..
P 272	Ruatorea	..	7·93	14·89	0·529	0·167	0·059	0·024	0·014	0·43	0·57	0·38	0·21	0·35	0·38	..
P 273	"	..	3·82	13·34	0·445	0·094	0·034	0·041	0·018	0·53	0·61	0·42	0·10	0·45	0·47	..
P 341	Waiomoko, Gisborne	..	4·71	14·62	0·519	0·130	0·046	0·035	0·022	0·25	0·22	0·12	0·09	..	..	..
M 362	Claudelands, Hamilton	..	18·44	14·16	0·450	0·069	0·025	0·018	0·003	0·21	0·20	0·07	0·07	0·45	0·55	..
O 759	Bull's	..	8·62	8·43	0·303	0·400	0·057	0·049	0·001	1·46	1·04	0·56	0·03	0·05	0·05	..
O 714	Palmerston North	16·7	4·73	11·40	0·344	0·275	0·068	0·034	0·036	1·06	0·80	0·55	0·13	0·17	0·18	..
O 715	"	16·8	3·87	7·63	0·271	0·116	0·053	0·026	0·019	0·78	0·57	0·50	0·08	0·15	0·16	..
O 716	"	15·5	3·00	7·80	0·254	0·130	0·074	0·028	0·016	0·84	0·76	0·52	0·08	0·17	0·18	..

LITTORAL AND OTHER SOILS.—MECHANICAL ANALYSES.
(Results are percentages on air-dried soil.)

Lab. No.	Description of Soil. (Classification of United States Department of Agriculture modified.)	Analysis of "Fine Earth" passing 2 mm. Sieve.							Stones and Gravel.
		Fine Gravel.	Coarse Sand.	Fine Sand.	Silt.	Fine Silt.	Clay.	Moisture and Loss on Ignition.	
O 809	Fine sandy loam	Nil	5·6	28·7	15·4	20·6	13·0	16·8	Nil.
O 810	Sandy loam	,,	13·8	47·6	8·9	12·4	9·0	8·6	,,
O 816	Coarse sandy soil ..	24·4	61·9	3·0	2·2	1·9	0·5	5·8	,,
O 817	,, ..	35·4	40·2	5·6	5·7	4·7	1·7	7·4	,,
M 636	Fine sandy loam ..	Nil	3·7	23·9	24·6	16·9	10·9	17·3	,,
M 651	Clay loam	,,	1·0	2·1	22·8	27·1	30·3	17·1	,,
M 652	Fine sandy loam ..	,,	0·7	27·6	40·2	12·1	10·1	7·9	,,
R 58	Medium sandy silt ..	3·4	24·9	14·6	14·6	10·2	2·8	29·8	,,
R 60	Fine sandy silt ..	1·2	14·2	22·3	24·3	9·0	1·2	25·9	,,
P1245-6	Not analysed.								
P 399	Sandy loam	0·4	20·0	40·5	11·6	10·0	11·1	6·0	7·0
P 400	Fine sandy silt ..	0·2	11·4	35·5	23·2	15·2	5·6	9·1	Trace.
P 401	Fine sandy loam ..	0·1	7·5	36·7	18·9	14·2	15·8	6·1	1·0
P 402	,, ..	0·1	9·3	26·4	23·7	19·8	10·0	10·3	1·0
P 973	Fine sandy silt ..	Nil	2·8	44·9	24·7	7·1	4·1	17·1	Nil.
P 974	Fine sandy loam ..	,,	2·7	10·3	26·0	16·7	8·7	35·1	,,
P 272	Fine sandy silt ..	0·2	8·5	25·7	25·8	15·8	2·6	21·6	34·4
P 273	,, ..	0·1	10·4	24·9	28·6	15·9	4·1	16·6	2·6
P 341	Not analysed.								
M 362	Silt loam	0·2	7·1	18·6	34·1	8·2	4·0	27·2	Nil.
O 759	Fine sandy silt ..	Nil	0·2	26·8	37·3	12·4	6·6	16·3	,,
O 714	Fine sandy loam ..	,,	1·7	31·7	28·9	10·5	11·8	15·4	Trace.
O 715	,, ..	0·1	5·0	33·8	29·8	12·5	8·4	11·3	,,
O 716	,, ..	Nil	1·9	31·3	34·3	11·5	11·0	10·6	,,

PUWERA AND ALBANY EXPERIMENTAL AREAS.

NOTES ON OPERATIONS, SEASON 1922–23.

T. H. PATTERSON, H.D.A., Instructor in Agriculture, Auckland.

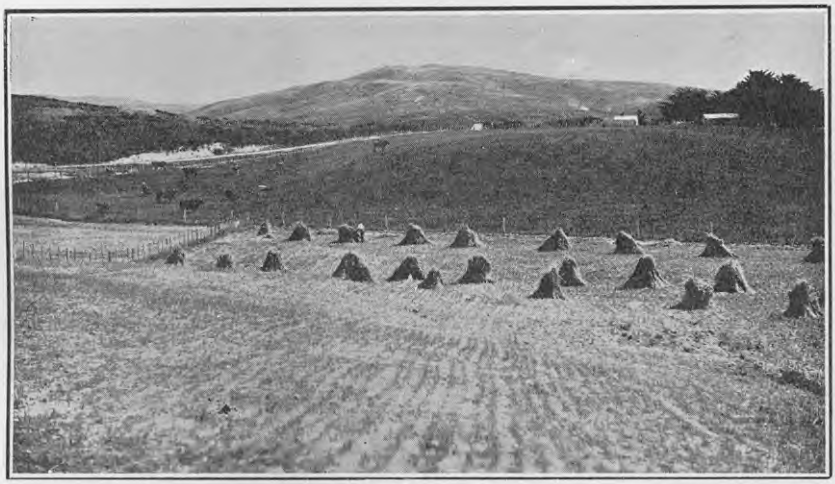
THE issues of the *Journal* for May, 1921, and December, 1922, contained accounts of the operations at the Puwera and Albany gum-land experimental areas. For details of cultivation and cropping those interested should refer to these reports. It may be repeated that Puwera is situated some eight miles from Whangarei, while Albany is near Auckland. The same general aim has been pursued on both areas—namely, the investigation of the most suitable grass-pasture for the gum lands represented, and the selection and growing of fodder crops to keep up adequate supplies of feed chiefly for autumn and winter, when pastures are not producing sufficient feed for the stock.

PASTURES.

The area under pasture at Puwera has been increased during the year. Field 3A (4 acres) was put down in permanent pasture last autumn. Half of the field, nearest the main road, was sown on 17th April with the following mixture: Perennial rye-grass (Poverty Bay), 8 lb.; Italian rye-grass, 3 lb.; cocksfoot, 12 lb.; crested dogstail, 2 lb.; paspalum, 6 lb.; white clover, 2 lb.; cow-grass (colonial), 3 lb.; chicory, ½ lb.: total, 36½ lb. per acre. The remainder of the field was sown on 30th April with the same mixture, except that the cocksfoot was cut out and the paspalum increased to 8 lb.

The first-mentioned mixture is now considered, from our experience at Puwera, to be one which will produce a good permanent pasture on this class of land. The fertilizer used, at the rate of 3 cwt. per acre, was a mixture of equal quantities of superphosphate and basic slag. The take was very fair, but the continued wet weather all through the winter and spring has had a bad effect on this area, much of which is flat and low-lying.

An additional 5 acres in tall manuka in Field 7 was cut, burnt, and surface-sown on 16th May with the following mixture: Perennial rye-grass (Poverty Bay), 12 lb.; Italian rye-grass, 4 lb.; paspalum, 5 lb.; crested dogstail, 2 lb.; cow-grass (colonial), 3 lb.; white clover, 2 lb.; Lotus major, 1 lb.: total, 29 lb. per acre. The grass has taken well, and should provide good grazing until the manuka-stumps have rotted sufficiently for the field to be ploughed.



VIEW AT PUWERA EXPERIMENTAL AREA.

Field 3A (with oats in stook), looking across to Field 3B. Photo taken last summer, since when Field 3A has been laid down in pasture.

In Field 7 the winding creek, which drains the lower portions of Puwera, has been straightened, and the water from heavy rains is now carried away much more rapidly. Further, the under-drainage of the soil on the low-lying land of Field 7 has been materially improved by the straightening of the creek. The result has been a decided general improvement of the drainage of the whole farm, but in particular the lower portions of it.

There is now nearly 50 acres at the Puwera area in grass-pasture. It is on the various grass-fields (all of which have been sown with different seed-mixtures) that observations are being made to ascertain whether or not a profitable pasture can be maintained. A further period of some six or seven years is necessary to secure conclusive results. Beef-cattle and horses are now used to graze the areas under

trial. From an economic point of view it is conceded that it would be better to test the pastures and crops grown with a small dairy herd, as dairying on small areas may be more profitable than grazing. When more of the area is in pasture the test could be made by dairying.

The pasture on Field 3B (now in its third year) is holding very well. It consists mainly of rye-grasses, red and white clover, Lotus major, and a sprinkling of paspalum and brown-top. It has had an average annual top-dressing of basic slag at 2½ cwt. per acre. It is the best sole of grass on Puwera, and it promises to hold out, as it has shown no signs of weakening, but, on the other hand, is improving under stocking. If it can be maintained for a further six or seven years with a continuance of the rational treatment it has received up till the present, then the successful grassing of these lands will have been economically solved.

BULLOCKS GRAZING IN FIELD 3B AT PUWERA.

This photo was taken in December, 1922, and shows a fine growth of clovers in the pasture.

On Fields 5 and 6 the mixtures laid down have been carefully examined regularly. An attempt has been made to secure a paspalum sward on Field 6. The paspalum is slowly taking charge and promises to make quite a good pasture, associated as it is with white clover and Lotus major, both of which have increased in vigour and quantity, mainly on account of their response to the top-dressings of slag, which have been applied each year at the rate of 3 cwt. per acre. On the upper portion of Field 6 (3 acres) superphosphate at the rate of 3 cwt. per acre, following on a liming of ½ ton to the acre, has produced such a satisfactory growth that the area will be cut this season for hay. This portion of the field is on the ridge, the poorest area of soil on the farm.

Kikuyu-grass (Pennisetum clandestinum).

An area of 1 acre was laid down in the spring of last year with kikuyu-grass, white clover, and Lotus major. Roots of kikuyu were planted, as the grass does not seed. The roots were spaced in rows 5 ft. apart and 3 ft. between the plants in the rows. Alongside was an acre plot of paspalum with Lotus major and white clover, and another plot of prairie-grass and red clover. The kikuyu grew vigorously, and with the clover and Lotus major produced a great quantity of feed. Cattle were turned in on the plots, and they fed off the kikuyu before going on to the other plots; they relish the grass. These kikuyu and paspalum plots were top-dressed last autumn with equal parts of slag and super mixed, and when the kikuyu was inspected on 29th September it was commencing to shoot.

At Albany the area on which kikuyu and Lotus major are growing together produced excellent herbage, while plots near-by where kikuyu and white clover were growing, and kikuyu alone, were not satisfactory. The growth was poor and the turf appeared to be sod-bound. The results on these plots illustrated most strikingly the advantage of growing kikuyu with Lotus major in addition to clovers.

As seed of kikuyu-grass cannot be procured its economic value in New Zealand farming must be thereby limited. Areas have to be planted with roots. The roots, of course, could be planted with the plough as in the case of young mangold-plants. Clover and Lotus major seed can be sown broadcast on the area after the kikuyu is planted.

MANURES FOR PASTURES.

Results show that phosphatic manures are essential on these soils. Their application is followed by an increase in clovers and other legumes, while the grasses also directly benefit. Stock at Puwera, as elsewhere, show a preference for pasture on which phosphates have been applied. Basic slag, basic slag with superphosphate mixed, and superphosphate with lime all give satisfactory results. Ground raw rock phosphate, though slower in producing growth than any of these fertilizers, has nevertheless promoted clovers and improved the pasture. From trials now in progress at Puwera the increase in the weight of hay produced on permanent pasture with a top-dressing of 3 cwt. per acre of ground raw rock phosphate has been approximately 30 per cent. That was very satisfactory for the first year. The pasture had been established five years and had received no fertilizer since being seeded. Ground raw rock phosphate, mixed with superphosphate, using equal weights of each, has, from eye inspections, given much better results so far than raw rock phosphate alone. The weights of hay will be taken at the end of this year when these plots are cut.

Where the areas have been top-dressed in Field 6, the pasture of plots 6 and 8, dressed with Nauru ground raw rock phosphate and lime, still remains poor, whereas plot 7, which lay between the two last-mentioned plots, and which received pure ground rock phosphate only, has a good mixture of clovers and grasses. This is the third season that this trial of ground raw rock phosphate with and without lime has been continued.

It has been well demonstrated that a pasture at Puwera cannot be satisfactorily maintained without regular top-dressings with some kind of phosphatic manure.

Nitrogenous Fertilizers and Green-manuring.

A very striking result has been secured with an application of 1½ cwt. per acre of nitrate of soda on a new pasture of Wimmera rye-grass (*Lolium subulatum*) and red clover laid down last autumn. Early in September the grass was looking fairly vigorous, but was a pale yellowish-green colour. It was evident that it lacked available nitrogen. A month after the application of nitrate of soda was made the writer inspected the area. The plot which had received the manure stood out clearly from the rest. The colour was a dark green and the grass was more vigorous, while it was 2 in. or 3 in. taller than on the areas adjoining. Experiments at Albany with sulphate of ammonia as a top-dressing on pasture in spring gave similar results. These gum-land soils lack nitrogen, and are usually cold and wet in the winter; they therefore respond to dressings of nitrogen in spring.

CROP OF BLUE LUPINS IN FIELD 2, PUWERA.

Collateral with this evidence may be cited the good results which are seen after a legume has been grown previously to cropping, or where organic matter is added by feeding off a crop or ploughing in a green crop. Orchardists on clay gum lands will be well advised to consider green manuring, especially as blue lupins, white mustard, and suchlike can be so successfully grown. The blue lupin crop at Puwera this season reached 4 ft. high, and was in every way a success. White lupins have not done well at Puwera. Grass-pea, serradella, and other legumes do well on these gum lands.

SUPPLEMENTARY FORAGE CROPS.

The area in grass at Puwera which was grazed or cut for hay during the season totalled 42 acres. On this were run sixteen head of cattle, four horses, and four sheep. The stock were wintered on the area and came through in good condition. Two acres were cut for

meadow hay, and 3 acres of Algerian oats for chaff; 3 acres sown in roots, mainly swedes and mangolds, were harvested. The oat crop yielded approximately 6 tons of excellent sheaves. The grain filled well, and the general quality of the material was good. The root crops, particularly the swedes and mangolds, suffered through a dry spell which commenced in the middle of January and continued till the middle of April. However, with the roots grown, together with the meadow hay and oaten chaff saved, the stock were adequately fed during the late winter, which proved long, cold, and wet.

Mangolds.

It has been shown at Puwera that an addition of 2 cwt. per acre of agricultural salt produced 9 per cent. increase in the yield of mangolds; an application of 4 cwt. per acre increased the yield 26 per cent. Nitrate of soda, at the rate of 1½ cwt. per acre, gave no economical gain two seasons ago. Last season, however, the results favoured the addition of nitrate of soda. In addition to the general dressing of mixed fertilizer, consisting of phosphates and potash applied uniformly to the ten mangold plots, five were top-dressed at the rate of 1½ cwt. per acre with nitrate of soda, with the following results:—

Without nitrate of soda (average of five plots): Yield 29·35 tons per acre. With nitrate of soda (average of five plots): Yield 35·07 tons per acre; gain 5·72 tons per acre, or 19·48 per cent.

It is intended to repeat these trials next season, when further data will be obtainable. The mangolds were sold at £1 7s. per ton; therefore the gain per acre of 5·7 tons represented a monetary return of £7 13s. 10d. The cost of the manure per acre was £1 7s. 6d., leaving a gain of £6 6s. 4d. per acre. This does not make allowance for labour and other costs necessarily associated with the production of the crop; but it is quite apparent that the use of nitrate of soda was decidedly profitable. Carrots and other root crops have also responded well to a dressing of nitrate of soda.

NURSERY NOTES.

A new grass known as carpet-grass (*Paspalum cupressum*), which is native to the southern United States of America, was sown in the spring of last year. In a plot side by side with *Paspalum dilatatum* the carpet-grass has so far not compared as well. Soya beans were tried, but the results were only fair. Compared with lupins, grass-pea, and other legumes referred to earlier they have not produced the same quantity of green material for ploughing-in. Kudzu has again failed at Puwera. Seed of white-fleshed swede, supplied by Mr. Langford, of Papakura, was sown in December, 1922. The crop produced was decidedly better than those of two other varieties, Masterpiece and Webb's Empire, also grown in the nursery. It withstood the dry spell which was experienced from late January until the middle of April.

