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AN INSECT INJURIOUS TO SPRUCE-TREES.

[By A. H. COCKAYNE, Biologist.

RED SPIDER.

UNTIL recently the various members of the spruce (*Abies*) family, which are largely used for both shelter and ornamental purposes, have been singularly immune from any insect or fungoid attack. During the past three seasons, however, various species of *Abies* (especially *Abies Menziesii*) have suffered severely in the South Canterbury District from the attacks of a minute insect belonging to the red-spider family. Quite a number of trees have been killed, while many more are in a very sickly condition.

There appear to be quite a number of species of red-spiders, red-mites, or spinning-mites, as they are often termed, injurious to cultivated plants in New Zealand. They seem all to belong to the two genera *Tetranychus* and *Bryobia*, which are distinguished from each other by well-marked characters both in their structure and life habits. The three best-known species here are *Tetranychus athaeae*, which is abundant and often very injurious to hops; *Tetranychus telarius*, a bad greenhouse and garden pest, preying on a large variety of plants, and especially injurious in the open on cape-gooseberries, violets, and primroses; and *Bryobia pratensis*, the red-mite of the fruitgrower. This last-named is a serious pest on many varieties of fruit-trees, notably the apple and peach; but in certain seasons *Tetranychus telarius* is also found abundantly on fruit-trees. The individual species of the red-spiders are difficult of determination except by a specialist, and this group has been very much neglected by both collectors and systematists, so that the literature on them is very scattered and difficult of access.

The injury to the spruce was first attributed to the red-mite (*Bryobia pratensis*), but an examination of affected material shows that a species of *Tetranychus* is responsible for the damage.

The nymphs of all the red-spiders possess three pairs of legs, while four pairs are developed on the adults. In *Bryobia* the fore legs are very much larger than the rest, while in *Tetranychus* the fore legs are only slightly longer than the others. In the case of *Bryobia*, especially in *Bryobia pratensis*, very little if any web is ever spun, while with the species of *Tetranychus* beautiful silken bowers are spun in the leaf-nerves, and at times masses of



APPEARANCE OF DISEASED SHOOT (REDUCED).

leaves and twigs are bound together with an extremely fine and shining web. The wintering habits of the two genera appear to be quite different. In *Bryobia pratensis* large masses of eggs are laid (just visible as reddish dots to the naked eye), in the summer on the branches of infested trees, especially in the forks of the branches and on the bark above and below the leaf-axils. They may be in such immense numbers as to give a quite distinctive red colour to the branches. The eggs remain dormant throughout the winter, and hatch in the spring. There may be several broods pro-

duced from eggs laid in the summer, but these appear to depend on the weather-conditions to a large extent. In *Tetranychus* the main wintering-over seems to be done by the mites themselves descending into the soil and sheltering in the cracks of the bark, remaining quiescent during the winter and appearing again when dry, hot weather sets in. Large numbers of eggs very similar to *Bryobia*, but lighter in colour, are laid during the summer,



ENLARGED VIEW OF DISEASED SHOOT, SHOWING WEB-DEVELOPMENT.

and if the weather is favourable to their development there may be a succession of insects. A few wintering eggs may be produced on the affected plants, but this will be quite exceptional.

THE SPRUCE-MITE.

The *Tetranychus* affecting spruce-trees agrees very closely with the two-spotted red-spider (*Tetranychus bimaculatus*), but specimens will have to be submitted to a specialist before the scientific name can be given with any degree of certainty.

The first sign of infestation is manifested by a yellowing of the leaves on the young branches. The leaves soon become quite dry, and fall off. In certain cases, although separated from the branches, they do not fall directly to the ground on account of the silken web which is spun along the stems, and for some time the leaves are held in place. Finally, however, in cases of very bad attack the trees may become almost completely defoliated, and the branches gradually die back from the tips.

The period of infestation varies according to the dryness of the season, but the little insects are generally to be found crawling over the leaves and sucking out the juices from the middle of December till the end of March, when they appear to migrate into the soil. No eggs have been observed on the affected trees during the winter, but large numbers are produced amongst the webs during the period of infestation.

METHODS OF CONTROL.

It is difficult to suggest methods of control until the life-history of the insect is properly worked out, but they will apparently have to be quite different to those that are adopted against the ordinary red-mite *Bryobia pratensis*.

In the case of *Bryobia* on fruit-trees, the most favourable time to control the insect is during the winter, when the eggs are exposed on the bare branches of the trees. In New Zealand the best results have been secured with an oil spray applied during the dormant season, using an emulsion containing about 6 per cent. of either a lubricating or cylinder oil. The lubricating-oils, especially those known as red machinery oils, are very suitable, as they are easy to prepare for spraying either with soft-soap or the method that I advocated in the July number of this Journal.* Against the red-spiders that hibernate in the ground this single winter spray cannot, however, be of any effect, as at the time it is applied there are no eggs or mature insects present on the plants.

It has been repeatedly asserted that dry weather is the main cause of the spread of red-spiders on plants, but in New Zealand even in greenhouses that are kept fairly damp *Tetranychus telarius* very often becomes a very serious pest. It has, however, been noted that spruce-trees growing near running water do not seem to become as badly infested as trees grown on very dry soil. Spraying for the spruce red-spider will have to be regulated entirely by the size of the trees and the practicability of spraying without undue expense. Weldon† reports excellent results against *Tetranychus bimaculatus* with the use of sulphur, using 1 lb. to 5 gallons of water. A small amount of soap is used in the water, and a constant agitation is needed to keep the material in suspension. It is important that the sulphur should

* Vol. i, No. 2, p. 92.

† Journal Econ. Entomology, vol. iii, p. 432.

be well screened to keep out any lumps. The spray would have to be applied at the first sign of infestation in the summer. Among large trees planted closely together spraying would, of course, not be feasible, and some soil treatment would be necessary to try and destroy the hibernating insects. I would be inclined to try the use of such soil-fumigants as Vaporite or Apterite. Carbon-bisulphide might also be effective, but its expense would preclude its use over large areas. Heavy liming of the ground around the affected trees, as has been suggested for the control of the hop red-spider, might also lead to good results, and would be quite practicable. The illustrations show the general appearance of an affected twig, and a portion of the underside of a stem with the silky web that is invariably developed.

THE GRASS-GRUB.

THE Fields Instructor, South Island, reports as follows on the influence of various systems of sowing grass upon the prevalence of the grass-grub :-

I have made careful and extensive inquiries in several districts to ascertain in what rotation the grass-grub becomes most destructive. Opinions differ, but from the information obtained and my own observations I am inclined to believe that it is worst in grass sown out with a white crop, and is not so prevalent in grass sown in autumn.

The following is a report by Inspector Scott, Lincoln :-

“ In connection with grass-grub, farmers generally seem to be of opinion that grass sown out with white crops is more subject to the attack of grub than when it is laid down, say, with a crop of rape. Several of the farmers speaking on the subject were of opinion that the rotation of crops has very little significance in its relations to the attack of grass by grub. My own opinion, formed as a result of observations made during the past few months, is that grass sown out with rape is, during its first year, rarely if ever attacked, and also, that it remains longer free from grub than when the grass has been sown with a white crop. In fact, although many grass paddocks which last year had been sown out with white crops have been badly devastated, I have not seen one instance of serious damage by that pest in last year's grass sown out with rape.

“ On Banks Peninsula the experience has been that whenever the grass had been allowed to remain long, thus preventing the operations of birds, the damage done by grub was much greater than when the grass had been well grazed down.”

Inspector Huddleston, Timaru, reports as follows :-

“ The grub has done the most damage here to winter wheat, on grass land, and in fields of cow-grass and rye-grass in their second year.

“ Most of the spring wheat goes in on root ground, and so far is very little troubled with grub.”

THE WEATHER AND AGRICULTURE.

[By D. C. BATES, Director of Meteorological Office.]

FEBRUARY.

RAINFALL FOR FEBRUARY, 1911.

Departure from Normal for the Month, + above, - below.	Station.	Total Fall.	Number of Days Rain fell.	Maximum Fall, and Date.
<i>North Island.</i>				
In.		In.		In.
- 0.73	Pakaraka	3.08	6	2.26 on 24th.
- 1.15	Auckland	1.76	7	1.56 " 24th.
- 1.15	Waiuku	1.38	6	1.28 " 24th.
+ 0.27	Waihi	4.26	11	2.74 " 24th.
- 1.03	Hamilton	1.58	6	1.10 " 24th.
+ 4.67	Gisborne	8.26	15	3.44 " 11th.
+ 1.39	Meeanee	4.14	15	1.04 " 25th.
- 1.85	New Plymouth ..	2.24	4	1.26 " 24th.
- 3.29	Inglewood (Taranaki)	3.56	5	2.42 " 24th.
- 0.17	Wanganui	2.47	6	0.76 " 25th.
+ 4.20	Levin	6.92	5	2.04 " 25th.
+ 4.25	Wellington	7.58	9	6.32 " 25th.
<i>South Island.</i>				
- 0.27	Nelson	2.29	5	1.26 on 25th.
+ 1.87	Highfield (Amuri) ..	4.34	6	3.30 " 25th.
- 6.62	Hokitika	1.04	5	0.50 " 19th.
- 6.22	Okuru	1.96	3	1.68 " 20th.
+ 0.67	Lincoln	2.28	5	1.10 " 25th.
- 0.38	Kapunatiki	1.32	4	0.82 " 3rd.
- 1.17	Oamaru	0.66	6	0.20 " 20th.
- 1.68	Balclutha	0.32	3	0.14 " 4th.
- 2.35	Dipton	0.46	2	0.30 " 19th.
- 1.91	Invercargill	0.77	7	0.26 " 2nd.