Cotton was tried in the nursery at Albany. The seed was supplied by the Queensland Department of Agriculture, the variety being Durango Upland. The seed germinated well, and the plants grew to an average height of 6 in. to 9 in., while odd plants reached 3 ft. high and flowered. The flowers, however, were attacked by caterpillars,

and the damage caused by them prevented the flowers coming to maturity. Most of the crop withered and died off. The soil, which is a clay loam with a fair amount of humus present, was in good condition when the seed was sown, on 2nd November, 1922. Intercultivation was carried our regularly, keeping the surface mulched and clear of weeds. Maize, sorghum, millet, and elephant-grass—all subtropical plants—did well. The season was one characterized by frequent showers all through the summer and autumn, and the rainfall was above the average. This cotton crop may be considered a failure, but it is intended to try it again this season.

Pasture experiments in small plots at Albany have given some interesting results. This work, carried out by Mr. A. G. Elliott, will form the subject of some special notes at a later date.

WORKING WITH THE SPRING-TOOTHED CULTIVATOR AT PUWERA.

This implement is used freely for surface cultivation on the area. It leaves the surface somewhat cloddy, which tends to prevent a crust forming.

ROCK PHOSPHATE AND SULPHUR.

It is claimed that sulphur used in combination with ground raw rock phosphate helps to make the phosphate more readily available to crops. Plots were set out last season at Albany, and grass-pea used as the indicator crop. Legumes have a higher power of using phosphoric acid in the raw rock form than other crops. The results obtained showed that on one plot the dressing of sulphur and rock phosphate produced a decided increase in yield, measured as weights of green-stuff produced. On another area the control was equal to the sulphur-and-rock-phosphate plot. The results were sufficiently encouraging, however, for repeating the trial during the current season.

INSTRUCTIONAL WORK.

The people of the respective districts show increasing interest each year in the work on these experimental areas, this being particularly manifest in connection with Puwera. In July last the writer, at the joint request of the Whangarei Chamber of Commerce and the sub-provincial executive of the Farmers' Union, gave a lantern lecture on "Gum Lands" at the Whangarei Town Hall. There was a large attendance, including farmers who had travelled a distance of thirty miles. The boys taking agriculture at the local high school were also present. Next day the farmers and members of the Chamber of Commerce made a visit of inspection to Puwera and were conducted over the area. The day was very wet, but the attendance numbered fifty persons. Those boys of the high school who take agriculture as a subject made their annual visit to Puwera on 27th September last. Sixty-five pupils with the master and the Chairman of the High School Board and others were shown over the area and the experiments explained to them. The instructional side of Puwera is steadily growing in popularity. It is the only Government experimental area in the far North, and its general help to the farming community and others, apart from the matter of the gum-land investigation, is much valued.

LOCAL RAINFALL RECORDS.

The following tables give the rainfall at the two areas during the period covered by these notes—October, 1922, to September, 1923:—

Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Total.
PUWERA.												
Rainfall (Inches) and Number of Wet Days.												
4·10	2·65	4·89	3·24	0·92	1·95	6·61	7·78	8·04	6·50	3·19	3·05	52·92
20	12	10	4	4	7	11	21	24	19	13	12	157
ALBANY.												
Rainfall (Inches) and Number of Wet Days.												
4·04	3·66	5·99	6·44	3·85	1·76	5·73	4·12	8·95	2·81	3·19	4·00	54·54
19	17	11	10	12	8	10	26	29	19	21	22	204

Mean Annual Rainfall: Puwera, 53·9 in.; Albany, 43·8 in.

Spent Oxide from Gasworks.—This material, which can often be had for the cartage, is rich in sulphur and also in nitrogenous compounds, which when allowed to oxidize on the surface of the pasture are transferred into useful nitrogenous fertilizers. The sulphur is also of value on some soils.

Seed-testing.—During the official year 1922–23 9,056 seed-samples were tested at the Agriculture Department's seed-testing station for germination, and some 1,500 were analysed for purity. Of this number only eighty were forwarded by farmers, which may be taken as showing an increasing confidence in the ability and desire of seed-merchants generally to supply good seed. This position has arisen, firstly, from the demand by the farmer for high-class seed, and, secondly, from the efforts of the merchants to cater to that demand, and their widely adopted custom of selling on the Department's certificate.

ELECTRICITY IN DAIRY FACTORIES.*

C. VOWELL, Assoc.A.I.E.E., Grad.I.E.E., London, in the *New Zealand Journal of Science and Technology.*

THE value of electricity to mankind lies in the three main effects it is capable of producing—namely, (1) magnetic effect, (2) heating effect, (3) chemical effect.

The first, which is always present when any electric current flows, is the most important of all. Upon it depends the working of all electric bells, telephones, telegraphs, electric motors, and electro-magnetic apparatus. Electric motors alone now supply many millions of horse-power. The magnetic effect produced by an electric current is directly proportional to the current producing it—or, in other words, if the current is doubled the magnetic effect is also doubled.

The heating effect, which is second in importance, is also always present whenever an electric current flows, and is also directly proportional to the current producing it. Upon the heating effect depends all electric lighting, heating, cooking, &c., as well as the operation of the electric furnaces used for making calcium carbide, carborundum, and nitrogenous compounds for use in manures and explosives, &c.

Chemical effect: Under suitable conditions an electric current will also produce a chemical effect, which, like the others, is also directly proportional in amount to the current flowing.

In dairy factories the chief uses to which electricity may be applied are the driving of the machinery by electric motors, and the heating of water and milk. Before discussing the various methods of driving dairy-factory machinery by electricity it will be helpful to define the main electrical terms.

The electrical unit of pressure, which is analogous to pounds of pressure per square inch in steam, is the volt. One volt of electrical pressure is a little less than the pressure that would be obtainable from a single-cell battery such as is used for ringing electric bells. The unit of current is the ampere, and is analogous to the volume of steam passing through a steam-pipe. The power supplied to a steam-engine depends upon the pressure of steam in the steam-pipe and the volume of steam passing through the steam-pipe. Exactly the same is the case with electricity: the power supplied to an electric motor depends upon the current and the pressure of voltage at which that current is supplied.

For power, the unit is the volt-ampere or watt, the power in watts being the product of volts and amperes. As the volt-ampere or watt is a very small amount of electric power, a larger unit is used, known as the kilowatt, which is 1,000 watts. It will be interesting at this stage to note that 746 watts, or about three-quarters of a kilowatt, are equal to 1 horse-power.

With steam working, the amount of energy supplied by a steam-engine is measured in horse-power-hours—or, in other words, the

* Paper read before the Southland Dairy-factory Managers' Association, at Wyndham, 1st March, 1923.

horse-power developed by the engine multiplied by the number of hours it has been working. Similarly, with electric power the amount of energy supplied is measured in kilowatt-hours, or the number of kilowatts being supplied multiplied by the number of hours' duration of the supply. The kilowatt-hour is commonly known as the Board of Trade unit, and is spoken of merely as the unit of electricity.

The Southland Electric-power Board rates for electric energy, per unit per month, are as follows: For the first 21 units, 7d.; for the second 21 units, 4d.; for the following 42 units, 2½d.; for all over 84 units, 1½d.

It will be seen from this sliding scale of charges that the more electric energy consumed the lower will be the average price per unit. Take, for example, a consumer using 100 units per month: his bill will come to £1 10s., or an average of 3·6d. per unit. If he consumes 200 units per month his bill will be £2 2s. 6d., or an average of 2·55d. per unit; and if he consumes 300 units per month his bill will come to £2 15s., or an average of 2·2d. per unit. It is therefore apparent that the greater the use made of electricity the lower will be the cost per unit or per horse-power-hour.

In tests on the driving of separators by electricity and steam which were carried out recently the following methods were employed. The results are valuable, and they go to prove that dairy factories in Southland cannot afford to use steam where electricity is available at the above rates.

In the steam test half a ton of coal was carefully weighed out and reserved for use during the separating-period. The fire was worked into good condition, and 100 lb. of steam raised on the boiler. This head of steam was maintained approximately constant both before and during the separating-period. As soon as the separators were started the boiler was fired from the half-ton of coal specially reserved. At the end of the separating it was calculated that nearly a quarter of a ton of coal remained. The cost of the coal (Kaitangata) delivered into the bunker is £1 11s. per ton, and the quantity of whey separated was 3,000 gallons. Thus the coal-cost of separating 1,000 gallons of whey by steam-power works out at slightly over 2s. 7d., or 3·1d. per 100 gallons. It must be noted that the fire and boiler were left at the end of the test in the same condition as at the beginning—that is, with a full head of steam. The quantity of coal burnt in raising steam has not been added in; if it were, the cost of separating by steam-power would be still higher.

In the electric test the A.V. 6 Alfa-Laval separator was driven by an electric motor by means of Vowell's constant-tension drive. A house-service type of kilowatt-hour meter was installed to measure the quantity of electric energy consumed. The separator was run up to speed for a consumption of 0·88 unit. The speeding-up occupied 28½ minutes, the constant-tension apparatus being set for a slow acceleration.

Separating was commenced and continued for one hour, during which time approximately 600 gallons of whey were separated for a consumption of 2·59 units, or a total consumption from the commencement of speeding-up of 3·47 units. Had separating been continued for a longer period the proportion of the energy consumed in speeding-up

to that used in separating would have been less. If we neglect the energy consumed in speeding-up, the consumption of electricity per 100 gallons of whey separated works out at 0·431 unit, or, including the energy consumed in speeding-up, 0·578 unit.

In a second test 200 gallons of whey were pumped into the separator-vat, and it was found that the time occupied in separating this quantity was 18 minutes, and the consumption of electricity 0·72 unit, or 0·36 unit per 100 gallons. This does not include energy used in speeding-up.

In a third test two separators were driven by steam and one by electricity. It is assumed that the one driven electrically separated one-third of the day's total quantity of whey, which was 2,850 gallons. The total consumption of electricity, including speeding-up, was 5·08 units, or 0·53 unit per 100 gallons of whey separated. From the foregoing test the average consumption of electricity for 100 gallons of whey separated, including speeding-up, works out at 0·554 unit. Taking the last season's whey at 722,188 gallons, the consumption of electricity for separating during the nine and a half months that the factory was open would have been 4,000 units, which would have cost £33 15s. The consumption of coal chargeable to separating for that period was not less than 60·18 tons, costing £93 5s. 6d. The saving in favour of electricity is thus £59 10s. 6d., or 63·8 per cent.

ADDENDA.

On 30th May, towards the close of the season, when the supply of milk had reduced sufficiently to allow all the whey to be skimmed by one separator, the following results were obtained in a steam test using Mataura lignite (which is delivered into the bunker for 14s. 9d. per ton) for fuel.

Whey separated, 793 gallons; fuel consumed, 3½ cwt.; cost, 2s. 7d. Cost per 100 gallons of whey separated, 3·9d.

In an electric test made on 2nd June, when all the whey was skimmed by the same single separator but driven by electricity, the following results were obtained: Whey separated, 922 gallons; electricity consumed, 4·38 units; cost (estimated on probable season's consumption), 8·88d. Consumption per 100 gallons of whey separated, 0·475 unit. Estimated cost per 100 gallons of whey separated, 1d.

It will be seen that the consumption of electricity in this test is 0·079 unit per 100 gallons of whey separated less than in previous tests. This is probably due to better adjustment of the driving-apparatus. It will also be seen that the cost by steam was 0·8d. higher per 100 gallons of whey separated than in the previous test. This is due to the inherent inefficiency of collective driving, which becomes more apparent when a factory is working at part capacity. In this case only one out of three separators was in operation. The higher cost also suggests that, although the fuel being used was less than half the price of that used in the earlier test, the increased amount required renders it less economical.

It must be remembered that this is the saving in the fuel bill alone if only the separators were driven electrically. If the rest of the machinery were driven electrically the percentage of saving would

be even greater, owing to the gradually reducing price per unit charged for electricity. Other economies would be effected, such as reduced maintenance of boiler and engine, reduced renewals of belts, reduced consumption of oil, saving of labour in boiler and engine attendance, &c. The very considerable economy effected by the use of electricity is due in no small measure to the efficiency of the constant-tension drive, which has the unique function of maintaining a perfectly uniform turning effort on the pulley of the separator. Even the slight variations which would be produced by sticky or greasy patches on the belt are compensated for.

This brings out an important point in the electrification of dairy factories. Had a large motor been installed in the engine-room little or no saving would have been effected. A little consideration will make this clear. The electricity used at Wyndham is generated in Invercargill by steam-power and then transmitted a distance of twenty-seven miles. If the steam-engine is merely replaced by an electric motor of equal power its operation at Wyndham would necessitate the consumption of an amount of coal at Invercargill power-station nearly equal to that required by the present steam-engine, the only economy it would be possible to effect being due to the higher efficiency of the steam plant at Invercargill power-station as compared with the efficiency of the small steam-engine and boiler at the factory.

It is only by careful and scientific installation of motors of the correct power and specially designed for the particular machine they are to drive that the maximum economy may be obtained. Collective driving by electricity—that is, driving the whole factory by one large motor—is comparatively inefficient, although it still has to be used in the case of steam-power. Individual drive—that is, one motor for each machine or group drive, in which case two or more similar machines are grouped together and driven by one motor—is the more efficient method of applying electric-motor drive. Each method has its advantages and disadvantages, and these have to be carefully considered with relation to the cost of installation of each method.

Individual drive has the advantage of allowing of direct coupling to the driven machine, or where belting is necessary it is reduced to a minimum: this reduces maintenance and running costs in belt-renewals and oil. A further advantage is that a motor of the exact power required to drive the machine may be used. It also enables the motor to operate at higher efficiency, for the reason that electric motors, in common with other prime movers, operate most efficiently at or near their full load. Another advantage of individual drive is that the driven machines, together with their motors, may be made self-contained units. This is of great advantage where there is a possibility of the plant having to be moved or reduced in size, or where part only of the plant is required at the beginning or towards the end of the season.

One disadvantage of individual drive is that the capital cost of several small motors is greater than that of a few of larger size, giving the same total horse-power. Another disadvantage becomes of importance when the machines to be driven require only little power. This is due to the fact that small electric motors have an inherent

lower efficiency than large ones. It is on account of these two disadvantages that the group method is used. To obtain the maximum economy with group drive, only similar machines, or machines with similar operating characteristics, should be grouped together. Of these machines only those which start up and shut down at the same time should be included in one group.

The chief advantage of group drive is that fewer motors are required, which reduces capital cost; also, the motors used are larger, and therefore more efficient. Machines which occupy a large floor-space relative to the power required by them should not be grouped, as the loss of power in belts and shafting more than offsets the increased efficiency of the motor; also, the capital cost of the belts, shafting, plummer-blocks, &c., more than offsets the reduced price per horse-power of the larger-sized motors.

Electricity for heating purposes in dairy factories does not show up to the same advantage as for power. In fact, in Southland, with its abundance of lignite easily mined, electricity for heating purposes on a large scale cannot compete. The reason is that £1 worth of coal contains vastly more heat-units than £1 worth of electricity. Small-size electrical-heating apparatus, such as electric kettles, are now made with the very high efficiency of 80 to 90 per cent., which enables electricity to compete favourably with such inefficient appliances as a cast-iron kettle heated on an ordinary fire. When, however, the more efficient system of heating by high-pressure steam is used, generated by an efficient steam boiler, the cost of heating by steam is considerably lower than by electricity. It must be remembered, however, that for heating small quantities of liquid electricity is probably the next cheapest source of energy, and also possesses the great advantage of being ready for use at any time of day or night, and may be automatically regulated.

At the present time the tendency in pasteurizing is to increase the speed with which the temperature of the milk is raised and lowered. Electricity would be capable of giving a higher temperature surface than steam, and therefore could be used more efficiently than steam in a flash pasteurizer. Another use of electricity in pasteurizing or sterilizing is at present being experimented with. It consists of exposing the milk to the action of the ultra-violet rays emitted by the mercury vapour electric lamps. These rays are chemically active, and produce an effect similar to sunburn if allowed to impinge upon the skin. Sunlight is one of the best sterilizing agents, and this artificial sunlight has a similar effect.

In conclusion, I suggest that the great advantages which may be derived by using electricity to operate dairy factories behoves all dairy companies within the electrically reticulated area to give earnest consideration to the electrification of their factories. There are thus great possibilities of future development in the application of electricity to dairying.

Registration of Nurseries.—In the year 1922-23 560 nurseries were registered and inspected by the Department, and certificates issued, an increase of thirty-five as compared with the previous year; £560 was collected in registration fees.

CHAMPION JERSEY COW OF NEW ZEALAND.

PRETTY'S FLIRT PRODUCES 1,010 LB. OF BUTTERFAT.

W. M. SINGLETON, Director of Dairy Division.

AT the farm of Mr. W. H. Miers, Rukuhia, near Hamilton, the Jersey cow Pretty's Flirt has established a Dominion record for that breed in both milk and butterfat by producing 1,010·49 lb. fat from 16,684·1 lb. milk in 365 days. Pretty's Flirt calved for commencement of test on 31st October, 1922, and was then 6 years 353 days of age. Her previous calving was eleven months prior to that date, and she is expected to calve again on 6th December, which will be 12 months 36 days after her calving for start of test. The previous New Zealand champion of the breed was Sultan's Daisy, who, during the 1918–19 season, made the very fine record of 13,502·7 lb. milk and 968·22 lb. butterfat, which, however, Pretty's Flirt has now exceeded by 3,181·4 lb. milk and 42·27 lb. fat.

The production month by month of the new champion is shown in the following table :—

Month.	Days.	Milk.	Test.	Butterfat.
		lb.	Per Cent.	lb.
November, 1922 ..	30	2,007·4	4·28	85·91
December	31	2,085·5	4·89	101·98
January, 1923	31	1,815·8	5·24	95·14
February	28	1,544·9	6·79	104·89
March	31	1,526·5	6·35	96·93
April	30	1,265·9	7·46	94·43
May	31	1,154·4	6·40	73·88
June	30	1,033·0	6·86	70·86
July	31	1,117·3	6·22	69·49
August	31	1,070·8	6·78	72·60
September	30	1,008·8	6·51	65·67
October	31	1,053·8	7·47	78·71
Totals ..	365	16,684·1	6·06*	1,010·49

* On total production.

It will be seen that Pretty's Flirt's highest monthly production was for February, when her average daily butterfat was 3·71 lb.—a New Zealand record for the Jersey breed. In fairness to Pretty's Flirt it should be mentioned that she suffered considerably from foot-rot during her testing-period, which must to a certain extent have unfavourably influenced her record.

Pretty's Flirt was born on 13th November, 1915, at the farm of Mr. John Hale, Holly Oak, New Plymouth. Her sire is Exile of Oaklands, who already has ten C.O.R. daughters to his credit. Exile of Oaklands is by the imported Island-bred bull Campanile's Sultan, the sire of Sultan's Daisy and nine other daughters with certificates. The dam of Pretty's Flirt is Jersey Bank Pretty, bred by Mr. A. Hodgkinson, Takaka, and with a certificate for 611·86 lb. fat. Jersey

Bank Pretty is by Blossom's Prince from Pretty Polly (648·51 lb. fat), who in turn is by the noted sire K.C.B. Blossom's Prince goes back to Magnet's Boy, while Exile of Oaklands, the sire of Pretty's Flirt, traces to New Zealand's Exile. Thus each side of her pedigree traces to now proven strains—on the sire's side to Campanile's Sultan and New Zealand's Exile, on the dam's to Magnet's Boy and K.C.B. It would therefore seem a natural expectation that such strong blood lines must ultimately concentrate in an outstanding individual. Pretty's Flirt is an outstanding animal on type as well as production, her depth of body and udder-development being striking indications of capacity.

We have no details regarding the quantities and varieties of food fed to Pretty's Flirt while under test, but understand she received in addition to pasture nothing beyond hay, roots, green oats, and other usual farm feeds.

We hope to be able to report in next month's *Journal* that Pretty's Flirt has fully qualified for a certificate of record by calving subsequent to test, and in the meantime would extend to Mr. Miers our hearty congratulations upon the possession of a remarkable animal. Her work is also adequate testimony that she has been in the hands of a person who is capable of enabling even an outstanding cow to attain the championship of the Jersey breed in New Zealand.

PASTURE TOP-DRESSING TEST AT MARTON.

In 1921 a small section of 2½ chains square, at Marton Junction, was divided into plots and top-dressed by the Department with several different kinds of fertilizers. The section, consisting of the typical heavy Marton soil, had been down in permanent pasture for a considerable number of years without anything in the way of top-dressing having been done. The result was that the better grasses and clovers had practically disappeared, and had been replaced by fiorin and such weeds as catsear, plantain, &c. The object of top-dressing the section was to ascertain what effect the treatment would have in bringing back the better grasses and clovers which were present to a small extent.

The section was divided into seven plots, and the manures applied carefully by hand. The following were applied—the three first in July and the others in August, 1921: (1) Ephos phosphate, at 4 cwt. per acre; (2) Nauru rock phosphate, at 4 cwt.; (3) Basic slag, at 4 cwt.; (4) Walpole Island phosphate, at 4 cwt.; (5) bone char, at 4 cwt.; (6) carbonate of lime (1 ton) and superphosphate (2 cwt.), each per acre. The seventh plot was left as a control.

All the dressings had a beneficial effect on the pasture to a more or less extent. The first to show effects was the lime-and-super mixture. When compared with the control plot the effect of the top-dressing was very marked. The section was cut for hay on 7th January, 1922. It was intended to take weighings of green material

off the respective plots, but owing to the absence of the writer from the district this was not done.

During the season 1922–23 the effect of the dressings was carefully watched, and it was noticed that the clover content of the pasture improved considerably on all plots with the exception of the control. This area had practically no bottom grasses or clovers, the bottom consisting mostly of catsear, plantain, &c. The section was cut for hay on 19th January, 1923. Prior to this, average areas were selected, and the green material off these carefully weighed. The weights per acre obtained from the respective plots were as follows: (1) Ephos phosphate, 7 tons 4 cwt.; (2) Nauru rock phosphate, 5 tons 2 cwt.; (3) basic slag, 7 tons 11 cwt.; (4) Walpole Island phosphate, 6 tons 15 cwt.; (5) bone char, 5 tons 12 cwt.; (6) lime and super, 5 tons 18 cwt.; (7) control plot, 4 tons 6 cwt.

It will be seen that all the top-dressings gave an increased yield for the second season over the control area, ranging from 18 per cent. to 75 per cent.

—*C. H. Schwass, Fields Division.*

TRIALS WITH BELL'S MERVUE SWEDE.

SOME seed of Bell's Mervue Bronze-top swede was sent to Auckland for trial in November, 1921. This variety is new to New Zealand, and two growers, Messrs. N. J. B. Dougherty and D. J. Bruce, who are dairy-farmers in the Ohura district, co-operated with the Department in carrying out a test. The soil on Mr. Dougherty's farm is a light clay loam, and the area set aside was on hilly land with a northerly aspect. On Mr. Bruce's farm the seed was sown on a heavy alluvial flat. The Ohura district is noted for its root crops, particularly swedes, the two growers mentioned being consistent winners in the root section at the Waikato Winter Show.

The trials were carried out during the past two seasons, and the average yields were as follows: Mr. Bruce's, 37 tons; Mr. Dougherty's, 32 tons per acre. The method of securing the acre yields was to weigh up three squares in different parts of the paddock, each square being an aliquot part of an acre. The squares were selected (in so far as an eye-inspection could be relied upon) to secure an average of the crop in each case. The fertilizer used was a proprietary mixture of the following composition: Insoluble nitrogen, 0·94 per cent.; phosphoric acid (P_2O_5), 16 per cent.; soluble potash (K_2O), 1·09 per cent.

The swedes were compared with three other varieties, including Superlative, and Mr. Dougherty's comment was as follows: "I grew three different kinds of swedes in areas side by side under the same conditions, and the Bell's Mervue, on the average, are equal in quality, though not quite so shapely, as the others." The combined considered opinion of Messrs. Bruce and Dougherty, after two seasons' trials, is that the new variety is not equal in their district, taking all points of view, to Superlative.

—*T. H. Patterson, Instructor in Agriculture, Auckland.*

MILKING-PREMISES FOR TOWN SUPPLY.

A GOOD MODEL.

Live-stock Division.

DURING the past few years the standard of dairies supplying milk for city or town consumption in the Dominion has been steadily raised, largely as the result of inspection and advice by the Department of Agriculture. There is still room, however, for considerable improvement in design and general efficiency among the ordinary run of such premises. With a view to presenting what may be regarded as a

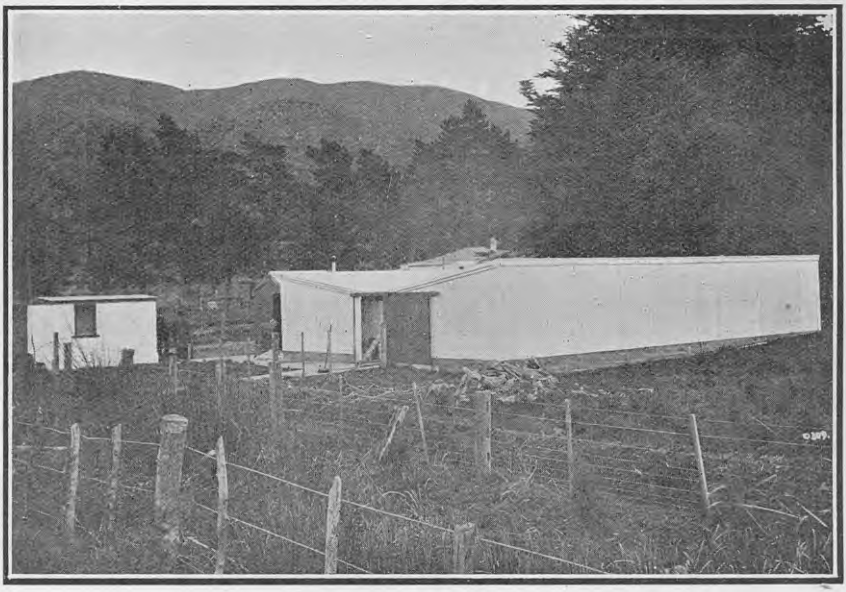


FIG. 1. GENERAL VIEW OF MR. HUSE'S MILKING-PREMISES.

good model for the class of larger suburban dairies a set of photographs has been taken of the milking-premises of Mr. W. Huse, at his dairy farm, "Cottleville," Hayward's, in the Hutt Valley, near Wellington. These are here reproduced, together with some descriptive notes.

Fig. 1 gives an external view of the premises, which lie practically east and west, thus affording protection against the prevailing winds and dust. For further protection a sliding-door is placed at each end. The shed is built entirely of corrugated iron and concrete, with the exception of the bail-heads and the frame, which are plated into a low concrete wall. The white building on the left is the milk-house, and

through this a permanent stream of water flows. This stream passes immediately behind the wire fence, and into it is discharged through an open concrete drain the washings from the shed. The broom seen in the photo is standing on this drain, and the effluent is immediately behind the large post in the first fence. The small shed at the rear end of the milking-shed is for washing-up, and contains a boiler and tubs for this purpose. The holding-yard is among the trees at the west end of the shed, and its floor is also of concrete. Its fence is shown at the right of the photo. A concrete race with a swing-gate leads from the holding-yard to the bails. The stall appearing as separate from the bails is for the accommodation of clean utensils just prior to milking.

Fig. 2 is an interior view of the shed, and gives a good idea of the roominess and comfort obtained. Note the leg-ropes attached to

FIG. 2. INTERIOR VIEW OF THE MILKING-SHED.

rings in the ironwork, and the handles and pulleys immediately above for releasing the head-bails. On the under side of the bail-heads runs a perforated sanitary pipe, to which water is supplied immediately after milking. This sprays the floor, which is then brushed down. The entire shed, with the exception of the concrete base, is painted white. The long roof to the centre walk affords ample protection for the milkers in wet weather. There is a small room on either side between the last bail and the outside wall at the eastern end. One of these rooms is used for holding the milk during milking, and the other by the milkers for washing, &c.

Fig. 3 shows cows in the bails feeding from movable boxes. These are preferable for sanitary reasons to the permanent feeding-box. The

water for washing-down purposes was turned on for two or three minutes before the cows were bailed up.

Fig. 4 was taken to show the race from the holding-yard, the gate to the yard being closed to allow the cows that are milked to pass along another concrete race placed just outside the holding-yard, and so to the open. This race turns to the left and at right angles to the main race. By this system during the wettest of seasons no dirt or mud is brought into the milking-shed. The fall from the rear walls to the centre is only 2 in., and as each cow has ample space to turn there is no falling or slipping in the shed.

Fig. 5 is a view in the milk-house. The milk before going into the cans is put over a cooler, and the cans are then placed in the trough,

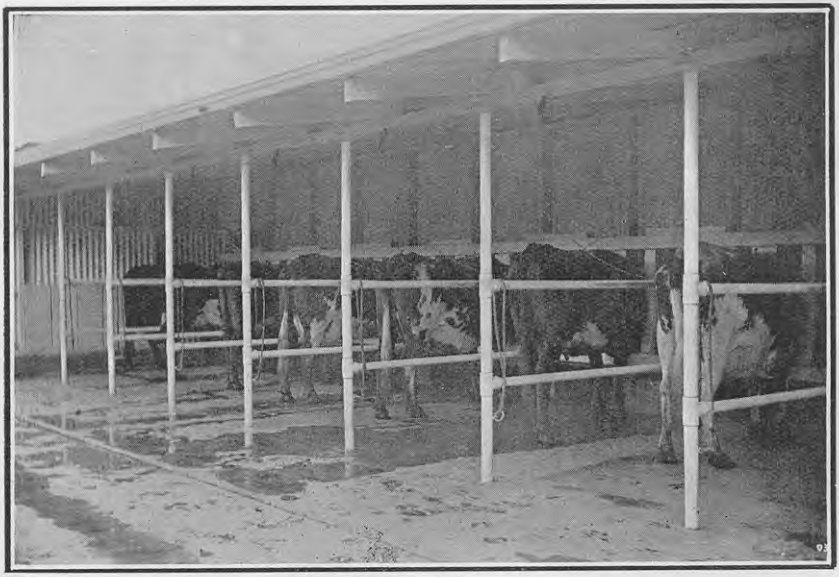


FIG. 3. COWS IN BAILS FEEDING FROM MOVABLE BOXES.

through which water is continuously flowing. The walls are lined with glazed tiles, and ample air is provided through glass louvred windows. A rail is provided for the milking-buckets and metal plunger.

GENERAL.

Following are the principal measurements of the shed: Total length, 50 ft.; total width, 35 ft.; height of rear walls, 9 ft. inside to floor; height of roof from floor at lowest elevation, 7 ft.; head-space, 2 ft. 6 in.; space for each cow, 4 ft. 5 in.; length of rail separating cows, 8 ft. 3 in.; centre walk (open), 6 ft.; fall from rear wall to centre, 2 in.

The shed accommodates twenty cows and cost £750, of which £50 was spent on painting. The design is capable of being either extended or reduced or otherwise adapted to suit varying requirements or means.

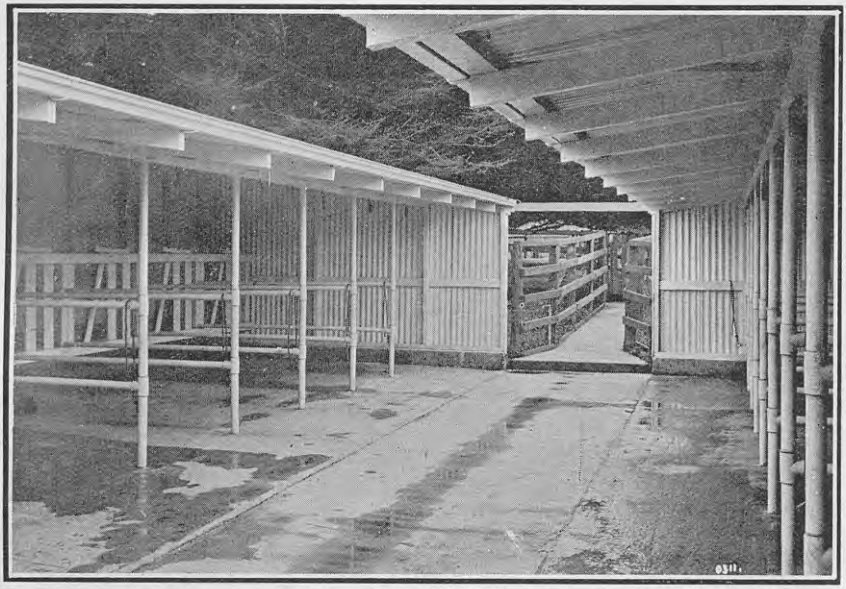


FIG. 4. SHOWING RACE FROM HOLDING-YARD TO MILKING-SHED.

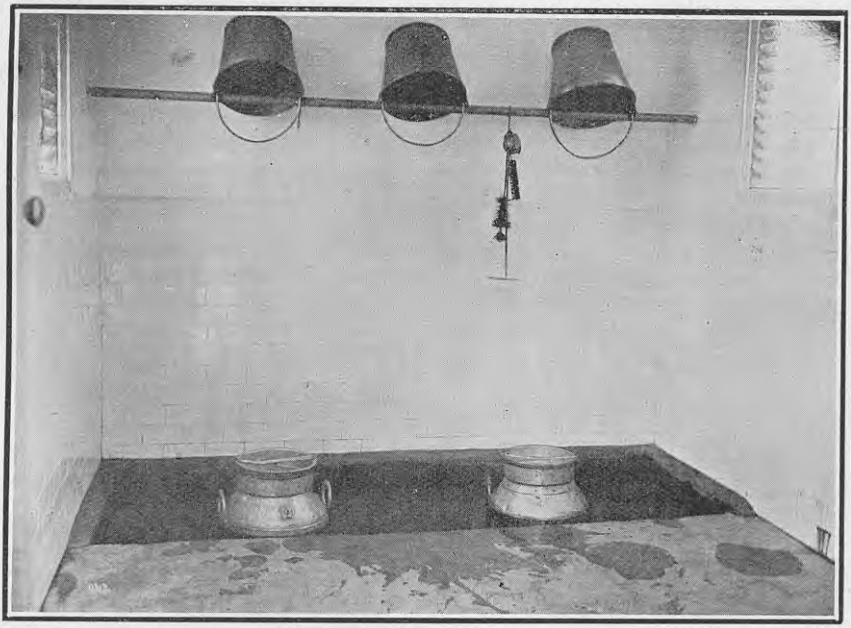


FIG. 5. VIEW IN THE MILK-HOUSE.