THE diversities of climate presented by New Zealand are accounted for not only by its great length, extending as it does nearly a thousand miles almost north and south, but also by its physical conformation. Less marked are the differences between the climate of the northern and southernmost districts than between those parts on the east coast of the South Island and parts on the west coast of the same Island. To take the extremes: While the latter lie open to the prevailing westerly winds and have a rainfall of 114 in. and upwards, the driest parts in Central Otago, on the lee side of the New Zealand Alps, have only 14 in. and less of an annual rainfall. On the one side are found lofty trees and thick under-

growth, while the other presents features resembling parts of Australia and South Africa, where the climate is dry, and the land, though fertile enough, is but little used. These marked differences in the climate in general are paralleled by changes in the weather which occur from time to time as the result of different atmospheric disturbances, and are accentuated by the physical conformation of the country.

During the past season rainfall has been deficient over the North Island and east coast of the South. Westerly disturbances with lowest barometric pressure in higher latitudes have passed over the South Island or else dispersed or gone further south, while there has also been a remarkable absence of disturbances with centres of low pressure further north or coming as cyclonic areas from the Tropics. The month of February, on the other hand, shows an absence of westerly low pressures; but three disturbances of an extropical nature were in evidence, the centres of which passed through Cook Strait on two occasions, and once off East Cape. The storms experienced were mostly confined to the east coast and regions about Cook Strait, and, while these parts show a higher rainfall than is usual, other districts throughout the Dominion have less than the average fall for the month. On the west coast of the South Island the rainfall was only one-seventh the usual of the month, and this owing chiefly, as before noted, to the absence of westerly low-pressure areas.

Between the 2nd and 4th a low-pressure area passed over the middle parts of the Dominion, but this was of a very mild character. On the 11th a cyclone, centred off East Cape, caused considerable rain and wind over the North. The most remarkable disturbance was a cyclone which came down on the west coast of the North Island and had a barometric reading of 29.40 in. at its centre in Cook Strait on the night of the 25th. This storm caused heavy rains and high winds in many parts of the North Island, and especially on the northern coasts and narrowest parts of Cook Strait. The City of Wellington experienced a rainfall of 6.32 in., and a southerly wind with a velocity totalling 860 miles for the twenty-four hours. This rainfall was the maximum fall in a single day for a period of fifty-four years, the previous record being 5.70 in. on the 1st March, 1893.

DISTRICT NOTES.

North Island.

Whangarei Heads.—Except for a southerly burster on the 4th and 5th, February was a fine month—nice clean weather, with the temperature above 75°.—(F. J. McKenzie.)

Auckland.—An universally dry February, almost the whole of the rain recorded falling on the one day (24th). Mean temperature and barometric pressure both considerably under the average.—(T. F. Cheeseman.)

Waiki.—The month was very dry, the fall on the 24th affording temporary relief from drought, replenishing the rapidly falling water-supply. The

effect on the pastures was not lasting, however. The sandy, pervious soil of the district requires constant falls to be of material benefit. Cool conditions prevailed, with light breezes. Heavy dews were frequent. The grass minimum thermometer registered 6° of frost on the 8th. The mean temperature was the lowest recorded for February. *(H. B. Devereux.)*

Te Aroha.—This month has been very dry, and weather oppressive, no doubt owing to the bush-fires raging in the vicinity. *(F. M. Lyons.)*

Kohukohu (Hokianga Harbour).—The month was characterized by extreme dryness during the first three weeks, following the rather dry month of January. Many of the creeks throughout the district dried up altogether, and water for dairying purposes became scarce. The atmosphere was thick with smoke for weeks together, due partly to local fires, and chiefly probably to constant southerly winds bringing up the smoke of fires from the south. *(A. C. Yarborough.)*

Kawhia.—A very hot and dry month. *(J. K. Newton.)*

Rotorua.—A very dry month, with the exception of the rains on the 24th. More rain wanted—country very dry. *(J. F. Robieson.)*

Raurimu.—The greater part of the month was hot and dry. *(E. Gould.)*

New Plymouth.—A very fine month, with little rain, but plenty of wind-gales blowing on five days. The prevailing wind was south-east, on sixteen days. *(W. D. Fletcher.)*

Plymouth Street (Wanganui).—For a great part of the month up to about the 24th the river, especially in the upper portion, was exceptionally low, being 5½ in. to 6 in. below the River Trust zero on water-gauge at Pipiriki, this zero being a low summer level. The steamer services Wanganui to Taumarunui were, however, maintained with some difficulty. *(J. T. Stewart.)*

Taihape.—A warm and comparatively dry month, log and grass fires burning in some parts of the district during the middle of the month until welcome showers of rain came on the 20th. More showers fell on the night of the 24th from the south-east, changing to the north-east, followed by a calm from 4 p.m. on the 25th until 6 p.m., when a strong gale sprang up from north-west, moderating at daybreak, and changing at 8 a.m. to mist and rain from south. Only 0.70 in. fell for the three days 24th–26th. *(A. R. Fannin.)*

Waituna West (Feilding).—The past month has been a somewhat trying time for a number of our settlers. Having been hot and dry, decrease in both feed and water has caused them considerable anxiety, and the milk-returns have fallen extensively in consequence. About the middle of the month things looked serious, but the rainfall on the 20th saved the situation, and there has been no danger since. Before that time the outlook for winter feed was anything but good; but the rainfall thence onward has made things much brighter, and the grass is coming away nicely. The wind during the month has been quite exceptional, blowing most of the time from the south-east and south. One foggy night, and one earthquake were noted. *(J. Guylee.)*

State Farm (Weraroa).—Hard dry weather during the first three weeks. Last week more mild; slightly frosty; good rain on the 24th. *(James Allan.)*

Pahautanui.—The early half of the month was very dry, and threatened to be serious to stock, as feed had become scarce, and what there was possessed little nutriment; but on the 20th 62 points of rain fell, which was very welcome to all concerned. On the 22nd cloudy weather set in, and culminated on the 24th with steady rain; and on the 25th the heaviest downpour experienced here for several years occurred—3·8 in. for twenty-four hours—the greater part falling during the night. The streams were only in ordinary fresh, the land being so dry that it absorbed a very large quantity of the water. Very little thunder was noticed, but during the heavy downpour a sharp earthquake occurred at 3·45 a.m. The rain has quite changed the appearance of the country. With more rain and warm weather grazing prospects should be brighter.—(*J. Pearce.*)

Tolaga Bay.—A most exceptional month, both as regards the rainfall and the number of southerly and south-easterly gales; in both, I think, a fair record has been established. Grass is now plentiful everywhere; but the wet month has destroyed most of the grain crops.—(*W. E. Holder.*)

Mecanee (Napier).—A month of scarcely any horizontal movement of the atmosphere—a great amount of cloud, and very little sunshine. The temperatures were low, with no very great extremes. Dew-point was very high, and as a consequence the usual fall of dew gave place on several occasions to nocturnal showers. On fifteen days rain fell, though between them they totalled in the end only 4·13 in. of rain. The soil at the various depths between 1 ft. and 3 ft. attained its highest temperature during the last week in January, and has been getting slowly colder since.—(*P. J. Smyth, S.M.*)

Dillon (Masterton).—A good deal of cold southerly weather: maximum temperature low for the time of the year. Rainfall exactly double the thirty-years average for this month.—(*S. Mawley.*)

South Island.

Manu.—The weather from the 1st to the 18th was very dry. Most of the small creeks dried up altogether, and the large streams were very low. Ground dry and parched, and clay soil cracked. This has been the driest spell of weather in the Nelson District for four years. Even the green trees in the beech forest were commencing to wither on account of lack of moisture. There have been a large number of bush-fires in the district, and at times the smoke was hanging so thick as to effect the eyes. Fortunately there was little or no wind to fan the fires, or the consequences might have been serious. The burns have been good, and at last welcome rain has set in at a very steady rate, and this will insure its soaking into the parched ground. On the other hand, owing to the clayey nature of the soil, if the downpour had been sudden, severe floods would have resulted. There is next to no grass left, owing to the excessively dry weather.—(*G. G. Wilson.*)

Pakawau.—Hot, dry month: much smoke from bush-fires; grass dried up.—(*T. C. V. Field.*)

Karamea.—The first three weeks were dry, and the farmers took advantage of this in logging up and clearing their lands. There were several good burns, as no rain fell for twenty-five days in succession, and only 27 points for a period of thirty-five days. There was no shortage of feed,

and the grass retained its verdure throughout the dry spell. This is due, no doubt, to the slow evaporation, absence of high winds, and the heavy dews. No great ranges of temperature were experienced: maximum in the shade, on the 12th, being 75°, and minimum, on the 3rd, 44°. (*E. J. Gilmore.*)

Hokitika.—Beautifully fine month—a little too dry for farmers; but, on the whole, a favourable one for late crops.—(*A. D. Macfarlane.*)

Christchurch.—North-east winds prevailed chiefly throughout the month, with seven calm days; on the remaining twenty-one the wind was north-east on twelve days, and south-west on seven. Rainfall considerably above the average for the month for the last ten years, owing to the extraordinary fall on the 26th.—(*H. F. Skey.*)

Methven.—An excellent month from the farmers' point of view: heavy rain on three days, with calm, bright sunny days between—very suitable for reaping and stacking grain.—(*J. Carr.*)

Waimate (Canterbury).—Though there was a good deal of cloudy weather, it continued during the month to be dry and fine, with little wind. Light to moderate easterly winds have been prevalent. Harvesting-work is all done, and rain is much wanted. The ground is dry, and feed short.—(*W. M. Hamilton.*)

Trotter's Creek.—The driest month for this locality for many years.—(*W. S. D. Trotter.*)

Bushey Park (Palmerston South).—A very dry month. Rain is badly wanted for pasture and turnips. A slight shock of earthquake was felt on the morning of Sunday, the 26th, at 6.50.—(*Mrs. J. McKenzie.*)