TESTING OF PUREBRED DAIRY COWS.

OCTOBER CERTIFICATE-OF-RECORD LIST.

Dairy Division.

THE appended list comprises the record of cows which received certificates during October, 1923. The list is a particularly strong one from the point of view of individual records. Each breed is represented by more than one worthy performance, and there are no fewer than nineteen cows credited with over 600 lb. of butterfat.

BAINFIELD 27TH.

The record which calls for special attention is that of the Friesian cow Bainfield 27th, which has been granted a certificate for 910·74 lb. butterfat from 23,203·3 lb. milk. This constitutes a record for the Dominion in both milk and fat for any cow of the senior four-year-old class, the yield of Mr. H. R. Green's Buttercup 3rd of Ashlynn, the former holder of the title, being exceeded by the substantial margin of 2,509·05 lb. milk and 77 48 lb. fat.

Bainfield 27th was entered for test by Mr. W. Y. Dickie, of Mataura, and after running for fifty-four days was sold to Mr. C. H. Potter, of Pukerau, at whose father's farm she completed the remaining 311 days of her period, calving subsequent to test almost exactly fourteen months after her calving for commencement. That she was well handled during her term under test there is no doubt, and much credit is due to those who piloted her through.

The sire of Bainfield 27th was Mr. W. D. Hunt's Bainfield Dutchman, who was sired by Longbeach Major, bred by Mr. J. H. Grigg, of Longbeach, from Oakwood Topsy (693·66 lb. fat), bred by Mr. Gladstone Robinson, of Gleniti. Longbeach Major is the sire of four certificated daughters apart from the cow under review, and two of these have produced over 600 lb. of butterfat. The dam of Bainfield 27th is Oakwood Daisy Bell (also bred by Mr. Robinson), with a certificate for 496·12 lb. fat as a senior two-year-old. Almost every name occurring in the pedigree of Bainfield 27th for four generations back is a name that is well known to followers of the Friesian breed, and almost every sire, at least, has proved his worth—there being in addition to Longbeach Major, already mentioned, Friesland Colantha Lad (four C.O.R. daughters), Dutchman (four C.O.R. daughters), Alfonso (sire of Oakwood Topsy, with 693·66 lb. fat), King Segis Wild Rose Homestead (sixteen C.O.R. daughters), and Rozine's Butter Boy (four C.O.R. daughters). Of the seven dams included in those four generations six have been tested and received certificates of record, their yields being 483·16, 414·51, 458·66, 508·06, 496·12, and 693·66 lb. butterfat.

From the foregoing two facts are apparent: In the first place Bainfield 27th is the result of a long line of successful matings of proven individuals, and in the second it is once more made clear that New Zealand has much to be thankful for in the wisdom of its early selectors of purebred dairy stock.

LIST OF RECORDS.

Name of Cow and Class.	Tested by	Age at start of Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat
	JERSEYS.					
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Penrose Arrabelle ..	J. B. Clemow, Stratford	2 15	242·0	365	9,490·6	575·60
Sultan's Topsy ..	J. H. Sherrard, Otaua	1 362	240·5	365	9,968·2	559·55
Waionui Kate ..	A. J. Dempsey, Hamilton	1 267	240·5	365	8,390·9	502·20
Rioter's Gavotte's Pet	W. A. Guy, Matapu	1 362	240·5	365	6,788·9	494·94
Marshland's Pride ..	W. J. Chynoweth, Pukeroro	1 296	240·5	365	7,080·2	469·08
Holly Oak Florence	H. J. Addenbrooke, Ngaere	2 14	241·9	365	8,302·2	466·39
Marshland's Primrose	W. J. Chynoweth, Pukeroro	2 4	240·9	365	7,422·9	461·63
August Blossom ..	R. Dunn, Auroa ..	2 9	241·4	365	7,012·7	458·06
Gowanbrae K.C. Lady Belle	W. A. Maddox, Richmond	1 321	240·5	365	9,246·7	450·26
Marshland's Golden Lady	W. J. Chynoweth, Pukeroro	1 363	240·5	365	8,051·0	449·78
Majesty's Belle ..	H. J. Addenbrooke, Ngaere	2 19	242·4	365	8,354·7	449·66
Holly Oak Prairie Maid	M. V. Reeve-Smith, Aria	2 48	245·3	365	7,649·1	449·61
Bridge View Nettie	G. A. Gamman, Marton	1 326	240·5	365	7,222·2	441·11
Gowanbrae Dairymaid	R. Harrison, Richmond	1 360	240·5	327	8,259·3	440·76
Holly Oak Peeress ..	A. J. Miller, Uruti ..	1 304	240·5	365	7,384·3	439·70
Bridge View Sunflower	A. L. Hooper, Mahoe	1 308	240·5	333	8,694·6	431·62
Snowview's Dairylike	T. W. Perger, Brixton	1 321	240·5	324	8,235·8	427·50
Jersey Brae Finance	Thos. Church, Te Rapa	2 1	240·6	361	7,393·3	424·07
Haruru	J. S. T. Short, Hawera	2 47	245·2	343	7,644·6	418·45
Penrose Breeze ..	J. B. Clemow, Stratford	2 33	243·8	365	7,968·6	409·46
Sweet Nancy ..	J. Magill, Normanby	1 354	240·5	361	7,988·6	409·29
Maori Fussy ..	A. C. Lovelock, Woodville	2 17	242·2	363	7,741·1	408·94
Jersey Brae Ruby ..	Thos. Church, Te Rapa	1 330	240·5	365	8,378·9	400·29
Onaero's Gipsy Queen	Frank Ranford, Stratford	1 302	240·5	354	7,512·0	381·90
Fernaig Folly ..	R. F. Wilkinson, Pukekohe	1 288	240·5	346	7,011·1	381·47
Jersey Brae Fox's Queen	Thos. Church, Te Rapa	1 350	240·5	365	6,667·5	380·60
Jersey Brae's Fairy	A. R. Clark, Hamilton	1 347	240·5	365	6,089·8	368·62
Fernaig Fay ..	S. C. Colmore-Williams, Dargaville	1 225	240·5	365	5,666·4	358·88
Awaroa Lady ..	George Bright, Otaua	2 37	244·2	360	6,720·4	358·16
Ruby's Pet ..	R. Hicks, Hawera ..	1 297	240·5	365	5,583·3	356·74
Craigalea's Pearl ..	J. G. Robertson, Eltham	2 45	245·0	316	5,840·9	348·87
Jersey Brae Lady ..	Thos. Church, Te Rapa	2 6	241·1	349	6,537·0	339·55
Onaero Rosebud ..	Frank Ranford, Stratford	2 79	248·4	316	6,304·0	337·25
Rosendale's Natalie	R. J. Ballantine, Normanby	1 357	240·5	365	5,916·7	332·22
Belvedere Olga ..	J. A. Pettigrew, Pihama	1 358	240·5	317	5,605·7	331·84
Craigalea's Beauty ..	J. G. Robertson, Eltham	2 40	244·5	299	6,918·9	331·19
Silverdale Garnet ..	G. Hodgson, Whakapara	1 289	240·5	365	5,403·4	321·11

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		JERSEYS—*continued.*				
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Fair View Magnet ..	T. Linn, Mangatoki	2 19	242·4	307	5,128·5	318·69
Waipiko Maud ..	W. P. Begg, Ataapohue	1 335	240·5	339	6,224·8	318·12
Onaero's Marjorie ..	Frank Ranford, Stratford	2 37	244·2	312	6,852·1	311·68
Fair View Cream ..	T. Linn, Mangatoki	1 353	240·5	345	5,451·5	310·10
Zenana	A. R. Clark, Hamilton	1 334	240·5	365	6,076·8	309·23
Onaero's Clematis ..	Frank Ranford, Stratford	2 16	242·1	321	6,308·1	307·05
Maori Sally ..	G. R. and H. Hutchinson, Auckland	2 5	241·0	337	5,613·1	305·50
Holly Oak Merry Moments	John Hale, New Plymouth	2 64	246·9	257	5,105·0	304·84
Craigalea's Tobina ..	J. G. Robertson, Eltham	1 326	240·5	286	4,962·1	291·81
Onaero's Veronica ..	Frank Ranford, Stratford	2 11	241·6	305	5,712·7	291·61
Fair View Meadow	A. Hazelton, Waihou	2 5	241·0	287	5,861·9	291·27
Silverdale Rosette ..	G. Hodgson, Whakapara	1 223	240·5	349	5,852·8	272·69
Senior Two-year-old.						
Marshland's Stylish Princess	W. J. Chynoweth, Hamilton	2 353	275·8	365	9,927·7	715·75
Marshland's Eminent	W. J. Chynoweth, Pukeroro	2 328	273·3	365	11,596·6	712·08
Kuku's Clover Leaf	R. L. Horn, Ohau ..	2 347	275·2	365	12,707·8	592·45
Penrose Fancy ..	J. B. Clemow, Stratford	2 359	276·4	365	8,878·2	553·73
Sabean Rose ..	G. Milligan, Mangateretere	2 304	270·9	365	9,083·9	543·11
Arden's Leola ..	W. J. Chynoweth, Pukeroro	2 278	268·3	345	7,855·8	526·52
Brentwood's Snowdrop	C. A. Willis, Pukekohe	2 253	265·8	364	8,677·4	523·29
Silver Chimes ..	H. Salway, Bell Block	2 349	275·4	365	7,879·0	519·20
Glenmore Velvet ..	A. C. Lovelock, Woodville	2 325	273·0	365	10,172·7	492·52
Glenmore Violet ..	A. C. Lovelock, Woodville	2 316	272·1	365	9,453·3	465·52
Rioter's Gavotte's Beauty	W. A. Guy, Matapu	2 355	276·0	357	7,192·9	440·00
Dorrit	Oscar Monrad, Palmerston North	2 277	268·2	365	8,734·7	436·11
Holly Oaks Sisyphus	S. C. Colmore-Williams, Dargaville	2 275	268·0	364	7,121·4	424·73
Kimberley Lady ..	L. and J. Griffith, Weraroa	2 321	272·6	309	8,955·3	406·64
Meadowvale Miss Winsome	C. Meuli, Tariki ..	2 346	275·1	339	7,436·1	399·69
Riverlea's Blossom	Mrs. C. O'Callaghan, Tikinui	2 294	269·9	365	5,811·5	389·47
Rosendale's Sweet Pea	R. J. Ballantine, Normanby	2 285	269·0	357	6,029·2	368·51
Miss Mulberry ..	Mrs. C. O'Callaghan, Tikinui	2 330	273·5	279	4,612·2	275·51
Three-year-old.						
Zola of Rosy Creek	E. Joyce, Kaponga ..	3 43	281·3	365	12,478·6	741·20
Farce	E. Joyce, Kaponga ..	3 292	306·2	365	11,987·4	691·54

LIST OF RECORDS—*continued.*

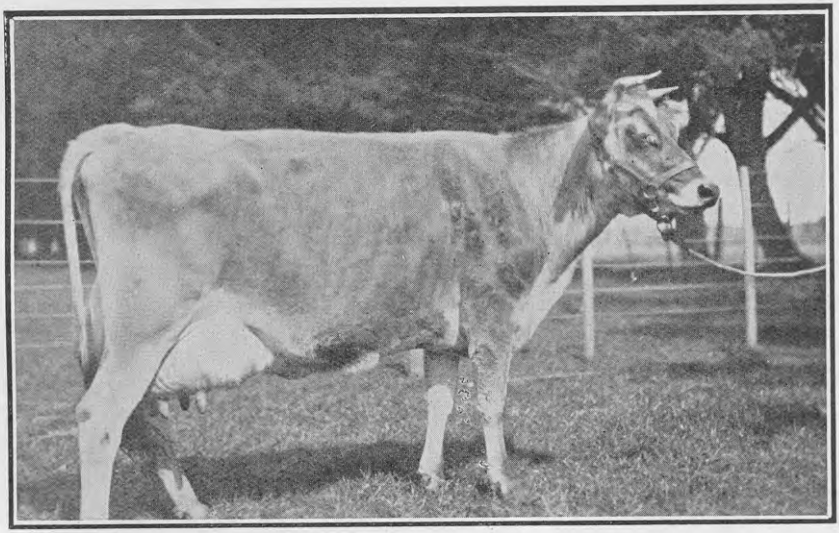
Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		JERSEYS—*continued.*				
Three-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Norfolk Park's Bilberry	A. L. Hooper, Mahoe	3 333	310·3	365	13,252·8	631·16
Belle Olga ..	A. N. Haylock, Stratford	3 31	280·1	365	11,286·5	630·67
Kewpie	A. L. Hooper, Mahoe	3 349	311·9	355	11,509·0	593·71
Flandrine's Vixen ..	R. E. Clements, Awakino Point	3 307	307·7	365	10,338·8	574·67
Rewa Prudence ..	B. Roberts, Parkvale	3 212	298·2	365	12,083·5	549·07
Jersey Brae's Frisky	F. J. B. Ryburn, Paterangi	3 68	283·8	336	8,028·0	540·61
Brentwood's Gipsy	C. A. Willis, Pukekohe	3 328	309·8	364	8,610·3	518·42
Wisp's Beauty ..	W. Muir, Waihi ..	3 361	313·1	365	9,686·0	488·10
Kerry's Pride ..	S. J. Bright, Otaua ..	3 325	309·5	364	9,500·8	484·85
Silverdale Dot ..	G. Hodgson, Whakapara	3 68	283·8	283	9,958·0	481·75
Fancy Maid ..	A. J. Miller, Uruti ..	3 74	284·4	365	6,881·2	444·93
Hillsbourne Briar ..	G. A. Gamman, Marton	3 103	287·3	343	8,936·6	438·86
Arthingworth Princess	E. Smallbone, Richmond	3 351	312·1	365	8,242·6	419·49
Grafton Christmas Gift	S. J. Robinson, Hinuera	3 315	308·5	309	7,857·0	415·58
Silver Plate ..	F. S. Veale, Cambridge	3 20	279·0	365	7,950·4	375·95
Four-year-old.						
Jersey Meadows Iris	H. H. Phillips, Te Rehunga	4 5	314·0	365	12,478·2	752·80
Croydon's Zealandia	A. Hazelton, Waihou	4 330	346·5	365	10,832·8	569·55
Golden Bloom ..	H. J. Lancaster, Glen Oroua	4 15	315·0	365	9,832·2	568·78
Jersey Meadows Daffodil	H. H. Phillips, Te Rehunga	4 2	313·7	365	10,491·1	567·08
Liryclear's Maid ..	G. Milligan, Mangateretere	4 349	348·3	365	9,701·0	541·59
Bronze Beauty ..	D. L. A. Astbury, Mangatoki	4 36	317·1	365	7,885·2	491·39
Twylish's Primrose	D. M. Finnie, Westmere	4 44	317·9	311	8,193·5	455·96
Bright's Queen ..	George Bright, Otaua	4 25	316·0	335	7,687·3	441·80
Emerald Hill's Grace	George Bright, Otaua	4 355	349·0	365	8,139·7	403·73
Mature.						
Miss Ivy	J. Smith, jun., Palmerston North	5 3	350·0	365	10,855·4	727·62
Prim's Pearl ..	W. I. Fallows, Puni ..	8 5	350·0	364	10,700·7	667·45
Pet's Dimple ..	A. Hazelton, Waihou	5 289	350·0	365	10,331·1	641·43
Princess Fawny ..	W. I. Fallows, Puni ..	6 259	350·0	364	10,526·0	622·35
Barbury's Princess ..	A. Hazelton, Waihou	5 359	350·0	365	10,321·1	583·64
Kuku's Clover ..	R. L. Horn, Ohau ..	6 348	350·0	365	12,749·0	579·99
Neatest Darkie ..	H. J. Lancaster, Levin	6 275	350·0	365	12,321·4	544·30
Te Rapa Lass ..	T. Brownlee, Pukekohe	6 363	350·0	365	9,602·7	541·81
Cicero's Princess ..	A. E. Death, Hawera	5 45	350·0	365	8,307·0	485·70
Shamrock Sweet Joan	H. T. Mellow, Mahoe	5 40	350·0	310	9,517·8	465·00
Matai's Pride ..	S. J. Bright, Otaua	11 333	350·0	355	7,263·5	449·11
Fancy Molina ..	A. E. Death, Hawera	6 31	350·0	365	7,961·9	435·11
Foxhill Fawn ..	H. W. Nicholls, Belgrove	5 1	350·0	282	7,846·7	372·32

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at start of Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		FRIESIANS.				
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Pietje Fayne Colantha	John Stables, Riverlea	2 42	244·7	365	13,072·9	469·89
Alice Blanco Beets	W. H. Madill, Auckland	1 338	240·5	350	9,667·0	349·88
Senior Two-year-old.						
Dominion Wood Anemone	R. C. Allen, Annandale	2 252	265·7	365	16,821·7	587·14
Junior Three-year-old.						
Peria Romeo Lulu	J. H. Wilson, Matamata	3 27	279·7	288	8,851·6	342·98
Senior Three-year-old.						
Domino Van Buttercup	Cameron Bros., Stratford	3 323	309·3	365	17,024·2	622·47
Brookside Manor Tilly	Cameron Bros., Stratford	3 317	308·7	314	13,270·7	484·87
Senior Four-year-old.						
Bainfield 27th ..	R. J. Potter, Pukerau	4 351	348·6	365	23,203·3	910·74
Beryl de Kol of Woodlyn	T. C. Barbour, East Tamaki	4 364	349·9	365	20,627·6	648·88
Lily Last	F. Crump, Springston	4 347	348·2	365	16,519·0	615·41
Waituki Princess Burke	T. C. Barbour, East Tamaki	4 325	346·0	360	13,371·9	521·66
Grace Fayne II Van Racelands	T. H. Richards, Cardiff	4 324	345·9	357	13,401·3	434·19
Mature.						
Oakwood Betty ..	W. D. Hunt, Invercargill	6 55	350·0	340	20,712·1	756·67
Waihi Duchess ..	T. H. Richards, Cardiff	5 27	350·0	365	18,183·9	612·33
Jessie Queen of Fairburn	Fred. Crump, Springston	5 288	350·0	352	13,110·0	527·38
Milkmaid 1st Johanna	R. C. Allen, Annandale	6 316	350·0	365	15,283·4	498·80
Riverdale Flossie ..	E. F. Peacocke, Hamilton	7 271	350·0	365	16,098·1	457·24
		MILKING SHORTHORNS.				
Junior Two-year-old.						
Glenthorpe Rose ..	A. J. Melville, Buckland	1 336	240·5	331	9,043·2	338·45
Senior Two-year-old.						
Glenthorpe Ruby 3rd	A. J. Melville, Buckland	2 340	274·5	326	9,723·2	362·83
Three-year-old.						
Glenthorpe Countess 2nd	A. J. Melville, Buckland	3 11	278·1	286	8,155·8	312·66
Glenthorpe Trilby 3rd	A. J. Melville, Buckland	3 10	278·0	316	7,735·0	307·28
Mature.						
Glenthorpe Daisy ..	A. J. Melville, Buckland	..	350·0	365	14,165·4	674·46
Glenthorpe Lady ..	A. J. Melville, Buckland	..	350·0	365	16,805·2	671·63

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		AYRSHIRES.				
Four-year-old.		Yrs. dys.	lb.		lb.	lb.
May Flower of Ayrshire Downs	Litchfield Bros., Tirau	4 0	313·5	365	8,838·0	379·10
Mature.						
Sadie of Edendale ..	W. Hall, Lepperton	7 333	350·0	365	12,084·1	530·00
Braemar Fanny ..	Litchfield Bros., Tirau	7 319	350·0	365	12,874·9	529·06
Fancy of Armadale	W. Hall, Lepperton	12 8	350·0	327	11,475·2	491·26
		SHORTHORN.				
Sunnyside Princess VII	Sunnyside Mental Hospital, Christchurch.	4 83	321·8	286	6,356·6	324·91
		Second-class Certificate.				
		JERSEY.				
Senior Two-year-old.						
Maori Nell ..	J. B. Laurenson, Hawera	2 280	268·5	365	9,124·1	534·67



EATON LADY REYNECOURT (D. WATKIN, TAKANINI).

C.O.R., 1923, in Jersey Mature Class: 12,777·3 lb. milk, 871·39 lb. butterfat, in 365 days.

Winemaking.—The yield of wine in the Dominion last season is estimated at 85,000 gallons. At a reasonable estimate of 8s. per gallon this represents a value of £34,000.

SEASONAL NOTES.

THE FARM.

ROOT CROPS.

Mangolds and carrots will be making good growth in December, and every endeavour should be made to get them thinned as early as possible, so as to check weeds and let the young plants become well established before the hot weather sets in. Carrots should be thinned out to about 6 in. apart, and mangolds to 1 ft. Wider thinning is frequently recommended, but many results go to show that the spacings mentioned give the heaviest crops and the best-quality roots.

The land between the drills should have frequent cultivation, so as to encourage root-development and control weeds. For the horse-hoe the L-shaped tines with flat blades are best while the plants are young. In cultivating mangolds care should be taken not to bank the soil around the plants; on the contrary, it should be pulled away from them. If the plants are pale and showing poor leaf-growth a top-dressing with 1 cwt. of nitrate of soda after thinning will help to push them along, but if doing well they are better without the nitrate.

Further sowings of soft turnips for cow-feeding and lamb-fattening may be made early in December, and when grown for late autumn and winter feeding they should be put in towards the end of the month. Good varieties for this purpose are Green Globe and Green-top Aberdeen, or "Green-top Scotch" as they are frequently called. Green-top varieties are hardier and better keepers than purple-tops, but mature more slowly. All the Aberdeens are apt to bury themselves, and are more suitable for ridging than for sowing on the flat.

Swedes.—In districts where swedes are still a staple crop the later part of December is the best time to sow, unless early sowings have been proved by experience to be satisfactory. For example, near the coast in north-west Wellington and Taranaki it is necessary to get them in during the first half of the month, but in higher situations any time between, say, the 20th and the end of the month will be found to be suitable. The later the crop is sown, the less likely it is to be destroyed by dry-rot; on the other hand, if left too late there is the danger of dry weather and a poor strike. Superlative, Masterpiece, Magnum Bonum, Grandmaster, and Up-to-date are among the best varieties. They are all liable to attacks of dry-rot, particularly the first mentioned, Grandmaster and Up-to-date being the most resistant.

A fine, firm, moist seed-bed is essential, in order that the crop may make a good start and so stand a good chance against the "fly." From 10 oz. to 14 oz. of seed should be sown through every second coulter of the drill; the better the land and the seed-bed, the less seed required. New seed of reliable origin should always be used; old seed is very apt to be disappointing. Fertilizers should be used with the seed at the rate of 2 cwt. to 3 cwt. per acre. Most of the proprietary manures give good results, but where the farmer wishes to mix his own the following will be found very suitable generally: Half superphosphate and half either Ephos phosphate, basic slag, bone-meal, or Nauru phosphate; on old land ½ cwt. sulphate of potash per acre added to the above will in some cases be advantageous.

Care must be taken that a run-off of rough grazing will be available adjacent to the swede-paddock when the latter is fed off. Failing this, a supply of hay will be a great asset.

HAY AND ENSILAGE.

In the earlier districts crops for both hay and ensilage will be ready for cutting from the beginning of December onwards. To get the best of grass for either purpose it should be cut when the majority of plants are in bloom; if allowed to stand until the seed is ripening, the quality of both hay and ensilage will be inferior. Further, if the crop is removed at the proper time the clover

and fine grasses then come away rapidly and a good aftermath is produced. Where special crops, like oats and tares or oats and peas, have been grown for hay or ensilage care should also be taken to see that they are cut at the proper time. For hay the oats should be cut in the milky stage, and for ensilage in the dough state.

The making of ensilage is steadily coming into favour either for autumn or winter feeding, for both of which purposes it is very valuable. Apart from the good fodder saved, the cleaning-up of pastures at this time of the year helps greatly towards a succulent autumn growth. On most farms there is now a great deal of rank grass which is not palatable to stock. If this is removed before it gets too dry it makes quite good ensilage.

Until the erection of silos is more general farmers will have to rely on the pit or stack methods of ensilage. The stack has the great advantage that it can be made in the field where the material is grown; its greatest disadvantage is the labour involved, but if this is set against the labour and worry of making hay in a wet season the ensilage probably has the best of it, and the fodder saved is better.

Making Stack Ensilage.

About 40 tons is the minimum quantity of green material that it is profitable to make into stack ensilage. If the quantity is less the farmer should try a small pit. With a small quantity of material the loss around the sides in a stack is considerable, whereas if it is put into a pit it can be covered right up and the loss reduced to a minimum. A fair average crop of grass will produce from 6 to 8 tons per acre of green material, and special crops like oats and tares 8 to 10 tons; heavy crops will give an extra 2 or 3 tons. A stack to contain 30 to 40 tons should be approximately 14 ft. by 14 ft.; 50 to 70 tons, 16 ft. by 18 ft.; 100 tons, 20 ft. by 24 ft.; and so on.

Having selected the site, the stack should be built up from 6 ft. to 8 ft. high the first day, and then allowed to stand for a day or two to allow the heat to generate up to about 130° F. After this a few feet may be added each day for two or three days, when the stack should be again spelled for a day or two. The builder is guided by the stack: if it is settling rapidly building should be continued every day, but if the settling is slight the stack should be rested until this is satisfactory. While the stack is being built great care should be taken to see that the sides are kept, if anything, a little firmer than the centre, and the top of the stack should always be kept as nearly level as possible. Further, if there is a continuous wind from one direction there will be a danger of the heat being driven to the lee side and of the stack settling unevenly. To prevent this, hang a tarpaulin or some bags on the windy side. It is also an advantage to add from 3 lb. to 6 lb. of salt per ton of green material when building; the poorer the material, the more salt required. Salt improves the quality of the ensilage, and it is a convenient way of feeding it to the stock.

When finished, the stack should be covered with from 9 in. to 12 in. of soil, so as to exclude the air; about 9 in. at the sides, running to 15 in. at the centre, gives a good finish. If the stack is very hot and settling rapidly the soil should be put on the day following the last material. If, on the other hand, the temperature is low and settling is slow the covering is best deferred for a few days.

The best ensilage is made at a temperature between 120° and 140°. If the stack gets too hot during the process of building add more material; on the other hand, if it is not hot enough spell for a time as already recommended. Experienced persons generally discard the thermometer, but it is a very useful guide for a beginner. At the end of each day's work drive a 4 ft. length of 1 in. or larger piping down the centre of the stack; then place an ordinary milk thermometer attached to a string down this pipe. In the morning the temperature is read, and, if satisfactory, the pipe is removed and stacking proceeded with, the pipe being again placed in position at the end of the day's work.

Lucerne Hay.

Lucerne is probably the most difficult plant to convert into first-class hay. The preservation of the leaf and a certain amount of moisture is essential if the green colour is to be retained. Too much moisture, however, is sure to result in heating, and a fusty hay. If weather permits, and the crop is not too heavy, the whole operation may be completed in three or four days. In the event of a heavy

crop, lucerne should be dried out in small cocks rather than big ones. Should rain fall on the small cocks less damage will be done than if it fell on big ones.

Where lucerne is planted in rows and used for haying purposes it is not advisable to intercultivate after every cut, as dirt is sure to get in the subsequent cut of hay. Proper attention to autumn and spring cultivation should be sufficient to keep the stand clean. Where the stand is used as a grazing proposition, grubbing after each grazing could be resorted to for keeping the surface free from weeds and forming a mulch.

PASTURES.

Under Canterbury conditions the ordinary rye-grass and red-clover pasture becomes hard and unpalatable in December. It has been noticed that several farmers in that district are safeguarding themselves by providing a pure cocksfoot, dogstail, and white-clover pasture, and keeping it shut up till the cocksfoot gets away. This feed then fits in nicely with the usual summer shortage, as grazing on such pasture can be commenced at the end of November. Western Wolths rye-grass, February-sown, gives the most satisfactory feed for October.

GREEN FORAGES AND POTATOES.

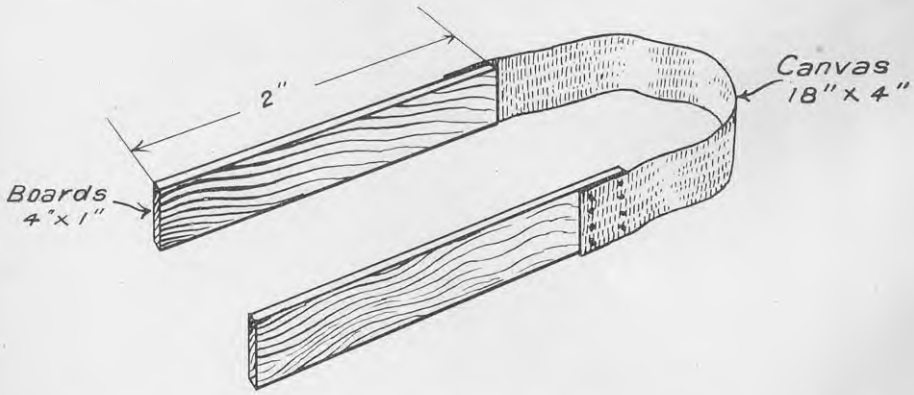
Most of the rape will now be in, but where this crop is favoured for late feed additional sowings can now be made. Late sowings of millet or maize for fodder may be completed in December.

The harvesting of the earlier potato crops will be in full swing, while the later plantings will need earthing and weeding. Potatoes, like mangolds, require a good deal of labour, but generally give a handsome return for it.

—*Fields Division.*

PREPARING LAMBS' WOOL FOR MARKET.

The difficulty usually experienced by the fleece-picker in "gathering" lambs' wool on the shearing-board can be overcome by using the simply made device shown in the illustration. The contrivance is made with two pieces of 4 in. by 1 in. boarding, each 2 ft. long. Having planed all sides to make them smooth, the two boards or battens are connected by tacking on at one end of each a piece of canvas or sacking 18 in. long and 4 in. wide. When the lamb is shorn and



the wool is on the floor the fleece-picker takes the free end of each board in each hand, spreads the boards apart so as to allow them to come on the outside of the wool, then closes the boards towards each other. This quickly gathers the wool between the boards and canvas, and it can then easily be carried away and tossed on the wool-table.

Previous to putting lambs' wool on the table the latter should be covered with a piece of hessian or sacking in order to prevent locks going through. When the wool is put on top of this it can be quickly sorted into its different

lots. All the best even-quality, clean, well-grown wool should be put into the first or A grade. Any very short, slightly discoloured wool or trimmings from low down on the legs go into the second or B grade. Any wool stained either by excreta or urine should be put into the third line, marking it "Stained pieces." When sorting according to spinning-quality it is necessary to keep each of the following as separate lines: 36's, 40's, 46's, 50's, and 56's. Very little of the two latter counts are shorn as lambs, the majority being from 40's to 46's (mostly Romney or Romney cross). Too many lines should not be made, but Lincoln or Lincoln crossbred must be kept separate from any other better-quality wool. Too often all these wools are found mixed together; this is an unwise proceeding, as the producer does not receive the best price for his best wool, which he would have done had the different qualities been kept separate.

Then, there is the wool carrying seed, such as piripiri (hutiwai), horehound, burr clover, and Bathurst or Australian burr, which must be kept separate from clean wool. This cannot be emphasized too strongly, and such wool must always be entered in the wool-book as "seedy," so that there is no chance of its ever being put up for auction with clean wool. As regards leaves of trees, gorse, broom, fern, &c., these do not affect the wool in the same way, because they crumble to dust during the process of sorting, scouring, drying, dyeing, and blending of colours to which wool is subjected prior to the manufacturing process. To destroy the seeds and burrs previously mentioned it is necessary for the wool to be carbonized.

—*J. G. Cook, Wool Instructor, Live-stock Division.*

THE ORCHARD.

FROM mid-November to mid-December thinning, cultivation, and spraying form the most important seasonable work. All of these operations play a most important part towards securing the best possible crop of fruit.

THINNING.

With fertility now definite, the number of fruits the tree is carrying may be ascertained. Should the number be very low, it should not be assumed they are not worth spraying; judicious spraying for the benefit of the tree alone will be well worth while. Should the number of fruits carried be medium, the crop will not necessarily be low in bushel capacity, as the fruits will be rather larger. One hesitates to recommend further thinning a comparatively light crop, yet there are instances where such can be done with advantage, as, for instance, with dense clusters of fruit. These are very difficult to keep clean; aphis-dirt, contact blemish, deformity of shape, and patchy low colour are intensified by such clusters. A thinning in such cases would allow better development and permit the wash of the spray to encircle the fruit.

Some nice judgment is required to decide what number should be allowed to remain on a tree where there is a heavy setting to choose from. Much, of course, depends on the typical size of the variety; one should aim at securing good specimens. Generally speaking, two fruits per spur is ample, but in the case of short-stemmed or notoriously small varieties this may be reduced to one. There are instances where this reduction of crop is not sufficient to secure a good sample; some trees spur so freely as to cause an overload to the tree even with one fruit only on each spur. In such a case the further reduction should be accomplished by removing all the fruit from maiden wood. In general practice it is better to thin twice, allowing a week or two between each operation, rather than to aim at completing the work by means of one heavy thinning. Under the former plan more latitude is allowed to determine and, as a result, discard all malformed and diseased fruit, to the ultimate benefit of the quality of the crop.