Gladbrook Station (Middlemarch).—A very dry month. Grass burnt up, and stock short of feed on the paddocks. The turnips are not doing any good, and in some cases are drying off with the drought. The prospects for winter feed are bad, as the pastures are so bare at present that no roughness will be at all left. The oldest settler never saw this district so bare before.—(*A. McKinnon.*)

Lower Crawford's.—The month of February, though free from winds, has been very dry; any winds which we have had have been cold south-west winds, which, as a rule, are a sign of dry weather in Central Otago. Grass and turnips are perishing for the want of rain. It is ideal harvest weather for grain crops.—(*J. C. Buchanan.*)

Riverton.—This has been the driest February on record, and the want of water is telling against the dairying. The fine weather has made an early season, and the crops in this district are all about in stook. There is every indication that farmers will have to sow much earlier, if we take the records of the past few seasons, thus giving the crops a fair chance to develop before ripening. There is every indication that the break of the drought in the north is not going to reach us, as the glass this day (the 1st) is again rising.—(*J. Gearey.*)

Roslyn Estate (Woodlands).—Very dry month, and grass is getting dried up.—(*J. D. Trotter.*)

Gore.—A very dry month. Splendid harvest weather, but much too dry for grass and turnips.—(*A. A. Scott.*)

Dipton.—Weather for the month very hot, consequently drought felt severely. I find that in July, 1909, we had a drier month here, only 38 points falling for the month, on six days.—(*R. D. MacLaughlan.*)

FORMALIN IN DAIRYING: ITS USE AND ABUSE.

[By B. C. ASTON, F.I.C., Agricultural Chemist.]

SEVERAL cases have recently occurred in which suppliers have preserved their milk with formalin to such an extent that not only has the factory-manager found the milk so adulterated to be useless for cheese-making, but, also, other good milk with which it had been mixed has been spoiled, and the whole contents of the vat have become a total loss. It is therefore considered desirable, in the interests of both suppliers and factory-managers, to publish a few words concerning this very powerful preservative and undoubted poison.

WHAT FORMALIN IS.

“Formol,” “formalin,” or “formaline” are the trade names for a solution of formic aldehyde (formaldehyde) in water, of a strength varying from 30 to 40 per cent. (usually 37 per cent.). Formic aldehyde is made by oxidizing methyl alcohol (pure wood-spirit). Lamps in which formaldehyde may be produced by burning wood-spirit in a certain manner are often used for disinfecting sick-rooms. The strong antiseptic, deodorizing, and preservative power possessed by formalin caused it to be put on the market about sixteen years ago, and it was at first thought that a harmless and effective preservative for foodstuffs had been discovered. Numerous prosecutions throughout the world soon showed vendors of food-stuffs the attitude which the medical profession adopted towards the use of the compound in food. In England, in 1904, a Departmental Committee of the Local Government Board stated that formaldehyde was a “very potent and poisonous substance,” and recommended that its use as a preservative in milk should be absolutely prohibited. Numerous convictions have been recorded in Great Britain for adulterating milk with formalin, the Medical Officers of Health usually testifying to its injurious effects on health, especially of young children.

The reason of this note is not so much to draw attention to the injury to health which may result from the ingestion of formalin, as to point out that its addition to milk supplied to dairy factories is utterly indefensible; that detection is sure to follow; that such addition is forbidden by the Dairy Industry Act; and that should much injury result to dairy produce in course of manufacture the supplier would doubtless be liable to an action for damages as well as for infringing the statute.

Formaldehyde has been called the most powerful antiseptic known, and in cases of retarded formation of lactic acid and other changes in the

curd necessary to the successful manufacture of cheese, its presence in injurious amounts should at once be suspected by the trained factory-manager. It is, however, quite possible that the manager may overlook the possibility of preservatives having been added, or the amount of formalin is only sufficient to result in the production of inferior cheese rather than irretrievable damage to the whole batch, in which case some time may elapse before the adulteration is discovered. A certain amount of lactic acid is desirable in butter-making; the use of formalin in milk for butter-making is also inadmissible.

As most of the factories are co-operative, the supplier who puts formalin in his milk is doubly damaging his own business.

The use of formalin as a preservative can only be sanctioned for preserving samples or specimens which are not intended for human consumption. For preserving composite milk-samples in the factory until such time as they can be analysed formalin is invaluable. One drop will keep half a pint of milk quite fresh for a week. Being a liquid it is easier to manipulate, and, unlike bichromate of potash, it does not in the small quantity used appreciably affect the analysis of the milk for total solids.

Owing to the condensation of formaldehyde into a solid (paraformaldehyde), bottles which have contained it should not be used for other purposes, as it is with great difficulty that such bottles can be cleaned.

HOW TO DETECT FORMALIN IN MILK.

The simplest way to detect formaldehyde in milk is to mix a little milk with a similar bulk of water in a test-tube, and then gently pour down the side of the tube a little commercial concentrated sulphuric acid, so that it rests at the bottom of the tube in an even layer. Should formalin have been added, a violet-blue or mauve ring makes its appearance in a few minutes at the junction of the sulphuric acid and the milk. This colour is permanent for two or three days, and by it 1 part of formalin in 200,000 may easily be detected. This must not be confounded with the red-brown ring which always makes its appearance after a little time, lower down in the acid than the violet ring, and which is due to the charring of the milk by the sulphuric acid. Those using this test should practise it for themselves by adding one drop of formalin to half a pint of milk, and comparing the test with milk to which no formalin has been added.

In the testing of milk by the Babcock method, this violet-blue colour often appears when formalin has been added.

Another test is to warm the suspected sample, when the characteristic pungent smell of formaldehyde becomes apparent if formalin is present. It is said that in this manner 1 part of formalin in 25,000 of milk may be detected.

COW-TESTING ASSOCIATIONS.

PROGRESS NOTES.

[By W. M. SINGLETON, Assistant Director, Dairy-produce Division.]

THE fifth period for the four cow-testing associations being operated by the Dairy-produce Division evidenced a falling-off in the production of both milk and butter-fat in each of the four associations. These thirty-day periods do not close on the same date for each association, and, since the feed is getting less succulent, those periods closing at the later dates would naturally be expected to show the lowest average production per cow. For periods ending between the 28th January and 14th February, the yield of the average cow in the respective associations has varied from 27.81 lb. to 31.62 lb. butter-fat, whereas during the previous period the variation was from 31.54 lb. to 36.07 lb.

From the general viewpoint, the most noticeable feature about the last test is the great shrinkage in yield of the various herds. During the thirty days between the taking of this fifth test and its predecessor, the shrinkage is two and a quarter times what it was during the previous thirty days. Had all these cows proper feed and plenty of good water, the variation should not show this marked decrease.

Some individual herds have evidenced practically the same rate of falling-off in yield as during the previous period, and, other things being equal, this is as it should be. While some herds have maintained their yield in this creditable manner, others have lessened their yield very rapidly, and the decrease in the production of some herds is shown to be from three to four times as much as was the case during the previous period.

The special-purpose dairy cow, with some succulent feed from a soiling crop in addition to ordinary pasture, will not show such abnormal decreases in yield as some of these herds evidence. Dairy-farmers know well how nearly impossible it is for dairy cows to be "brought back" in their yield after it has once fallen very considerably.

The variations in the production of the average cows in the various herds shows much the same difference as in previous tests. During the fifth period, at

Dalefield,	27	} cows of the best herd gave the same yield as	} (37)	} of the worst.	
Stratford,	25				
Cambridge,	21				} (37)
Kaupokonui,	21					} (38)

The expense of keeping, feeding, and milking 37 or 38 dairy cows for the same total yield as is produced by herds numbering 21 to 27 does not appeal favourably to most dairy-farmers, and still many dairy-farmers are thrusting on themselves expense, labour, and worry in this connection which the returns and net profits do not justify. In the instances given, although the total yield of the larger herd equals that of the smaller herd, the net profit of the smaller herd will be much the greater.

Better cows, better fed, and quietly handled, are necessary to insure the increased profit for which so many dairymen are striving.

The only sure way of ascertaining the good and inferior cows is by testing the individual yields.

THISTLES AS FODDER-PLANTS.

THE following note on the possibilities of the wing thistle as a fodder-plant is supplied by the Director of Fields and Experimental Farms :—

The true winged thistle (*Carduus pycnocephalus*) is plentiful throughout New Zealand, but is usually confined to waste places and grazing-areas, and is not troublesome on cultivated lands. In portions of the depleted areas in Central Otago and the Mackenzie country it constitutes a considerable and valuable food for stock, especially sheep, when no other vegetation is available; and it undoubtedly has a high value under such conditions. Its cultivation as a fodder-plant could not be advocated except on such country, and even there it would be displacing plants of much greater nutritive value which could otherwise occupy the same ground. It must be remembered that it lasts for only a portion of the year. The winged thistle must not be confused with the star thistle (*Centaurea calcitrapa*) or the yellow star thistle (*Centaurea solstitialis*), both of which are absolutely useless, the former being especially undesirable, as it is armed with long, stiff, sharp spines, which inflict nasty festering wounds. In the South Island, however, the name star thistle is almost universally applied to the true winged thistle.

THE ELEVEN-SPOTTED LADYBIRD AND WOOLLY APHIS.

THE Orchard Inspector in Hawke's Bay reports that on visiting several orchards in and around Hastings, which are somewhat badly infested with woolly aphis, or American blight, he has noticed a common New Zealand ladybird—the eleven-spotted ladybird (*Coccinella punctata*)—doing good work by feeding upon the aphis. He states that close observation extending over several days clearly demonstrated that these useful little insects effected a very considerable improvement in the condition of affected trees—in some instances the trees were almost cleaned. A fortnight later he found that the ladybirds were disappearing rapidly from the orchards, but that, wherever the number had been large, the good that had been done was unmistakable. This ladybird is readily recognized as of red colour, with eleven black spots.