CULTIVATION.

The primary object of cultivation is to so aerate the soil that beneficial bacteria may live and multiply. Some of the other considerations are suppression of weeds, so that the trees may have the full benefit of the land, and preservation of soil-moisture. Aeration of the soil presents no difficulties where the soil is porous

or well supplied with humus, continued working with the spring-tooth or pulverizer being all that is necessary at this season. Aeration of the more tenacious soils is rather more difficult, but the first rule is not to work such soils when they are wet. The best cultivation tools for such soils are the plough and disk harrow. A shallow ploughing and immediate disking aerate heavy soils to a much greater depth than would be possible with lighter implements.

Cultivation under the tree is just as, if not more, important than on the open land. Extension disks make this possible. A thorough working of the whole surface soil will also suppress weeds and conserve moisture. During cultivation, damage is often done to trees by horse-harness, swingletrees, &c. This may be reduced to a minimum by the use of special orchard harness. There are several types to be had, all being designed to eliminate projections, which are the main cause of the damage.

SPRAYING.

Spraying-requirements for the present period are not many, but they are exacting, as only timely and thorough applications will be effective. Timely, because though there may appear to be a liberal deposit of material remaining on the trees most of this is residue, the efficiency of which, from a protection point of view, has passed away. A renewal of the sprays is therefore necessary to afford continued freedom from fungi and insects. Thorough, because the fruit is rapidly developing and exposing new surface. New wood and foliage are being added, and unless these are sprayed they are exposed to attack. Applications at twenty-one-day intervals are usually sufficient to meet requirements.

Stone-fruits will require lime-sulphur, 1–125, plus atomic sulphur, 6 lb., for brown-rot, plus nicotine, 1 pint, if black or green aphis are present. As the season is approaching for leech on plums and cherries, keep a good lookout and apply arsenate of lead, 1½ lb. per 100 gallons, should this pest appear. If the fruits are near the picking stage it is undesirable that they should be stained with arsenate, and hellebore powder, ½ oz. per gallon, should be used instead. Hellebore should be boiled for 20 minutes in a small quantity of water to prepare it for mixing.

Apples, pears, and quinces will require arsenate of lead, 1½ lb. to 2 lb. per 100 gallons, for codlin-moth, leaf-roller, and other caterpillars; lime-sulphur, 1–100, for fungi; 6 lb. atomic sulphur per 100 gallons for powdery mildew; and nicotine, 1 pint per 800 gallons, for leaf-hopper. These may be mixed, but in such a case the milk of 2 lb. of fresh-slaked lime per 100 gallons should be added. Under some unfavourable conditions as to variety, weather, or locality, lime-sulphur may not be effective in controlling black-spot, and bordeaux, 3–4–40, must then be used.

GRAFTS.

Look over grafts which were worked this season. If union has taken place, indicated by growth of the scion, sever the ties to allow expansion of the wood, but do not remove the covering.

HARVESTING AND PACKING STONE-FRUITS.

The earliest varieties of stone-fruit will soon be ready for harvest. Some definite turn towards maturity is required, but otherwise the fruits should be picked when firm. Most stone-fruits ripen to full condition very rapidly when packed in cases, and firm condition at picking-time will naturally contribute to the arrival of the fruit at its destination in good order. Such picking can best be done by going over the trees from time to time and gathering only such fruits as have reached the requisite stage of maturity. Uneven maturity in a packed case of stone-fruit is a serious though common fault detrimentally affecting the price realized. In the very early part of the season the choicest peaches are worth special packages, such as trays or punnets enclosed in a crate. At all times the fruit should be evenly sized and graded. Even with plums, the larger sizes find a better sale if packed separately from the jumble pack, this invariably applying to the main crop.

Care should be taken to protect picked fruit from the direct rays of the sun. When exposed a considerable rise in flesh-temperature takes place, some scald, and much soft rot, also wilt due to loss of moisture.

—W. M. Rice, Orchard Instructor, Hastings.

CITRUS FRUITS.

The main work in the citrus orchards at the present time consists of attention to efficient cultivation by means of cultivators and harrows, &c.; also the spraying of both lemon and orange trees with bordeaux, 4–4–40, for the control of verrucosis. The spraying should be done at the time when the majority of the petals have fallen from the newly formed embryo fruits. This is a most important spray and should be got on as nearly as possible at the time indicated.

STRAWBERRY-GROWING.

There will be time for little else but the harvesting of the crop at this period. The attention of growers is drawn to the necessity for the establishment of a standard pack and the honest maintenance of that pack. Only the best berries should be included in the top grade, and none but sound fruit should be sent to the market in any grade.

Those who are merely growing sufficient strawberries for their own use are advised to establish some form of protection by means of wire netting or old fishing-net to prevent depredation by birds. Where leaf-spot continues to be bad on plants a summer strength of Burgundy mixture may be applied with benefit, care being taken to pick all fruit near maturity before the application is made.

FIREBLIGHT.

Growers are again reminded that swift action is absolutely necessary in the entire removal of any part of a tree or trees affected with this disease, and the burning of the same. Any orchardist who identifies the disease in his orchard, and who is situated outside the areas where fireblight is at present known to exist, is asked to notify the local Instructor immediately and ask his advice.

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

POULTRY-KEEPING.

LATE-HATCHED STOCK.

It is now too late to put down sittings of hen-eggs with much prospect of the young birds ever developing into really payable stock. Yet it is safe to say that in many cases poultry-keepers, and especially those who conduct the business as a side-line, have not yet commenced their hatching operations. The fact of a chicken being hatched on the late side is all against its attaining a desired size and healthy development. Thus late-hatched chickens should be managed to the very best advantage. Of course, such stock, however well they may do, will only catch the tail-end of the dear-egg season, instead of commencing their productive period, as do the early-hatched birds, at the beginning of it. If, however, they are subjected to weak methods of management they will probably not lay till next spring, and therefore will prove non-payable stock. Every care should be given the young birds in the matter of liberal feeding, shady shelter from adverse weather conditions (especially wind), together with an abundant supply of succulent green-stuff. The reason why few farmers secure winter eggs is chiefly that they hatch their chickens at the wrong period of the year.

WAR AGAINST VERMIN.

Now is the time to make special warfare against insect vermin, which with the approach of warmer weather will multiply at an alarming rate if not constantly kept in check. It is always a weak policy to wait till the quarters become overrun with these enemies of the fowls before adopting preventive methods. The wise poultryman never allows them to make their appearance. He realizes that if these are present (especially red mite) in ever such small numbers his profits must be reduced as a consequence. It is common during my visits of instruction, when called upon to advise regarding poor egg-yields and unthrifty flocks, to ask their owners if the quarters are free from vermin. The usual reply is "Only a few." Generally, however, on making a search for the so-called few they are found in immense numbers.

Some poultry-keepers argue that it is natural for bird-life to harbour vermin when living in a natural state, and conclude that because these thrive and do well vermin should not have an injurious effect on the domesticated bird. It is here that local conditions have to be studied. Under natural conditions birds produce but few eggs during the year, and have everything in their favour for freeing themselves of vermin and retaining strong constitutional vigour. With the domesticated hen, however, it is entirely different. A bird producing 200 or more eggs a year under artificial conditions obviously cannot be expected to produce her special yield if her life-blood is being constantly drawn from the body by parasitic life.

It must not be concluded that because vermin cannot be seen with a casual glance they are not present. The most troublesome types are often the most difficult to discover. For example, the red mite, the most objectionable of all, seeks seclusion during the day in out-of-the-way corners till after dark, when it attacks the bird by blood-sucking. It thus escapes the observation of any but the keenest of poultrymen. Then, there is the depluming-mite, which causes constant irritation to a bird, and is the most common cause of feather-pulling. It is almost invisible to the naked eye, and, besides, hides in the plumage in a way that demands keen observation to disclose its whereabouts. Fleas also may cause no end of trouble in a poultry flock. They are most common where the plant is located on sandy soil. Like the red mite they mostly hide during the day and attack the birds by night. Their chief hiding-place is under the nesting-material.

Cleanliness is the great safeguard in keeping these enemies at bay. It is now recognized the world over that the most economical insurance against loss from vermin and disease in the management of poultry stock is that of cleanliness. At least twice yearly the quarters where poultry are kept should undergo a thorough cleaning and disinfection. The first step in this direction is to remove all litter and nesting-material. Then every part of the interior should be swept down with a stiff broom. It should next be thoroughly sprayed with a strong disinfectant. It is then a good plan to tar the walls, as a means of covering up all hiding-places. Remember that there is nothing like tar for keeping parasitic life at a distance. Where fowls have to be accommodated in a house soon after tarring, pieces of sacking or something similar should be tacked up against the walls until the tar dries, so as to prevent the latter getting on the feathers. To complete the cleaning of the house, and after the tar is dry, it should be given a good spraying of whitewash. Only after doing this can the house be said to be in a thoroughly clean condition.

It must not be inferred, however, that this half-yearly cleaning is sufficient. Far from it. The house should be kept clean at all times by never allowing manure, dirt, &c., to accumulate. Care also should be taken that the nesting material is frequently changed.

—*F. C. Brown, Chief Poultry Instructor.*

THE APIARY.

FORMING NUCLEI.

WITH the approach of the main honey-flow and the prospect of more settled weather the beekeeper can turn his attention to the question of forming nuclei, either with an eye to artificial increase or for queen-raising purposes. Whatever the object for which they are produced the simplest method of forming nuclei is as follows :—

From the strongest colonies in the apiary take combs of sealed brood with adhering bees. Place two of these combs in each nucleus hive, together with one comb of honey and an empty comb. It is as well, if the size of the hive will permit, to add a feeder. Close the entrance of the nucleus hive by tacking over it a piece of perforated zinc or wire cloth, and place the newly formed colony in a cool place for twenty-four hours. At the end of this time the hive may be placed on its permanent stand and the entrance opened. Some of the field-bees will return to the parent hives, but in the meantime much of the sealed brood will have hatched, and thus the absconders will hardly be missed. The small colony can

at any time be given a ripe queen-cell, and under favourable weather conditions will soon possess a laying-queen.

Nuclei can be built from one or two strong colonies, each of which should produce four or five small colonies; or several hives in the apiary may each be robbed of a frame of brood, thus providing increase while leaving the full colonies practically undiminished. When the young queen commences laying in a nucleus hive she should be left in possession until she has filled two frames with eggs, when she may be removed and given to a colony which requires requeening. The nucleus should at the same time be supplied with a ripe queen-cell, and the process repeated as long as young queens are required.

REQUEENING.

The most important bee within the hive is the queen, and it is useless to expect a colony to be productive unless she is a good one. It is therefore highly essential that all colonies should be headed with prolific queens of a good strain if vigorous workers are to be raised. Queen-rearing is an important adjunct in apiary-management, and unless provision is made to requeen systematically the bee-keeper will find dwindling colonies and diminished crops. Where practicable, it is advisable to requeen the colonies every year. Exception, however, must be made in the case of hives containing breeding-queens, and others retained on account of desirable drones. Where the operations of the beekeeper are such as to prevent annual requeening, provision should be made to replace half the queens in the apiary each year. If this plan is followed no colony will have queens more than two years old. With the aid of a few nuclei young queens can easily be hatched and mated, but in many cases—especially where a swarm has emerged from a hive—virgin queens can be secured and form an easy solution of the requeening problem.

No better plan can be followed by the beginner than to utilize queen-cells produced naturally—that is, under the swarming-impulse. In New Zealand it has been proved that the best months for raising queens are from November to January. During this period everything is favourable to the operation, as the hives are at their highest state of prosperity. Under normal conditions the workers and drones are at their best, this being the swarming-period. There is practically no risk of robbing; the young queens are readily accepted, and will tend to reduce swarming. Moreover, a queen introduced during the months of prosperity will produce numbers of young bees for the winter, and still be fairly young in the following spring. In the case of after-swarms, these may be sifted through an excluder placed between two empty supers, when the queen or queens can be removed. The bees will then return to the parent hive.

These young queens can be utilized for starting nuclei. It always seems a pity to destroy the young vigorous queens bred under the swarming-influence, and wherever there is an opportunity they should be saved and failing queens destroyed. A handy method of introducing virgin queens is by the smoke method. The old queen must first be removed from the hive that is to be requeened. The entrance then is contracted, and a few vigorous puffs of smoke are forced in at it. Then, before the bees have recovered from this treatment, the virgin queen is released at the entrance, piloted into the now queenless hive, and hastened therein by several more puffs of thick smoke. The hive is then closed altogether for about ten minutes, after which the entrance is once more opened slightly and left like this till the next day, when the full entrance can once more be allowed.

EXTRACTING.

Preparations for extracting the honey must be well in hand. By the time these notes are published the main flow should have started in the North, but it will depend entirely upon weather conditions. In the South the flow is fully three weeks later, and extracting rarely commences before the New Year.

It is well to get all the arrangements for handling the crop completed before the honey is sealed and ready for the extractor. It does not take a great deal of time to prepare extra supers and frames, but these are of inestimable value to the beekeeper when the main honey-flow commences. Every year immense quantities of honey are lost through lack of proper gear for handling the crop, or through the unreadiness of the beekeeper when the hives are full of honey. It is poor economy to keep one's supply so low that the bees hang about outside the hive and loaf for want of combs in which to store the honey.

Room should be provided for the workers as soon as the first honey is capped, either by extracting the combs or by supplying them with another super. Keeping the extractor running from the beginning of the honey-flow till the end is good beekeeping, provided the honey is not extracted while in an unripe condition. Although some authorities advocate leaving all the honey in the hives until the end of the season—thereby building colonies three and four stories high—the result is rather heavy work, and this method is not advisable in southern localities. Where the summer is short and variable the risk of getting the honey chilled by leaving it in the hives until the end of the season is too great. Honey, except in a few instances, is best extracted when warm from the hives. In fact, where there is any tendency to "thick" honey, extracting while the honey is warm is the only way to obviate breaking the combs in the extractor.

Comb-honey should be treated in the same way. All sections should be removed from the hives as soon as they are filled. This makes them less liable to be daubed with the propolis and to become "travel-stained" by the constant passage of the bees.

The extractor, tank, and all the rest of the gear connected with the handling of honey should be scalded and thoroughly dried before commencing the season's work. Honey, by reason of its peculiar method of production, does not call for the daily cleansing required by other foods, but it behoves the beekeeper to see that his honey-house is as trim as hands can make it. After the extractor has been scalded it should be kept covered with a clean washing cover when not in actual use, and every receptacle containing honey should receive the same treatment. These covers are easily made and washed, are inexpensive, and add much to the condition of honey as an article of food. No bees, flies, or any extraneous matter should be allowed to touch the honey once it leaves the extractor, and from the time the bees gather it till it leaves the beekeeper's hands for market his aim should be to produce a dainty and attractive article of food.

EXTRACTING APPLIANCES.

It is useless trying to work bees profitably without proper appliances. These consist of an extractor, uncapping-knives, uncapping-can, and settling-tanks. Many beekeepers make the mistake of trying to get along with any makeshifts, but experience will teach that it is a poor policy to endeavour to operate without an up-to-date equipment. However small the number of hives kept, if extracting is the objective it will be found to be most profitable to install a four-frame machine. Costing a little more at the initial outlay, it will soon pay for itself in labour-saving, and enable the beekeeper to meet the biggest flow. In any case he should not be persuaded to purchase a machine that will not reverse. Fixed machines are labour-makers, besides being messy in working. When fifty or more colonies are worked it will be found that a power plant pays for itself over and over again. Prior to the war the cost of installing a power plant was only a moderate figure, and yet relatively few of such plants are to be found in use.

Second in importance is a good tank. No apiary equipment is complete without one or two good tanks. Too little attention is paid to maturing the honey when out of the hive, and freeing it from the minute particles of wax which float on its surface. It must be left to the beekeeper to decide the size of tank he requires, this depending on his needs and conveniences. Particulars of the construction of a suitable tank to meet the requirements of an apiary of 100 to 150 colonies are given in the Department's Bulletin No. 55, "Bee-culture."

For rapid working two ordinary uncapping-knives are very convenient, but as yet no better invention has been given to the beekeeping world than the steam-heated knife. This knife obviates the necessity of constantly dipping the cold knives into hot water, and the work of uncapping can proceed uninterruptedly. There are several uncapping-cans and melters on the market, most of which are more or less satisfactory, but the perfect capping-melter has yet to be invented.

DISEASE.

If the weather conditions have not been favourable for the treatment of foul-brood this should be undertaken when the first opportunity occurs. Do not delay until the main flow arrives. Remember that if colonies are treated early enough a surplus of honey will be secured and the expense of treatment

recovered. Handling clean bees is a constant source of delight, but diseased bees are a never-ending cause of trouble. Full particulars of the treatment of disease were given last month, but if fuller information is required this is given in Bulletin No. 1, "Foul-brood in Bees," which can be obtained free from Wellington or from the Apiary Instructors in each centre.