IMPORTATION OF NEW ZEALAND MEAT INTO FRANCE.

THE efforts of the High Commissioner to obtain some relaxation of the regulations which prevent the importation of New Zealand frozen meat into France are being persevered with, and the matter has been taken up by the British Chamber of Commerce in Paris. The difficulties are great, as will be seen by the following extracts from communications received from Sir W. Hall-Jones :—

Under date 17th October, 1910, Mr. H. C. Wilkie, late a New Zealand Government Veterinarian, now resident in Paris, informed Mr. Crabb, New Zealand Veterinary Representative in London (whom he had kindly undertaken to keep posted in the matter) that the time was one in which some action might be advantageously taken. Nearly all kinds of food had recently risen in price in France, especially in Paris, and the increased cost of living was given as the reason for the strikes which were occurring. The introduction of beef from Morocco and potatoes from America was under the consideration of the Government. (The importation of American potatoes was prohibited a good many years ago on account of potato-disease). The coming winter was likely to be a bad time for very many people in Paris owing to the increased cost of food, and Mr. Wilkie thought it possible that at such a time New Zealand meat might be admitted.

The High Commissioner brought these circumstances under the notice of the British Chamber of Commerce in Paris, whom he informed fully regarding the quality of the New Zealand meat and the regulations regarding its slaughter and inspection, and requested that the French Administration be approached in the matter.

Reply was received, dated 26th November, that the Chamber had carefully examined the possibility of facilitating the entry into France of New Zealand frozen mutton. The first obstacle in the way of a free sale of this meat in France was, of course, the fact that all New Zealand produce was liable to the French maximum tariff of Customs duties. New Zealand mutton would, therefore, have to pay upon entry into France a duty of 50f. per 100 kgs. (£1 per cwt.), whereas Argentine mutton would only pay 35f. (14s. per cwt.). In addition, a surtax of 3f. 60c. per 100 kgs. (1s. 6d. per cwt.) would be levied on extra-European mutton if it were transhipped in a European country before reaching France—*e.g.*, if it came by way of England or Belgium. The fact that New Zealand mutton would be liable to this heavy duty presented a considerable difficulty, and, in the opinion of the Chamber, it would not have been possible for the New Zealand Government to obtain the application of the French minimum tariff by 35f. except by protracted negotiations with the French Government, while it was hardly likely that such a deduction of duty would be made unless a corresponding concession were offered by the New Zealand Government.

The likelihood of obtaining the removal of the surtax of 3f. 60c. per 100 kgs. would be even less, for the French Government had maintained this surtax for eighteen years, in spite of many complaints.

Apart from these two duties, a still more serious obstacle existed to the introduction of frozen meat, either from New Zealand or from countries

even like Argentina, which benefit by the French minimum tariff. The allusion is to the regulations of 1892, by which carcasses of mutton could only be imported into France if cut in quarters, with the heart, liver, and lungs (*fressure*) adhering to one of the fore quarters; the regulation absolutely prohibited the importation of frozen or fresh mutton, except a small quantity from Algeria to which the regulation was not applied. The Chamber were of opinion that it *may* be possible to obtain the temporary or permanent removal of this regulation, especially if application were made for that purpose at a time when mutton was exceedingly scarce and dear in that country. This, however, was not then the case, for the price of mutton had recently dropped considerably owing to the fact that the flocks had been rapidly slaughtered in consequence of the spread of contagious disease. If, as was extremely probable, that rate of slaughtering were succeeded by a period of scarcity and high prices, it was considered that it may be possible to find a profitable sale for New Zealand mutton after paying the duty, 50f. per 100 kgs., surtax, 3f. 60c., and Paris *octroi*, 10f. per 100 kgs. (a total import of 2¾d. per lb.—Ed.), provided the regulation as to cutting in quarters could be removed.

An application to the Government with this view would, the Chamber believed, receive the support of the retail butchering trade, who complained very much of the high prices of some months ago. They thought, however, that such applications should coincide with a rapid rise of mutton prices in France in order to have any chance of success.

The incidence of the Australian tariff is reviewed at length, and the opinion is expressed that modification of the meat duties could only be obtained by negotiations between New Zealand and French Governments.

Mr. Crabb pointed out that information previously obtained stated that meat imported into France must be in entire carcasses, whereas quarters are now specified. Inquiry on the point confirmed the latter reading. Mr. Crabb expresses the opinion that if the regulation as to the presence of internal organs was removed, it might be possible to import New Zealand mutton into France profitably, even under the maximum tariff. The total duties, including surtax and *octroi*, amount to 2¾d. per lb., and in January last (1910) the retail price of mutton in Paris varied from 11d. to 1s. 0½d. per lb., these being the normal prices.

In the course of the correspondence it is stated that a decree has been recently signed authorizing the import at Marseilles of live cattle conditionally upon their being immediately slaughtered.

GRUBS ATTACKING TUSSOCK.

SOME specimens of grubs attacking tussocks in the Mackenzie country, found by the Minister of Agriculture three or four miles south of Omarama, were submitted to the Biologist. The latter identified the specimens as the larval and pupal forms of *Agrotis ypsilon*, one of the New Zealand native moths. This moth is commonly found on all the tussock-clad lands of the South Island, and of late years has caused considerable loss in the drier regions. There appears to be no practical means of dealing with the insect over extended areas. Some methods of controlling cutworms of the genus *Agrotis* in small gardens were given in the January issue of the *Journal*, page 53.

CALIFORNIAN THISTLE IN ALSIKE-SEED.

THE Biologist supplies the following note on the prevalence of Californian thistle in alsike-seed :—

There appears to be great difficulty in securing alsike-seed that is perfectly free from Californian thistle. The majority of the seed of this clover imported into New Zealand is of North American origin, and much of that classed as English is in reality Canadian-grown. It is said that much of this American seed is quite thistle-free, but this statement is not borne out by a recent examination of a considerable number of samples representing a bulk of many tons of seed. A very large percentage were found to contain fertile seeds of Californian thistle. In most cases the actual number of seeds per pound was not great, but a very small percentage is liable to cause a great deal of harm, especially when sown in localities where Californian thistle has not yet become established.

In five separate samples the amount of thistle present was as follows :—

Sample A.	3 thistle-seeds per pound, equals	0-0005	per cent.	by numbers.*
Sample B.	6	0-001	„	„
Sample C.	7	0-00117	„	„
Sample D.	18	0-003	„	„
Sample E.	32	0-00534	„	„

It will be noted that the amount is in reality very small when the number of alsike-seeds in a pound is considered. Thus, in sample E with two thistle-seeds per ounce, there would be one thistle-seed to about 19,000 alsike-seeds. Many seed-control stations would deem such a sample thistle-free; and, were it not for the fact that Californian thistle is, in New Zealand, looked upon as the most dangerous impurity of agricultural seed, such small percentages as were found in the first three samples might be disregarded.

From the samples quoted above it will be seen that if very small amounts of seed—say, half an ounce—had been examined in each case, four of the samples could very easily have been reckoned quite thistle-free, which would have been found incorrect when larger amounts of seed were examined. For this reason I would strongly advise farmers who are sowing alsike in their mixtures to buy on samples of not less than 4 ounces. If such an amount contained no thistle, it would be safe to infer that the bulk line contained very little if any thistle-seeds. It must be remembered that a few minutes' examination before purchasing the seed may be the means of avoiding endless labour in attempting to eradicate Californian thistle after it has once become established through the medium of affected alsike-seed.

Were it not for the fact that alsike is such a valuable clover on heavy soils, and also on light lands where the rainfall is more than 50 in. per year, I would be inclined not to favour its use except where it was absolutely certain to be thistle-free. At the present time I do not think it an exaggeration to say that over 50 per cent. of the alsike imported into the Dominion contains the seeds of Californian thistle.

* One pound of alsike-seed is calculated to contain 600,000 seeds.

POULTRY-KEEPING.

[By F. C. BROWN, Poultry Instructor.]

(Continued.)

THE HATCHING SEASON.

BEST TIME TO BEGIN OPERATIONS.

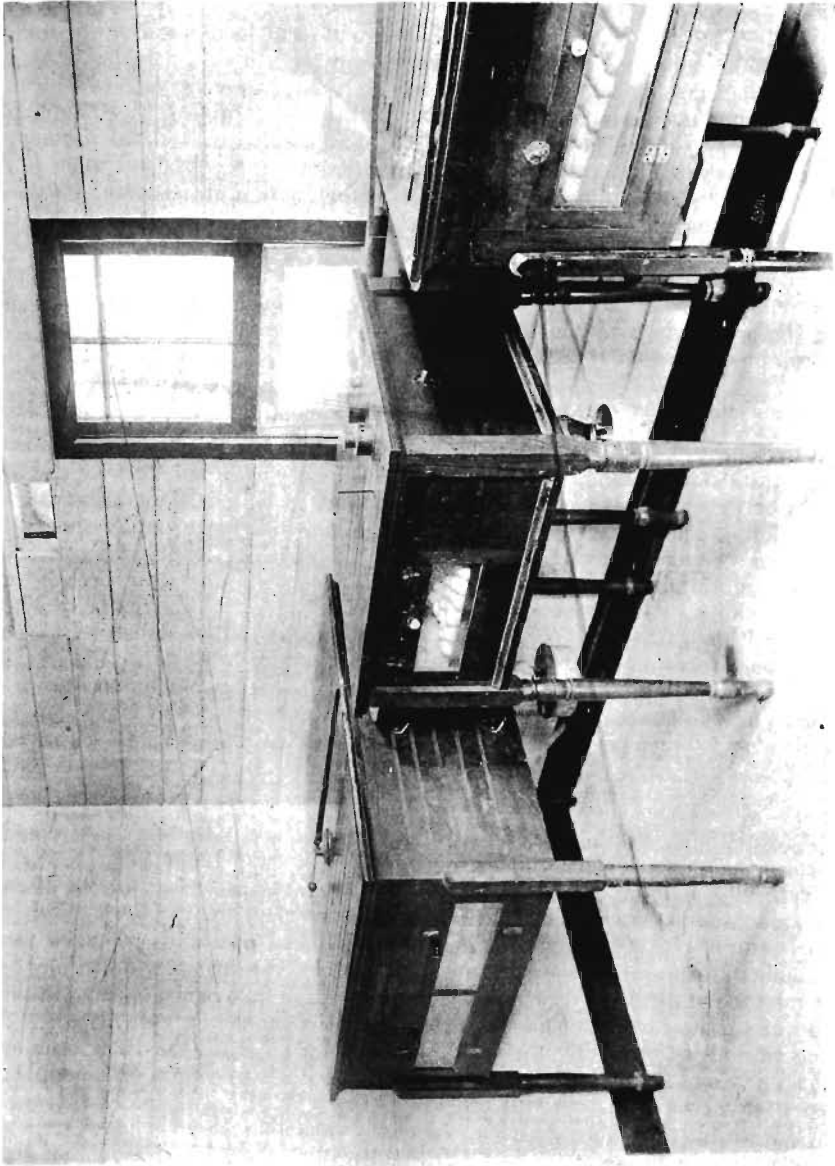
It is a difficult matter to advise as to the best time to begin hatching operations, as some strains and breeds mature earlier than others; but, as a general rule, for heavy birds such as Orpingtons, Wyandottes, Rocks, &c., July, August, and September are the most suitable months; and for the lighter breeds, such as Leghorns, August, September, and October. There is always a risk of the early-hatched pullet going into a moult about April. The best means of preventing this undesirable moult is to do nothing which will induce it, such as changing the feed and the quarters. Birds hatched in December and January have seldom the desired robustness, and only begin to lay in the spring, when eggs are cheap; besides, they never make good breeding-stock.

ARTIFICIAL INCUBATION.

Where it is intended to breed a large number of chickens, an incubator and foster-mother are indispensable. When the natural method of incubation is adopted, vexatious delays often take place through the scarcity of broody hens. Even where a large number of fowls are kept, there will be very few hens ready to sit in cold weather or when they are required, and sittings of eggs that have been carefully saved are thus wasted. By using machines eggs can be hatched at any time. There are other advantages: the eggs are not crushed, as so often occurs with hens; the machine does not leave the eggs, nor does it cover the young chickens with vermin; and it costs less for kerosene to hatch out, say, 100 chicks, than it would to feed the number of hens that would be required to do the same work. Of course, it is essential that the incubator shall be of a reliable make. It is not intended here to give detailed instructions for every make of incubator; there are many different machines and methods of operating, and each maker gives instructions for his own machine. The beginner should follow the main instructions which follow. With experience he will find variations advisable in many cases to obtain the best results. Almost every machine has its peculiarities, and can only be run to advantage with experience.

MAKE OF INCUBATOR.

There is no best make of incubator. There are many good machines; and there are a number of cheap unreliable machines on the market which beginners may be tempted to buy by the glowing statements of the manufacturers and the low prices at which they are sold. As a general rule these inferior machines require very close attention in order that an even temperature may be maintained, and, although in some instances good results have been obtained from them when worked by men of experience, their use is not recommended, as they generally prove expensive



INCUBATOR-ROOM, BURNHAM POULTRY-STATION.

articles in the long-run. The best course is to procure an incubator of a reliable and popular make.

SIZE OF INCUBATOR.

The capacity for holding eggs in most makes of incubators varies from 30 to 360 eggs. It is not a good policy to buy too small a machine. As a rule it does not give as good a result as one of larger size, besides which the cost of running the larger machines is very little more than that of running the smaller sizes. It is not necessary to run an incubator at its full capacity in order to get a successful hatch; equal results can be obtained when run partially filled. The most popular sizes of incubators are those of 100- to 240-egg capacity. Sometimes a small machine is helpful as an auxiliary to one of the larger machines. Especially is this desirable when the fertility of the eggs is not good. In this case the two machines should be started at the same time, and carried on until after the first test. The fertile eggs in the small machine should then replace the infertile thrown out of the larger one. The small machine is then refilled.

LOCATING THE INCUBATOR.

With the modern machine the question of location is not of as great importance as it was with the old-fashioned hot-water machine, or one of inferior make. There is no need in our climate of going to the expense of building a special incubator-room. If the machine is packed as it should be, and perfectly regulated, it will maintain an even temperature in the egg-chamber when there are extreme variations in temperature outside of the machine. Almost any lined wooden room where the incubator can be kept without interference will answer the purpose. Care must be taken that pure fresh air is admitted into the room, as fresh air is the life of the chick or duckling before and after hatching. There should be no draught direct on the lamp. The slightest flicker is apt to make the lamp smoke, which is a frequent cause of poor hatches, and of incubators being destroyed by fire.

STARTING THE INCUBATOR.

After following the directions for setting up given by the maker, and care being taken that the incubator stands on a solid foundation, perfectly level, fill and light the lamp, leaving the flame turned very low to allow the machine to heat up slowly. During cold weather it may take some time to heat up a new machine, or one that has been out of use. When the machine heats up to a temperature of 102° , turn the set-screw down on the regulator-rod until the disc is raised to about $\frac{1}{16}$ in. above the opening in the top of the heater. At this stage the incubator should be well tested, and the workings thoroughly mastered. When the machine has been running for a day or two, and an even temperature of 102° is being maintained, the eggs may be put in. It will probably take several hours before the eggs are warmed through. At this stage the machine should be examined frequently, to make sure that the temperature does not rise above the desired point.

For hen or duck eggs the temperature at the level of the tops of the eggs on the trays should be about 102° the first week, 103° the second and third weeks, and 104° to 105° when hatching. There need be no alarm should the temperature vary slightly for an hour or two, but if left longer

than this the germ is apt to become impaired and the success of the hatch affected. After the first week, when the germs within the eggs begin to develop, a considerable amount of animal heat is radiated from the eggs. This causes a rise in the temperature, which is registered by the thermometer. The greater the fertility and the stronger the vitality of the germs the more will animal heat be generated, and the greater will be the tendency of the temperature to rise. This, as a general rule, points to a good hatch. In order to correct these variations of temperature and keep down the heat it may be found necessary to readjust the regulator several times during the hatch. During the first and second weeks, when the variations of temperature are slight, it is a mistake to be always altering the set-screw in order to maintain an even temperature; in most cases the lowering and raising of the flame is sufficient to overcome undesirable fluctuations of heat. It is important that things should not be thrown carelessly on the top of the incubator, or the regulator is apt to be interfered with. Care must be taken that the rod connecting the thermostat with the lever is kept perfectly straight. If there is the slightest bend or twist, an even temperature cannot be maintained. Should the temperature of the incubator be low at one end raise that end until a uniform heat is attained. When the thermometers are suspended, care must be taken that the bulb is resting on a fertile egg. Thermometers should be well tested against a clinical thermometer; they are often two or three degrees out.

CARE OF LAMP.

The lamp should be filled every day with oil of the best quality. Always have sufficient flame turned on to keep the valve slightly open. Do not turn the flame up high enough to smoke, or soot will collect in the flue. Trim the wick daily by rubbing with a piece of cloth, care being taken to press the corners down so that the flame will have a round appearance; the charred portion may be taken off every four or five days. Renew the wick after each hatch; keep the burner free from dirt; and wipe from the lamp any overflow of kerosene.

SELECTION OF EGGS.

It is important to have eggs of the same colour. Brown shells are thicker than white shells, and are slower in evaporation, so that when the latter are brought to a proper condition the former have an excess of moisture, and the chick is apt to drown in the shell. Select eggs of medium size, with smooth shell, and as perfectly formed as possible. Deformed eggs or very long and narrow ones should not be used. The embryo is always in the upper part of the egg, a point that should be kept at the right temperature. This is impossible when eggs of different sizes are used. If it is necessary that different varieties should be placed in the machine at the same time, an average will have to be struck. Eggs intended for setting should be placed in a drawer or on a shelf with auger-holes bored so that the large end of the egg is uppermost. When otherwise kept they should be turned every two or three days. Eggs lose in hatching-quality with age. When eggs are purchased, a good index of the age is the air-cell: the larger the cell the older the egg. Fresh eggs will hatch earlier than those that are old. If the egg is deformed, or there is insufficient turning, the chick touches the shell-membrane, and forms in an unnatural manner.

TURNING THE EGGS.

Turn the eggs every twelve hours, commencing on the third day after they have been in the machine. They should be moved gently for the first week, so as not to injure the embryo. It is not necessary that an exact half-turn should be given. The positions of the eggs on the trays should be varied; a few extra rolls will do more good than harm. When set a week those that are on the outside of the tray one day should be placed in the centre the next. Cease turning the eggs as soon as they begin to pip.

COOLING THE EGGS.

Commence cooling after the eggs have been in the machine three days. The amount of cooling required depends upon the development of the air-cell, which gradually increases until the nineteenth day. The longer the cooling, the larger the air-cell becomes. The air-cell should be almost one-fourth the size of the egg at pipping-time—or, in other words, dried down so where a chicken would be expected to pip when under the natural mother. As a general rule ten minutes once a day for the first week is sufficient. The time may be increased by degrees up to twenty minutes in the second week, and up to thirty or even forty minutes in the third week. It is not possible to give the exact time for cooling during the second and third weeks that would suit all classes of eggs and climatic conditions alike. As with the application of moisture, so must the amount of cooling be regulated by the condition of the air-cell. In the event of the air-cell being slow to change or dry down, as is often the case during wet weather, the maximum amount of cooling is necessary. The beginner must realize the difference between cooling and chilling, or he will be apt to overdo it, and risk getting a poor hatch. On no account must the incubator-door be opened during hatching, unless when moisture is being applied. There is no hurry to open the machine after the hatch. The chicks will not die of starvation.