—E. A. Earp, Senior Apiary Instructor.

THE GARDEN.

VEGETABLE-CULTURE.

HOEING, weeding, and thinning the main crops are operations of first importance at this period.

If the onion crop is late and there is danger of it being attacked with mildew an application of bordeaux, 2–2–40, should be made.

The seedlings of brussels sprouts, early and late broccoli, savoy, cabbage, kale, celery, and leeks should now be under way. A piece of good land, well manured, should be made ready for planting them out; frequently they follow on the early crops of potatoes and peas. Plant them out towards the end of December, planting brussels sprouts and early broccoli first. Water the beds well before lifting the plants, and remove suckers from celery-plants before planting them in the trenches.

Sweet maize should be sown now. Egg-plants (aubergines) and Chile peppers (capsicums), sweet and hot, should be planted out without delay. These interesting luxuries of the garden should be more generally grown.

TOMATOES.

Cultivation (but not too deep), pinching out laterals, and tying the plants to their supports are the chief operations for December. Should the plants need a fungicide spray, apply bordeaux, 4–4–40 (4 lb. bluestone, 4 lb. quicklime, and 40 gallons water). If more convenient 6 lb. of washing-soda may take the place of the quicklime.

THE FLOWER-GARDEN.

Here, too, special care should be taken to prevent weeds seeding. Herbaceous plants requiring support should be given early attention. Remove all seed-pods as soon as blossoms fall. About the middle of the month most garden-hedges will need trimming. Backward plants can be helped with a little liquid manure. Superphosphate, sulphate of potash, and nitrate of soda or sulphate of ammonia are water-soluble; use them sparingly, and apply only when the soil is moist.

W. C. Hyde, Horticulture Division.

Draught Stallions.—The Board of Agriculture recently decided to recommend to the Minister of Agriculture that the Bill providing for the inspection and registration of draught stallions should again be introduced. The Clydesdale Horse Society is strongly in favour of this Bill, which, states the Board, is considered by almost all breeders to be essential in order to bring about a much-needed improvement in the quality of draught horses.

Export of Honey.—The quantity of honey graded for export at the various grading-stores during the year ended 31st March last was as follows: Auckland, 5,485 cases; Wanganui, 350; Wellington, 759; Lyttelton, 1,177; Timaru, 632; Dunedin, 1,198; Bluff, 570: a total of 10,111 cases for the Dominion. This represents an increase of 1,396 cases as compared with the previous year's figures. According to Customs statistics, the quantity of honey actually exported during the year was 10,605 cwt., of a total value of £43,032.

NOXIOUS WEEDS AMENDMENT ACT, 1923.

1. THIS Act may be cited as the Noxious Weeds Amendment Act, 1923, and shall be read together with and deemed part of the Noxious Weeds Act, 1908 (hereinafter referred to as the principal Act).

2. Section two of the principal Act is hereby amended by omitting from the definition of the term "clear" the words "any part thereof flowering," and substituting therefor the words "the spread thereof by seeding or otherwise."

3. (1.) A local authority may at any time in manner hereinafter provided declare that any of the plants mentioned in the Second Schedule to the principal Act, except blackberry and sweetbriar, shall be deemed not to be noxious weeds within the district of that local authority or within any specified portion of that district, and every such declaration shall have effect according to its tenor.

(2.) Any declaration under this section and any declaration under section four of the principal Act, whether made before or after the passing of this Act, may at any time be in like manner amended or revoked.

(3.) Section five of the principal Act shall apply to declarations under this section in the same manner as it applies to declarations under section four of the principal Act.

4. (1.) Every occupier of land on which there are hedges or live fences consisting of barberry, sweetbriar, gorse, broom, or hakea (whether the same are noxious weeds or not) shall in every year cut or trim such hedges or fences: Provided that where such cutting or trimming would destroy the effectiveness of any hedge or live fence for shelter purposes the Inspector may, by writing under his hand, suspend the operation of this subsection with respect to such hedge or live fence for such period as he thinks fit.

(2.) Every occupier of land on which blackberry or sweetbriar is growing otherwise than in small patches shall clear so much thereof as is required by an Inspector by notice in writing under his hand. Every occupier of land on which barberry, gorse, broom, or hakea are growing otherwise than in small patches or as part of a hedge or live fence shall, in districts in which such plants are noxious weeds, clear so much thereof as is required by an Inspector by notice in writing under his hand.

(3.) Every occupier who has received a notice under the last preceding subsection may, within fourteen days of the receipt thereof, appeal to the Minister, or such person as the Minister by notice in the *Gazette* appoints in that behalf,* on the ground that the requirements of the Inspector are unreasonable.

(4.) The Minister, or the person so appointed by the Minister, shall, after inquiry, either dismiss the appeal or reduce the requirements of the Inspector, who shall, in the latter event, thereupon serve upon the occupier an amended notice in writing setting forth his requirements as so reduced. The decision of the Minister or person appointed by him, as the case may be, shall be final.

(5.) Subject to the foregoing provisions of this section, every occupier of land shall do all things necessary to clear his land and to keep the same cleared of noxious weeds.

(6.) This section is in substitution for section nine of the principal Act, and that section and section three of the Noxious Weeds Amendment Act, 1910, are hereby accordingly repealed.

5. In any case where an occupier of land takes such measures for controlling the spread of noxious weeds as may be agreed upon between the occupier and an Inspector, the Inspector may, by notice in writing under his hand, suspend or modify to the extent set forth in such notice the operation of the provisions of the last preceding section with respect to such land. Any such notice may be at any time in like manner revoked.

6. Where an occupier of land is required to cut or trim any hedges thereon, or to clear the same of noxious weeds, he shall perform those duties at such times as may be directed by regulations in that behalf, and in default of such regulations, then at the proper season of the year.

* Mr. A. R. Young, Director of the Live-stock Division, Department of Agriculture, Wellington has been appointed by the Minister under this provision.

LIVE-STOCK IN NEW ZEALAND: 1923.

Unless otherwise specified, the enumeration is at 31st January.

Land District.	Horses.	Asses and Mules.	Cattle (including Dairy Cows).	Dairy Cows.		Number of Sheep shorn, 1922–23.	Number of Lambs tailed, 1922–23.	Sheep (including Lambs) as at 30th April, 1923.	Pigs.	Goats.	
				In Milk.	Dry.					Angora.	Other.
North Auckland ..	38,132	39	481,253	164,993	20,883	611,221	262,824	616,749	56,227	977	1,828
Auckland	47,518	6	662,409	266,054	26,466	708,593	343,940	699,135	89,293	466	1,815
Gisborne	19,841	71	303,158	23,821	3,427	2,660,433	1,360,859	2,945,831	15,236	536	40
Hawke's Bay	17,214	8	259,436	43,720	6,641	2,442,758	1,285,004	2,769,053	14,619	156	1,015
Taranaki	21,812	4	388,880	187,818	13,940	666,679	307,203	703,944	48,564	250	4,172
Wellington	43,647	14	678,932	175,483	18,332	4,542,010	2,395,251	5,158,045	58,929	495	748
Nelson	7,851	..	64,934	24,068	3,800	384,706	145,791	405,914	12,006	828	1,228
Marlborough	7,338	1	48,010	15,635	2,133	938,111	366,627	980,870	8,209	499	1,704
Westland	2,644	8	45,359	11,134	2,139	52,131	30,854	54,370	4,062	10	32
Canterbury	62,563	33	215,306	85,648	11,683	3,707,120	2,359,085	4,393,943	56,750	116	83
Otago	35,444	21	148,954	54,030	7,859	2,461,839	1,246,236	2,921,681	20,669	5	34
Southland	26,814	..	184,063	72,267	6,669	1,244,518	791,847	1,431,904	16,325	..	34
Dominion totals ..	330,818	205	3,480,694	1,124,671	123,972	20,420,119	10,895,521	23,081,439	400,889	4,338	12,733
Totals, 1922 ..	332,105	266	3,323,223	1,015,325	121,730	21,100,550	10,267,901	22,222,259	384,333	5,904	11,576

WEATHER RECORDS: OCTOBER, 1923.

Dominion Meteorological Office.

GENERAL SUMMARY.

SPRING-TIME weather, in spite of its capricious and often stormy character, is marked by increasing warmth and humidity which finds a natural response from the soil, and it must not be overlooked that both sunshine and rain are necessary for the most desirable results. Rainfall, however, is mostly associated with dull days and cool changes; and, though unwelcome to the pleasure-seeker, it is everywhere the immediate factor which spells success or failure to the farmer.

October is the middle month of spring in New Zealand, and this year it was very changeable. There were at least five westerly depressions; one, which culminated on the 24th, was severe. Three ex-tropical cyclones also passed in the North, and one which hung about East Cape from the 13th to the 19th was particularly intense about the 15th.

Rainfalls differed very greatly over the Dominion, and though mostly above the average in the northern and east-coast districts of the North Island and in North Canterbury, most other parts of the country showed a deficiency; Nelson and Westland Districts showed from 40 to 70 per cent. deficiency.

Temperatures on the whole were about the average, but the cold southerly about the middle of the month did considerable damage.

—D. C. Bates, Director.

RAINFALL FOR OCTOBER, 1923, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	12·98	17	2·88	4·48
Russell	4·79	12	1·06	3·27
Whangarei	4·22	14	1·80	4·58
Auckland	3·74	20	1·12	3·62
Hamilton	6·00	20	1·10	4·82
Kawhia	5·34	15	0·86	5·28
New Plymouth	5·20	19	0·98	5·47
Inglewood	9·28	20	1·54	10·09
Whangamomona	6·62	20	0·96	9·11
Tairua, Thames	6·02	13	1·62	6·89
Tauranga	6·11	23	1·45	5·36
Maraehako Station, Opotiki ..	5·28	11	1·10	5·50
Gisborne	3·39	12	1·10	2·84
Taupo	6·00	10	1·10	4·28
Napier	3·77	12	1·22	2·30
Maraekakaho Station, Hastings ..	4·95	18	1·22	2·98
Taihape	3·64	22	0·70	4·30
Masterton	4·59	19	0·96	3·34
Patea	4·56	17	0·86	4·11
Wanganui	3·45	9	0·85	3·65
Foxton	3·36	11	0·66	3·07
Wellington	3·83	16	1·11	4·15
South Island.				
Westport	2·33	16	1·05	6·97
Greymouth	4·66	15	2·26	10·66
Hokitika	8·08	17	2·98	11·74
Arthur's Pass	10·58	15	5·12	20·99

RAINFALL FOR OCTOBER, 1923—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
South Island—continued.				
	Inches.		Inches.	Inches.
Okuru, Westland	18·54	14	2·88	15·37
Collingwood	5·86	15	1·44	11·03
Nelson	1·67	12	0·30	3·41
Spring Creek, Blenheim	2·06	12	0·75	2·39
Tophouse	3·56	13	1·19	5·80
Hamner Springs	5·38	12	1·30	2·66
Highfield, Waiau	3·16	12	0·72	2·02
Gore Bay	3·20	9	1·40	1·80
Christchurch	1·73	10	0·78	1·65
Timaru	1·74	11	0·64	1·97
Lambrook Station, Fairlie ..	1·40	9	0·62	2·00
Benmore Station, Omarama ..	1·86	9	0·58	2·09
Oamaru	0·67	6	0·40	1·66
Queenstown	2·14	9	0·46	3·60
Clyde	1·01	7	0·50	1·58
Dunedin	3·33	12	0·85	3·05
Gore	1·91	15	0·42	3·35
Invercargill	3·12	17	0·64	4·61

FORTHCOMING AGRICULTURAL SHOWS.

Waikato A. and P. Association: Hamilton, 20th and 21st November.
North Otago A. and P. Association: Oamaru, 21st and 22nd November.
Stratford A. and P. Association: Stratford, 21st and 22nd November.
South Otago A. and P. Association: Balclutha, 22nd and 23rd November.
Otago A. and P. Society: Dunedin, 28th and 29th November.
Gore A. and P. Association: Gore, 4th and 5th December.
Auckland A. and P. Association: Auckland, 7th and 8th December.
Winton A. and P. Association: Winton, 9th December.
Southland A. and P. Association: Invercargill, 11th and 12th December.
Masterton A. and P. Association: Solway, 19th and 20th December.
Woodville A. and P. Association: Woodville, 22nd and 23rd January.
Feilding I., A., and P. Association: Feilding, 5th and 6th February.
Clevedon A. and P. Association: Clevedon, 9th February.
Rodney Agricultural Society: Warkworth, 9th February.
Dannevirke A. and P. Association: Dannevirke, 13th and 14th February.
Te Puke Agricultural Association: Te Puke, 14th February.
Whakatane A. and P. Association: Whakatane, 20th February.
Katikati A. and P. Society: Katikati, 21st February.
Rotorua A. and P. Association: Rotorua, 27th February.
Tauranga A. and P. Association: Tauranga, 28th February.
Waipu Agricultural Association: Waipu, 28th February.
Omaha and Pakiri A. and H. Society: Leigh, 1st March.
Taranaki Metropolitan Agricultural Society: New Plymouth, 5th and 6th March.
Waikato Central Agricultural Association: Cambridge, 5th and 6th March.
Morrinsville A., P., and H. Society: Morrinsville, 12th March.
King Country Central A. and P. Association: Te Kuiti, 13th March.
Mayfield A. and P. Association: Mayfield, 15th March.
Methven A. and P. Association: Methven, 27th March.
Temuka and Geraldine A. and P. Association: Winchester, 3rd April.

(Agricultural and Pastoral Association secretaries are invited to supply dates and location of their shows.)

ANSWERS TO INQUIRIES.

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

CALCULATION OF LAMBING PERCENTAGES.

H. E. HARPER, Ashhurst :—

A number of farmers in this district just take the percentage of lambs from the ewes that are yarded at docking-time, not counting the ewes that have died during lambing. Others take it from the ewes that were put out with the rams. For instance, one farmer puts out 100 ewes, loses 10, and gets 90 lambs, claiming 100 per cent. Another farmer puts out 100 ewes, loses 10, gets 90 lambs, and reckons 90 per cent. Kindly advise as to the correct way of ascertaining the percentage.

The Live-stock Division :—

The correct method is to calculate the percentage of lambs on the number of ewes put to the ram. To take an extreme case : If two ewes were put to the ram and each produced twin lambs, and one ewe died in the process but the lambs lived, it would obviously be incorrect to claim a percentage of 400. The correct figure is 200 per cent. Official statistics are calculated on the number of ewes put to the rams.

MAKING BUTTER AT HOME.

"SUBSCRIBER," Pihama :—

Kindly advise me as to the best way to make butter at home from separator cream. I cannot complain about the flavour of what I make, but although I work it well it is inclined to be streaky.

The Dairy Division :—

The cream should be cooled down to as low a temperature as possible—say, 60° F. or under—as it leaves the separator. This is best done by allowing it to flow from the separator over a cooler through which cold water is passing and then into a can. The can containing the cream should be removed to a place where the atmosphere is kept fresh and cool, and left there for four to six hours to allow the fat-globules in the cream to become completely cooled. The churning may then be proceeded with. Experience has proved that to produce butter with long-keeping quality and of mild flavour the cream requires to be churned as sweet as possible and cold. Where a fuller flavour is desired and long-keeping quality is not of vital importance the cream may be allowed to sour a little before churning. A light sourness is usually present about twenty-four to forty-eight hours after separating. Temperatures much over 60° are high for churning. The lower the temperature, the firmer the butter will be, and the better it is handled without causing greasiness. The churning should be continued until the butter forms into granules about the size of wheat-kernels. The buttermilk should then be run off and replaced with a little more than an equal quantity of water of about 4° lower temperature than the cream, for the purpose of washing the butter-granules. The washing should be repeated, and the second wash-water come away almost as clear as when placed in the churn. After washing allow the butter-granules to drain for a few minutes, then place them on the worker and sprinkle the mass with salt at the rate of about 1 oz. of salt to the pound of butter. Divide the mass into three, and then form into rolls by pressing and folding each about a dozen times ; afterwards remove to a cool place, and let stand from four to six hours or longer to allow the salt to dissolve. The butter will then have a streaky appearance, and should be placed again on the worker and each roll worked about a dozen times, or until the colour is even and all traces of streakiness disappear. Probably the streakiness you speak of is due to the uneven distribution of the salt, and may be overcome by working the butter a little more.

FOWL-MANURE AND SAWDUST.

"INQUIRER," Springston :—

Further to the advice in the *Journal* for June last as to the way to preserve fowl-manure, could you tell me if the value of the manure is lost if it is mixed with straw litter, put in a heap, and allowed to rot? Would it be better if kept dry? Has sawdust any harmful effects when used as a dressing? I have heard it said that sawdust is not good for fruit-trees.