METHOD OF TESTING EGGS FOR FERTILITY.

TESTING THE EGGS.

Eggs should be tested after having been in the incubator five or six days. The fertility of an egg cannot be determined by testing before putting the eggs into the incubator or under a hen, but a spoiled or stale egg may readily be recognized. The manner of testing recommended is shown in the illustration. Hold the egg between the forefinger and thumb, or in a tester that is usually supplied with incubators, and look through the egg at a strong light. Have no other light in the room, or, better still, test in front of a window in daylight. The rays of the light of the sun are thus focussed through the egg, and the germ is clearly seen without straining the eye. If the egg is fertile it will appear as in Fig. 1, with a spider-like appear-

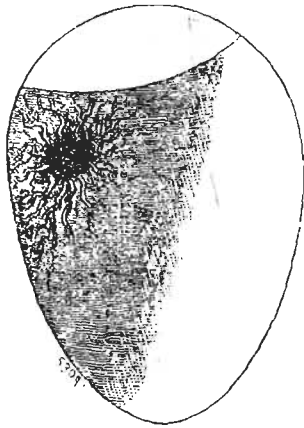


FIG. 1. APPEARANCE OF FERTILE EGG.

ance, and slightly red in colour. If infertile it will be quite clear. The infertile egg is one in which there is no germ from which life can start; it will remain perfectly clear throughout the whole hatching-period. Infertile eggs may be used for culinary purposes if taken out of the machine at the first test, providing they were fresh when put in. As the vitality of an egg is not always of sufficient strength to bring it to maturity, it sometimes happens that the germ dies after making an apparently healthy start. For this reason it is advisable to make a second test of all the eggs on the eighteenth day, removing such as may have ceased to grow. Frequent tests of a few eggs should be made for the purpose of having an accurate knowledge of the development of the air-cell. The object to be aimed at is to have the chick to pip in the air-cell. Fig. 2 shows the correct size of the air-cell on the fifth, tenth, fifteenth, and nineteenth days, and an attempt should be made to have the air-cell to exactly correspond with the diagram. Should the air-cell be smaller, the ventilator should be opened wider; if the cell be larger, the opposite course should be taken, or the ventilation reduced.

Fig. 3 shows the air-cell of a duck-egg at the different stages of incubation. As shown in the margin, duck-eggs require more cooling than hen-eggs. They should also be tested more frequently, as they decay rapidly. A decaying egg should be removed from the incubator as soon as discovered

given in Fig. 4. Fig. 5 shows a weak or imperfectly fertilized egg on the seventh day of incubation. Remove all such eggs. During the first test care must be taken not to turn the eggs round and round in order to see the germ. Doing this accounts for many germs dying between the first and second tests.

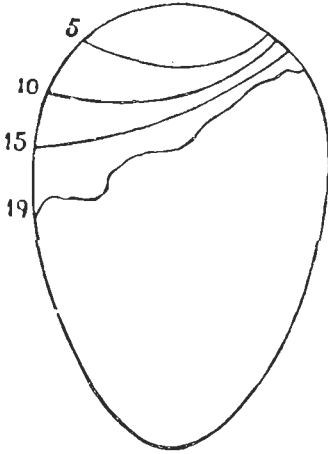


FIG. 2. SHOWING CORRECT SIZE OF AIR-CELL IN HEN'S EGG ON THE FIFTH, TENTH, FIFTEENTH, AND NINETEENTH DAYS.

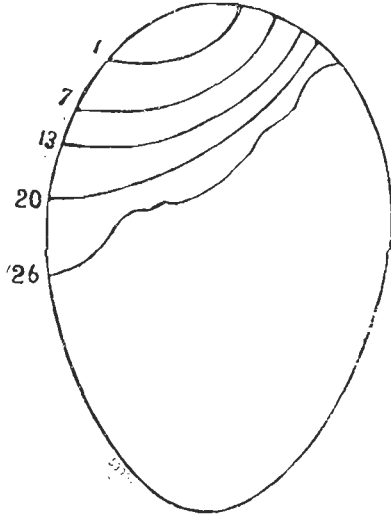


FIG. 3. SHOWING CORRECT SIZE OF AIR-CELL IN DUCK'S EGG IN VARIOUS STAGES OF INCUBATION.

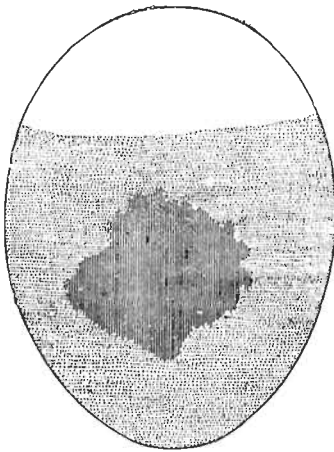


FIG. 4. APPEARANCE OF A DECAYING EGG.

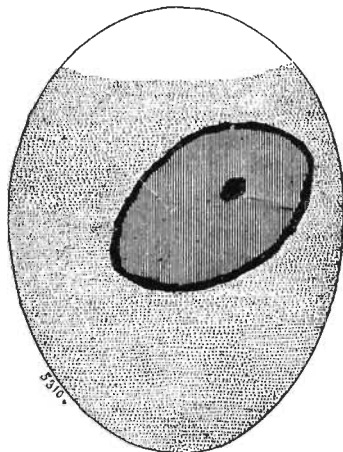


FIG. 5. SHOWING A WEAK OR IMPERFECTLY FERTILIZED EGG ON SEVENTH DAY OF INCUBATION.

MOISTURE FOR HEN-EGGS.

The size of the air-cell should govern the application of moisture. With the most modern and most popular makes of incubators it is rarely found necessary to apply moisture before the pipping stage. When applied with water-trays it is only the man with a very experienced eye who can regulate the amount required. Some machines are constructed in such a way that the excess of moisture cannot get away. With such machines it frequently occurs that it is most difficult to dry the air-cell down to the desired line, and as a result many of the chicks are drowned in the shell at pipping-time. Again, during dry, hot weather the air-cell is apt to dry down too fast, and, if not checked by applying moisture, many of the chicks at pipping-time will be compressed in such a small space that they cannot get room for their natural turn in order to cut their way out, and consequently die in the shell. Under such circumstances, if the operator finally succeeds in hatching some by adding moisture, the chicks will be found to be small and difficult to rear. A dry location for an incubator is always favoured, and plays an important part in the development of the air-cell. It should always be borne in mind that it is better to be a little too dry than too moist. Moisture can always be added at pipping-time to assist the hatch, but it cannot be withdrawn. When it is observed at an early stage that the air-cell is drying down too fast, this may be checked by keeping the floor of the room wet, or by placing a tray of wet sand under the egg-tray.

At pipping-time, should the air-cell be well dried down in the last stage, the safest and best system for the novice to adopt is to take a piece of thin flannel or cotton cloth the size of the egg-tray, dip it in hot water, wring lightly, and place it at once over the tray of eggs. It may be left on until the main hatch sets in, when it can be rolled up and left in the end of the machine next to the heater; should any of the eggs appear to be "hanging fire" at any time, the process should be repeated. This will soften the membrane under the shell, and assist the chick's final effort to get out of its prison. If the chicks appear to be wet when hatching, added moisture is not required.

HATCHING DUCK-EGGS.

Excepting that they demand more moisture duck-eggs require much the same treatment as that described for hen-eggs. During the first week they require very little cooling. The time it takes to turn them is mostly sufficient for this purpose. In the second and third weeks the time allowed for cooling should be increased by degrees up to thirty minutes, and during the last week up to forty minutes or even an hour. Of course, much depends on the temperature of the incubator-room. Care must be taken, however, not to allow the eggs to get chilled on cold days. The best system of applying moisture is to spray water at a temperature of 103° (with the mouth will do) on the eggs every morning after the fourteenth day. Do this after they have been turned, and immediately place the eggs back in the machine. Never cool after spraying. Spray in the morning, and cool at night. Care must be taken that the ventilation vents are open, so that any excess of moisture can get away. At the pipping stage the ventilators should be closed, and any needed moisture applied by means of a wet cloth, as directed for hen-eggs.

CRIPPLED CHICKENS.

This trouble is mostly caused through the air-cell being dried down too far, the membrane under the shell being too tough for the chick to pierce; hence, through being too long in the shell, and the constant working to get

out, the delicate legs are injured. Irregular temperature is also a frequent cause of crippled feet. If moisture is properly applied at pipping-time the chicks will hatch out without any injury.

CHICKS DEAD IN SHELL.

There are many causes of chicks dying in the shell, mostly due to poor condition of breeding-stock. Breeding from fat hens that have had insufficient exercise, or birds that have been forced for heavy laying, are common causes of this trouble, while it often occurs through faulty incubation—the air-cell may be too dry or too moist. If the breeders are not attended to, and there is faulty incubation, the chicks are not strong enough for the final effort of pipping, and, consequently, die in the shell.

WOOD-PULP INDUSTRY.

In response to a request by the Department, the High Commissioner, London, is obtaining information regarding the establishment of a wood-pulp industry for white-paper making. In a recent memorandum the High Commissioner transmits particulars supplied by the Albert Reed Company, of London, which operates large pulp-mills in Newfoundland. It is stated that probably the minimum-capacity mill that could be calculated on to give any satisfactory return in New Zealand would be one to make about 300 tons of paper per week. The mill would require a site where there was 5,000-horse power, and where the wood could be got with very small cost of transit. Such a mill would cost, on a good average site in the United States, about £200,000. This includes the plant for mechanical pulp, sulphite pulp, and paper machinery and plant. The estimate is based on a production of ordinary news paper. For the manufacture of better-quality paper the cost of the mill would be considerably increased, and more power required. Owing to the necessity of importing machinery from distant countries, the cost of the plant would be correspondingly greater in New Zealand. The wood chiefly pulped in America is spruce; in Scandinavia it is termed "white-pine." These woods are comparatively free from turpentine, which characteristic is the principal requirement for pulping purposes. Assuming that New Zealand has suitable woods, that labour would cost about the same as in the United States, and that coal for fuel is available at a cost not exceeding £1 per ton, then ordinary news paper might be expected to cost about £8 per ton to produce at the mill-site. About 25 cwt. of coal per ton of paper is used in the process of manufacture. Doubt is expressed whether conditions in New Zealand would allow of the establishment of a pulp paper industry able to compete with paper supplied from countries where the industry is developed on a large scale, with immense resources.

Some of the finest wood-pulp paper mills in the world have been recently established in Newfoundland, which is found to possess the natural resources and conditions for the industry in a high degree. The Harmsworth publishing concern of London, for instance, has recently expended the sum of £1,200,000 in the purchase of forest-areas in the interior of the island, the construction and equipping of mills, building of railway-lines and waterside terminals, and generally in the creation of their paper-milling enterprise. An interesting advantage claimed for the Newfoundland forests is that they reproduce themselves very rapidly after being cut out or burned over, and can be used again in the manufacture of paper and pulp within thirty years

FRUIT-GROWING AT WERAROA EXPERIMENTAL FARM.

[Report of W. A. BOUCHER, Assistant-Director of Orchards, Gardens, and Apiaries.]

THE orchard at Weraroa Experimental Farm was planted, and is being maintained with several objects in view, among them being,—

- (1.) To test and demonstrate the value or otherwise of varieties of the different classes of fruits—*i.e.*, apples, pears, peaches, apricots, cherries, and small fruits—for planting for commercial or domestic purposes on the west coast of the North Island.
- (2.) To afford information as to the methods of pruning that may be adopted to bring about successful results with trees planted in a similar class of land, with similar climatic conditions.
- (3.) To afford an opportunity for testing the many specifics for the control of orchard-pests that are constantly being introduced, and demonstrate the results to visitors.
- (4.) To provide a supply of buds and scions from thoroughly proved varieties for distribution to propagators.

FRUIT-TESTING.

This department of experimental work is regarded as of the highest importance in the United States and Canada, where large numbers of fruit-testing stations are maintained. New varieties of the different classes of fruits, almost all reputed to be of great excellence, are placed upon the market each season. Varieties that succeed in one locality may prove complete failures in other districts; still, it is a great temptation to plant varieties that are highly recommended. To give way to such temptation produces an orchard with a large number of varieties and a small output of each, a result which is fatal to success in commercial fruit-culture.

A fruit-testing orchard such as that at Weraroa will provide information as to the value of varieties for a large extent of country both north and south of the farm. It is worthy of note that in the case of many varieties of some classes of fruits, reliable data can only be furnished from five to seven years after the trees have been planted—a period during which, to some people, quite naturally, perhaps such an orchard may appear to be of little or no value.

Fruit-planting at Weraroa for fruit-testing was made during the season of 1903, and continued in 1905. Careful observations have been made and notes taken, and the results summarized as appended.

TESTS OF SPRAYING-COMPOUNDS.

On a section of the orchard already in existence when the farm was transferred to the Department of Agriculture, a large number of spraying-compounds have been tested for the control of codlin-moth, mussel scale, red spider, and woolly aphid. In this connection it may be noted that compounds that have given good results in other countries may not prove equally effective in New Zealand, owing to the somewhat different climatic conditions and for other reasons; consequently, a compound introduced here under high recommendations if placed in the hands of and used by the commercial grower, might be followed by, to him, possibly disastrous results in the loss of the value of a crop and even more or less serious injury to his trees. This has been proved repeatedly on a small scale at Weraroa, where, as the result of careful experiment, a considerable number of failures have had to be recorded, a fact which has caused some criticism by visitors who have noticed the existence of orchard-pests on the section devoted to the testing of spraying-compounds, but failed to observe that the same pests were practically non-existent on adjoining sections of the orchard, which had been sprayed with compounds already tested and of proved value. As a result of the careful and thorough testing that has been carried out from time to time, the spraying-compounds now recommended by the Department for the control of the principal orchard-pests are few in number, effective in result (if properly applied), easily prepared, and economical for use. It is a matter for congratulation that a large majority of the fruitgrowers are content to use the compounds recommended, and rely upon further experiments being carried out by the Department with a view to discovering, if possible, spraying-mixtures that may prove equally effective and even more easily prepared, and of less cost. That this is being done may be instanced by the fact that oil sprays and several brands of arsenate of lead are under trial this season.

SHELTER-PLANTING.

One of the most important points in connection with fruitgrowing on the west coast of the North Island is the provision of adequate shelter from the north-westerly, westerly, and south-westerly winds, which in many localities prevail at certain times during some seasons to such an extent that the leaves of young trees unprotected become blackened and shrivelled, and the trees consequently stunted in growth, and misshapen. For this reason it is desirable that the shelter-belts should be planted a season or so before the orchard-trees are set out, in order that the latter may benefit during their first season of growth in orchard or garden—a most important period in the life of a fruit-tree; for, if the foliage be injured during the season after transplanting from the nursery, the tree suffers in vitality, and frequently recovers slowly and with difficulty, if at all. So important is it to provide adequate shelter that it is wise to give as much attention to the shelter-belts as to the fruit-trees themselves, in order to produce such rapid growth in the shelter-trees as will outstrip that of the fruit-trees, and so provide the protection needed.

APPLES.

Variety.	Quality.	Description.	When ripe.	Period of Keeping: Weeks.	Remarks.
Alfriston	Culinary; one of the best when ripe	..	Autumn	..	Strong, clean tree; available for local market; prolific.
Arkansas Blanche	Culinary	Russety red; flat	April	8	Shy bearer; strong growth; blights badly.
Allington Pippin	Dessert	Seeding from Cox's Orange, similar colour, more conical, firmer flesh	..	..	Blights badly, subject to bitter-pit.
Aromatic Russet	Dessert	Red and yellow; firm, flesh, acid flavour	April	8	Strivels with keeping.
Brownlee's Russet	Good dessert	Flat russet	Autumn	12	Clean tree; good cropper.
Betty Geeson	Culinary	Large	..	..	Clean tree; fair cropper.
Braddick's Nonpareil	Good dessert	Crimson and yellow stripes; flat and small	March	4	Very slow coming into bearing, and blights badly.
Ben Davis	Dessert and culinary	Yellow and red stripes; round	April	14	Tree blights, but not badly; good all-round apple.
Baxter's Pearmain	Good dessert	Dull-coloured; red and green; round, flat, medium size	April	12	Blights badly; no fruit matured. Tree blights; a free bearer.
Boston Russet	Dessert and culinary	..	..	..	None of the Russets do well at Werarosa—the fruit falls too early.
Brittle Sweet	Dessert	Russet, bronze side; medium size	May	10	Shy bearer.
Cornish Aromatic	Poor dessert	Handsome red and yellow striped	..	..	Blights badly.
Dani's Maria	..	..	..	..	Almost blight-proof; fair cropper.
Delicious	Good dessert	Yellow and red	Autumn	12	Good cropper.
Duke of Clarence	Culinary and dessert	Crimson; conical; medium size	March	4	Clean tree; very prolific; quality poor.
Dougherty	Dessert	Red and yellow stripes; small, conical	June	14	Clean tree; so far does not develop properly in this district.
Etowah	Poor dessert	Handsome small apple; bright red	June	20	Clean tree and free bearer; doubtful value.
Early Rivers	Soft cooking	Yellow and red striped; fair size	February	..	Shy bearer; blights badly; of no value.
English Golden Russet	Dessert	..	..	..	None of the Russets do well at Werarosa—the fruit falls too early.
Grenadier	Culinary	Yellow; large	..	..	Clean tree; prolific.
Golden Queen	Dessert	Yellow, red blush; medium size	Summer	8	Clean tree; strong grower; crops well, bears young.
Gloria Mundi	Culinary, good	Very large	January	..	Strong, clean tree; prolific.
Gravenstein	Dessert	Handsome; first quality	Summer	6	Strong, clean, prolific.
Golden Spire	..	..	..	..	Clean tree; prolific.
Gooseberry Pippin	Culinary	Green; flat to conical; large	March	3	Tree blights badly; shy bearer; of no value.
George Nelson	Poor	Striped red and yellow; small and flat	April	6	Very slow grower; clean tree; of no value.
Hawthornden	Culinary	Yellow flushed red	Autumn	..	Strong, clean, very prolific.
Hobiana Seeding	Culinary	Yellow; conical	..	..	Good cropper; not profitable.
Henrietta Prince	Poor	Small; yellow; flat	March	4	Poor cropper; blights very badly.
Hames's Seeding	Dessert	Crimson; round, flat, medium size	April	10	Clean tree; good in some districts
Horn	Dessert	Yellow striped red; small	July	20	Strong, clean tree; very prolific; bears young.

("Blight" is the common term applied to woolly aphis or American blight. A vast amount of experimental work for the control of this pest has been carried out, but so far without any very satisfactory result.)