The Horticulture Division :—

The advice given in the *Journal*, and to which you refer, details the best known means of preserving fowl-manure without loss of its fertilizing properties. If mixed with straw litter it may still be valuable material. No manure can be exposed to rain without loss, as rain leaches out a proportion of the soluble contents. Some amount of moisture is necessary, however, to promote decay of the straw. If this condition can be secured the material would be best under cover. When heat is generated in the heap and vapour escapes a large amount of ammonia goes with it, and some value is lost. For this reason, if the manure is not in a fit state to allow for its immediate use, or if it is not convenient to use it at once, the heap should be turned over to check violent fermentation.

Sawdust should not be regarded as manure, nor used as such. If applied to supply humus it would be very slow in decaying, and would form shelter for woodlice and various insects. Other evils would also follow if it were used in any quantity. Authorities dealing with the utility of horse-manure where sawdust is used as bedding state that it is quite safe to use it, as it can absorb liquids that otherwise would be lost, but the dry portions should be discarded. It may be assumed that moderate amounts used in this way will be useful on any but light soils. Clean sawdust, however, could only do harm, especially to fruit-trees.

WARTS ON COW'S TEATS.

E. A. M. L., Mairoa :—

Would you be good enough to advise me of an effective method of getting rid of warts on a cow's teats and quarters? I omitted to treat the cow when it was dry. She has since come in.

The Live-stock Division :—

The only effective method to rid a cow's teats of warts is to clip the warts off with a pair of surgical scissors during the period when the cow is not milking. After the operation, when bleeding has ceased, the teats should be washed, and the spots where the warts have been should be lightly dressed with tincture of iodine. In the meantime, if a little castor-oil is occasionally smeared lightly over the teats it will have the effect of softening the warts and preventing them from becoming sore.

GETTING RID OF SILVERFISH.

A. H. S., Auckland :—

Our house is infested with silverfish, and I shall be glad if you can tell me how to get rid of them.

The Entomologist :—

As silverfish attack farinaceous matter, they may be controlled by means of poisoned flour-paste. White arsenic mixed with paste and spread on pieces of paper which are put in places frequented by the insects should attract and poison them. However, this is a dangerous practice wherever children are about. Another method is to dust infested places with sodium fluoride. If the silverfish are seriously damaging wall-paper, the latter and the scrim should be removed, and the wall-boards sprayed with crude creosote before being rescrimmed.

MAKING GREEN-HIDE LEATHER.

S. H. SMITH, Dannevirke :—

When making green-hide leather, what is the ordinary process for taking hair off the hide ? What amount of water should be used for, say, a 40 lb. hide, which would require 2 lb. of chromate and 1 lb. sulphuric acid for the first solution ? What amount of water should be used in the finishing solution—3 lb. hypo and 1 lb. sulphuric acid ? Would the amount of water used in both solutions have any effect on the finished leather ? What is the best method for making leather soft and pliable ? The weights given are taken from recipes given in the *Journal* for May and August, 1921.

The Live-stock Division :—

A solution containing lime, or lime sulphite of soda, is usually used for removing hair from hides, and you should find the recipe given in the August *Journal* for 1921 quite suitable. The hide should, however, be thoroughly washed afterwards to remove all evidence of lime. The amount of water to be added to the chemicals appears to be immaterial so long as there is enough mixture to thoroughly cover and saturate the hide. The amount of chemicals used is based entirely on the weight of the hide. After tanning, the hide requires to be partially dried and is now ready for "perching" or stretching. This is best done with a wooden crutch which has an old hoe-blade fixed. When stretched, and to make and keep the leather soft and pliable, whale-oil is then well rubbed in.

BEES AND DECAYING FRUIT.

"INQUIRER," Ettrick :—

Kindly advise me what benefit bees can get from overripe apples which have been thrown out. They gather in large numbers on any heap of apples left uncovered, and I wish to know if it is advisable to allow them to do so.

The Horticulture Division :—

Bees are attracted to overripe fruit by the juices set free at decayed spots. Where large quantities of fruit are concerned it should be protected from bees, otherwise it is likely to set up intestinal troubles in them.

HAND REARING A FOAL.

H. W. E., Maungatapere :—

Kindly advise me how to rear a foal by hand. It only had one good drink from its mother, which has since died. I have so far given it milk and water, half-and-half, with a little sugar.

The Live-stock Division :—

The complete hand rearing of a foal from birth is a matter beset with many difficulties, and necessitates extreme care and patience. In the first place it is advisable to use the milk from one cow throughout. To approximate the composition of cow's milk to that of the mare, water must be added to reduce the fat-proportion, and sugar must be used to compensate for the much smaller quantity present in cow's milk as compared with that of the mare. During the first month the proportion of water to cow's milk should be one part of the former to two of the latter. At the second month it can be used one to three, and at about three months water may be excluded. The water should be warmed to blood-heat, with a little sugar dissolved, before adding to the milk. The milk used should be as freshly drawn from the cow as possible. Cold, stale milk will cause diarrhœa. Strict attention must be paid to the cleanliness and previous scalding of milk-vessels. Feeding must be frequent—not less than once hourly after birth, extending the intervals as time goes on, but always observing regularity in time of feeding. If the foal should suffer from indigestion a little lime-water added to the milk will prove helpful, or two teaspoonfuls of baking-soda. If the foal becomes constipated this can be remedied by giving 1 oz. of castor-oil, or an enema of glycerine and water.

BLUESTONE-WATER AND PASTURE.

SIMON AND VOWLES, Moerangi :—

Is bluestone-water poisonous when it is the strength of 8 oz. to the gallon ? I use it in a foot-bath for foot-rot, and wish to know if it will poison the grass.

The Live-stock Division :—

Bluestone-water at the strength mentioned is poisonous if partaken of in any quantity. There is little danger, however, of the sheep carrying enough on their feet to render the grass poisonous, more especially if they are allowed to stand in the yard for a time before being turned into the grass.

WARTY GROWTH ON HACK'S LEG.

S. R. DICKSON, Te Rauamoa :—

A six-year-old hack has during the last twelve months developed something like a wart, nearly as big as a penny, on a hind leg between the hoof and the fetlock. It is raw, and may have been caused by striking timber, as the hack is used on bush country. Will you kindly advise me what is the best treatment ?

The Live-stock Division :—

As the growth appears to be of a warty nature and has been in existence for a considerable time, probably the best treatment would be to cauterize the part with the red iron. Afterwards apply a dressing of the following powder twice daily : Oxide of zinc, ½ oz. ; boric acid, ½ oz. ; iodoform, 15 grains. Keep the part covered with a bandage to protect from dirt.

CURING CALF-SKINS.

HORACE SIMON, Orakipawa :—

Would you please give me a reliable recipe for curing calf-skins with the hair intact ?

The Live-stock Division :—

The most reliable method is as follows : In 1 quart of water thoroughly dissolve 12 oz. alum, 4 oz. salt, 4 oz. oatmeal, and 2 oz. saltpetre. Rub this mixture thoroughly all over the skin on the flesh side, and fold (flesh to flesh). Allow the skin to remain for three weeks, turning once weekly. The skin should then be exposed to the wind and air until it is half-dry, when any flesh should be scraped off and the skin should be pliable. Then dry thoroughly, and it is fit for use.

Noxious Weeds. — Gorse, foxglove, and ox-eye daisy have been declared to be noxious weeds within the County of Hauraki Plains, and foxglove within Kiwitea County.

British Market for Peas and Beans.—The following information was cabled by the High Commissioner, London, on 3rd November : Peas—Market quiet and tendency lower. New Zealand Partridge stocks very heavy and selling very slowly at 60s. to 75s. per quarter ; Tasmanian small spot supplies making 80s. to 85s. ; English 55s. to 60s. New Zealand blue nominally £17 to £19 per ton ex store ; Tasmanian £19 to £20 ; small business has been done with Japanese forward shipments at £20 (spot value about £23) ; English offering at £19 to £20 ; New Zealand on passage offering at £17 10s., but no business reported.

QUALITY IN FROZEN MEAT.

THE following remarks were made recently by Mr. J. Fraser, General Manager to the New Zealand Meat-producers' Board:—

"It is a better proposition for a farmer to produce high-quality mutton of medium weight than sheep running up to, say, 75 lb. In years gone by the difference on Smithfield in value between good-quality light sheep was a matter of farthings; to-day there is a difference of pence per pound, so insistent is the demand for light sheep of good quality.

"To-day a 55 lb. wether of prime quality would realize on Smithfield about 8½d. per pound, equal to 38s. 11d. per head; whereas a heavy wether weighing, say, 75 lb. would realize about 6½d. per pound, equal to 40s. 7d. per head. But, in addition to this, we must take into consideration the respective cost of placing these sheep on the Smithfield market, including killing, freezing, freight, and London charges—on a 55 lb. wether at, say, 2¾d. = 12s. 7d.; on a 75 lb. wether at the same price = 17s. 2d. On these figures, based on Smithfield prices, a 55 lb. wether works out at about 2s. 11d. more than a 75 lb. Besides this loss, the reputation of our meat is not improved by sending heavy mutton of indifferent quality.

"The same applies to beef. There is a demand for a limited amount of heavy beef, provided it is of prime quality, but what the London market wants is bullocks weighing from, say, 700 lb. to 800 lb., of prime quality, and not too old."

NEW ZEALAND DAIRY-PRODUCE CONTROL BOARD.

REGULATIONS FOR ELECTION OF PRODUCERS' REPRESENTATIVES.

THE poll of producers, taken on 17th October, resulted in the proposal that the Dairy-produce Export Control Act be brought into operation being carried by 22,284 votes against 9,255. It was then formally declared by Governor-General's Proclamation that the Act should come into operation on 3rd November. Regulations prescribing the manner of taking the votes of producers for the election of members of the Control Board under the Act were gazetted on 8th November, as follows:—

1. In these regulations "the Board" means the New Zealand Dairy-produce Control Board; "the Minister" means the Minister of Agriculture.

2. For the purpose of taking the votes of producers there shall be appointed a Returning Officer, who shall make all necessary arrangements.

3. For the purpose of the election of producers' representatives the Minister shall direct the preparation of a roll of producers for the North Island and of a roll of producers for the South Island; and such rolls shall be compiled from information furnished by each owner of a dairy factory manufacturing dairy-produce for export, and registered with the Department of Agriculture in accordance with the Regulations under the Dairy Industry Act, 1908.

4. The election of members to the Board shall close on the 13th day of December, 1923, and shall be by a system of postal voting. No voting-paper shall be valid which is not received before noon on that day.

5. No person shall be eligible for election as a producers' representative unless he has been nominated by two or more producers whose names have been submitted to the Returning Officer by the owner of any such dairy factory, and he has accepted nomination in writing, or by telegraph.

6. Nothing in the foregoing regulations shall prevent the Returning Officer from accepting a nomination-paper in such manner as, in his opinion, is sufficient to identify the candidate and nominators.

7. No producer shall be entitled to nominate more persons for election than the number of producers' representatives required.

8. The form of nomination shall be in the form No. 1 in the Schedule hereto, or to the effect thereof.

9. The last day and hour for receiving nominations shall be the 22nd day of November, 1923, at noon.

10. If no more persons are so nominated as producers' representatives than are required to fill the vacant positions on the Board, such persons shall be deemed to have been duly elected.

11. If more persons are so nominated than are required to fill the vacant positions on the Board, the Returning Officer shall cause voting-papers to be printed, in the form No. 2 in the Schedule hereto.

12. At such ballot no voting-paper shall be valid unless votes are recorded for the full number of persons required to be elected.

13. Where there is an equality of votes between any condidates and the addition of a vote would entitle one of such candidates to be declared elected, the Returning Officer shall give a casting-vote.

14. Subject to the foregoing provisions, the candidates required to be elected who have received the greatest number of votes shall be declared elected by the Returning Officer by notice in the *Gazette*.

SCHEDULE.

FORM NO. 1.—NOMINATION OF PRODUCERS' REPRESENTATIVE ON NEW ZEALAND DAIRY-PRODUCE CONTROL BOARD.

To the Returning Officer, Box 25, Government Buildings, Wellington.

WE, the undersigned persons carrying on business as suppliers of milk or cream to factories manufacturing dairy-produce for export, do hereby nominate A. B. [*Full name*], of [*Residence and occupation*], with his consent, as a candidate at the election of members of the New Zealand Dairy-produce Control Board.

Dated at , this day of , 1923.

[*Full names, residence, and occupation of two or more producers.*]

I, A. B. [*Full name*], do hereby consent to the above nomination.

A. B. [*Residence and occupation*].

FORM NO. 2.—VOTING-PAPER.

New Zealand Dairy-produce Control Board: Election of Producers' Representatives to Board, 1923.

MARBLE, Roland Top.
APPLE, James Ross.

Directions.—The voter must vote for the *full number of candidates* (*six* for the North Island or *three* for the South Island); he shall leave uncancelled the names of the candidates for whom he desires to vote, *and must strike out* the names of all the candidates not voted for. Should a voter leave uncancelled the names of *more or fewer* persons than there are producers to be elected, then his voting-paper shall be invalid. A voter is only entitled to *one* vote. After indicating the vote in manner aforesaid this voting-paper is to be transmitted to the Returning Officer, Box 25, Government Buildings, Wellington, so as to be delivered at his office on or before noon on the 13th December, 1923. An addressed envelope is enclosed for use in transmitting the voting-paper.

IMPORTATION OF FERTILIZERS, SEPTEMBER QUARTER.

FOLLOWING were the importations of fertilizers into New Zealand for the quarter ended 30th September, 1923: *Sulphate of Ammonia*—United Kingdom, 300 tons; Australia, 32 tons; Belgium, 50 tons. *Gypsum*—United Kingdom, 1 ton; Australia, 356 tons. *Nitrate of Soda*—United Kingdom, 60 tons. *Basic slag*—United Kingdom, 2,300 tons; Belgium, 4,997 tons. *Bonedust*—Australia, 509 tons. *Chardust*—Australia, 50 tons. *Guano and Rock Phosphates*—New Caledonia, 1,673 tons; Ocean Island, 6,350 tons; Makatea Island, 14,273 tons. *Superphosphate*—Belgium, 5 tons. *Phosphates, other*—Egypt, 3,800 tons. *Kainit*—United Kingdom, 15 tons; France, 299 tons; Germany, 325 tons. *Sulphate of Potash*—United Kingdom, 75 tons; Belgium, 45 tons; Germany, 60 tons. *Potash, other*—United Kingdom, 25 tons; France, 50 tons. *Fertilizers, other*—United Kingdom, 3 tons.

THE SEASON'S LAMBING: NORTH ISLAND ESTIMATE.

FROM information furnished by the Inspectors of Stock in the various districts the average lambing for the current season in the North Island is estimated at 91·34 per cent. With 7,170,154 breeding-ewes in the North Island, as shown in the 1923 sheep returns, the number of lambs is estimated at 6,549,143. The corresponding figures for last year showed a lambing percentage of 90·36 and 6,118,530 breeding-ewes. South Island and Dominion estimates will appear in next month's issue.

ESTIMATED AREAS UNDER WHEAT AND OATS.

THE following estimates of the areas under wheat and oats in the Dominion for the current season have been issued by the Government Statistician, under date 31st October, the figures being based on the usual card census: Wheat—North Island, 5,000 acres; South Island, 180,000 acres: total, 185,000 acres. Oats—North Island, 55,000 acres; South Island, 390,000 acres: total, 445,000 acres. The corresponding final totals for the previous season (1922–23) were 278,687 acres of wheat and 468,928 acres of oats. In the current season's wheat-sowings the areas under the different varieties are given as follows: Tuscan or long-berry, 124,727 acres; Hunters (various), 33,739 acres; Velvet or Pearl, 13,901 acres; balance unspecified.

KILLINGS AT MEAT-WORKS, SEASON 1922-23.

FIGURES supplied by the Meat Control Board show the killings at all freezing-works in New Zealand for the season 1st November, 1922, to 31st October, 1923, as follows, the unit given being the 60 lb. freight carcase:—

Class.	North Island.	South Island.	Dominion.
Beef	1,241,130	9,703	1,250,833
Wether mutton	903,385	103,875	1,007,260
Ewe mutton	328,438	137,806	466,244
Lamb	1,148,081	1,592,482	2,740,563
Sundries	260,531	40,277	300,808
Totals	3,881,565	1,884,143	5,765,708
Totals, 1921–22 ..	3,898,254	2,113,443	6,011,697

Freight on Stud Pigs from Britain.—Although the shipping companies have for some little time past been carrying stud sheep and cattle freight free from Britain to New Zealand, this concession does not apply to pigs. The freight rates for pigs are £7 17s. 6d. per head up to five, and £6 6s. per head for over five.

Area under Potatoes.—The Government Statistician estimates the area under potatoes this season (1923–24) as 5,500 acres in the North Island and 11,000 acres in the South Island, or a total of 16,500 acres. The corresponding final figures for the 1922-23 season were 5,370, 14,827, and 20,197 acres respectively. Only holdings of 1 acre and over outside borough boundaries are covered by these figures. A fair aggregate area of potatoes is grown on the smaller holdings and within boroughs.