Variety.	Quality.	Description.	When ripe.	Period of Keeping: Weeks.	Remarks.
Irish Peach	Dessert	Crimson; medium	February (early)	8	Early dessert; does not keep.
Judy's Surprise	Fair dessert	Crimson; flat to conical	January	8	Clean tree, weakly growth; fair cropper.
John Iroon	Dessert	Yellow-striped, red; conical	April	12	Tree clean, free bearer; fruit handsome, but poor flavour.
King of Pippins	Good dessert	Yellow; conical	April	16	Fair cropper; blights very badly.
Keswick Codlin	Culinary	Yellow; large	March	..	Blights badly; very free bearer; valuable in small orchards.
Lord Suffield	Culinary and dessert	Striped red, green, and yellow; large	January	..	Valuable for local markets; very prolific.
London Pippin	Good culinary	Yellow; flat, small	Autumn	8	Clean tree; good for canning; keeps well.
Lane's Prince Albert	Good culinary	Crimson and yellow; conical; soft	May	16	Good cropper; slow-growing tree, almost blight-proof.
Lippitt's Seedling (No. 2)	Culinary	Yellow; flat, small	June	..	Blights badly.
Lewis's Incomparable	Fair dessert	Crimson and yellow; flat; large	February	4	Poor grower, and blights.
Lamb's Abbey Pearmain	Good dessert	Dull red and green; flat; large	March	8	Tree clean; bears well; good apple in its season.
Lippitt's Seedling (No. 1)	Culinary	Yellow, red to sun; round, flat; large	June	8	Tree fairly clean; strong grower; not recommended.
Lord Nelson	Culinary	Very large	April	3	Very shy bearer.
Mobb's Royal	Culinary, good	Yellow and red	January	..	Clean tree; valuable for local markets.
Munro's Favourite	Culinary and dessert	Yellow, red stripes; small	Autumn	12	Good for export.
Marjory Hay	Dessert	Handsome small apple; bright red	Autumn	12	Strong, clean tree, promising well; prolific.
Mellon's Seedling	Fair dessert	Handsome red and yellow; round; medium size	June	16	Clean tree; prolific.
Margil	Good dessert	Small; yellow; flat	March (early)	14	Subject to blight and bitter-pit; fine-flavoured apple.
Norfolk Beauty	Culinary	Yellow, red stripes; soft	January	..	Strong, clean tree; prolific.
Nicholas Michaclowitch	Poor	Large handsome red and yellow	February	..	Blights very badly.
Old Nonsuch	Dessert	Red-yellow; handsome	January	..	Blights badly; second early; very prolific.
Prince Bismarck	Culinary	Very large; handsome, but coarse	January	..	Inclined to blight; prolific.
Peasgood's Nonsuch	Culinary	Dark-red-striped; conical	January	..	Clean tree; favourite in private gardens; fair cropper.
Prince Altred	Culinary	Green; flat; small	January	..	Useful for private gardens; fair cropper.
Prince of Pippins	Good dessert	Handsome apple	March	4	Fair cropper; nearly blight-proof.
Pigeonette	Culinary	Red and yellow striped; conical	June	16	Tree strong, clean; fruit small.
Royal Pearmain	Fair dessert	Crimson with blue bloom; flat to conical	Autumn	12	Fair cropper.
Robin Palmer	Culinary	Handsome red and yellow; round; medium size	March	8	Clean tree, fair cropper.
Ribston Pippin	High-class dessert	Handsome red and yellow; conical	February	..	One of the worst for American blight.
Red Astrakhan	Dessert	Yellow shaded with red; conical and large	March	2	Clean tree so far; good grower and bearer; first early.
Rivers's Early Peach	Poor dessert	Dark red, yellow stripes; medium size; ovate	March	..	Tree weak growth, shy bearer; not recommended.
Robertson's Superb	Dessert and culinary	Green and dull red; flat	March	2	Shy bearer; of no value.
Red Beightheimer	Dessert and culinary	Yellow and large	..	..	Blights very badly.
Reine Passe des Pommes	Cider	..	..	..	Only useful for cider-making.
Rokewood	Poor dessert	..	June	18	Tree blights; not recommended.
Speckled Pearmain	Poor dessert	..	April	8	Poor cropper; weak growth; blights badly.

APPLES—continued.

Variety.	Quality.	Description.	When ripe.	Period of Keeping: Weeks.	Remarks.
Stewart's Seedling	Good culinary	Green and bronze; large conical	May	12	Good grower and cropper; blight-proof.
Schneider's	Culinary and dessert	Red and yellow striped; medium size	June	18	Very poor grower; blights very badly.
Springdale	Culinary and dessert	Crimson; round, flat, inclined to large	June	12	Tree strong, blight-proof; tree bearer; handsome apple, fair quality.
Seek-no-further	Dessert	Red and green striped; inclined to large	April	6	Clean tree; bears on the ends of the shoots. Very shy bearer.
Traveller	Culinary	.. .. .	Winter	12	Appears to do well here; clean.
Willie Sharp	Culinary	.. .. .	Autumn	12	Blight-proof; strong tree, prolific; the best baking-apple.
Worcester Pearmain	Dessert	Good; handsome; medium	Midseason	8	Clean tree; fair cropper.
Welcome	Good dessert	Yellow-red stripes; small	February	..	Blight-proof; one of the best first earlies.
William's Favourite	Poor dessert	Red and yellow; conical, large	March	3	Tree weak, and shy bearer; blights badly.
Walbridge	Culinary, fair dessert	Round, flat, red and yellow stripes; medium size	May	18	Strong tree; free bearer; blights, but not badly; may prove a valuable variety.
White Transparent	Culinary and dessert	Yellow; conical and soft	February	..	Not recommended.
William Anderson	Medium dessert	Red-green striped; medium size	June	10	Tree strong and clean, but not prolific.
Wolf River	Culinary and dessert large	Beautiful apple; carmine-yellow	March	10	Clean tree; fruit large for market purposes.
Yellow Newton Pippin	Good dessert	Yellow; round flat, medium size	April	14	Subject to blight and bitter-pit; fine-flavoured.

VARIETIES THAT HAVE BEEN PROVED AT WERAROA TO BE OF VALUE FOR COMMERCIAL PURPOSES.

Albiston	Good dessert	Large; green	Autumn	12-14	Strong, clean grower.
Adam's Pearmain	Good dessert	Medium to large; splashed and striped with red	April	..	Tree strong grower; subject to blight.
Ben Davis	Dessert and culinary	Large; light and deep red on yellowish ground	April	12-14	Tree strong, healthy grower.
Cox's Orange Pippin	Excellent dessert	Medium size; rich yellow, splashed and striped with red	March	12	Tree weak grower, subject to blight.
Cleopatra (syn. New York Pippin)	Good dessert	Medium to large; yellow	April	20	Tree strong grower.
Colonel Washington	Good dessert	Medium to large; yellow with red stripes, deep red in sun	Autumn	20	Strong grower, prolific.
Jonathan	Good dessert	Medium to large	April	10	Strong grower, healthy.
Jenkins's Seedling	.. .. .	Medium to large	Autumn	20	Strong, clean grower, prolific.
Lord Wolsley	.. .. .	Medium to large	Autumn	20	Strong grower, prolific.
London Pippin	Dessert and culinary	Medium to large; yellow	Autumn	8	Clean tree, moderate grower.
Murro's Favourite (syn. Ohinemuri)	Dessert and culinary	Medium to large; yellow with red blush	April	14-16	Free, strong grower.
Reinette du Canada	Dessert and culinary	Large; yellowish green	March to April	8	Tree strong grower.
Sturmer Pippin	Good dessert	Medium to large; yellowish green inclined to brownish green, red in sun	May	20	Tree very prolific, strong grower, subject to blight.

VARIETIES FULLY PROVED, AND RECOMMENDED FOR PLANTING FOR COMMERCIAL PURPOSES.

Jonathan.	Cox's Orange Pippin.	Monro's Favourite.
Sturmer Pippin.	Cleopatra.	

These are among the best varieties suitable for an export trade.

PROMISING VARIETIES, BUT NOT YET FULLY TESTED (DESCRIPTION ELSEWHERE).

Gravenstein.	Worcester Pearmain.	Horn (American).
Delicious.	Brownlie's Russet.	Marjory Hay.

VARIETIES PROVED SUITABLE FOR DOMESTIC ORCHARDS.

Betty Geeson.	Hawthornden.	Prince Bismarck.
Danns Maria.	Jupp's Prize.	Red Astrakhan.
Duke of Clarence.	Keswick Codlin.	Robin Palmer.
Gloria Mundi.	Mobbs's Royal.	Royal Pearmain.
Golden Queen.	Norfolk Beauty.	Traveller.
Golden Spire.	Peasgood's Nonsuch.	White Transparent.
Grenadier.	Prince Alfred.	Willie Sharpe.

VARIETIES UNDER TEST (TO BE REPORTED UPON LATER).

American Golden Russet.	Golden Summer Pearmain.	New Rock Pippin.
American Golden Pippin.	Garibaldi.	Old Golden Russet.
Byford Wonder.	Hall's Seedling.	Pioneer.
Baldwin.	Harley's Seedling.	Prince of Pippins.
Blenheim Orange.	Hainc's Seedling.	Queen.
Black Northern Spy.	Hohenzollern.	Royal Late Cooking.
Bonum.	John Sharp.	Roundway Magnum Bonum.
Crofton.	King of Tompkin's County.	Sharp's Midseason.
Court Pendu Plat.	Late Aromatic.	Saundersham.
Carlton.	Lady Sudeley.	Stirling Castle.
Charles Ross.	Lord Derby.	Scott's Seedling.
Claygate Pearmain.	Mellon.	Scarlet Pearmain.
Climax.	Mona Hay.	Sharpe's Late Red.
Colville Blanche d'Espagne.	Morgan's Seedling.	Swaar.
Chestoc.	Mayflower.	Signe Fillich.
Diadem.	Magg's Seedling.	Twenty-ounce.
Edward's Coronation.	Maid of Hawthorn.	Trespun Sechirter.
Eagle's Seedling.	Mrs. Bryan.	Tararu.
Fraise.	Nameless.	Winter Quarrenden.
Fall Wine.	Northern Spy.	Yarrow Bank.
Frambois de Holovous.	Newton Wonder.	

VARIETIES NOT RECOMMENDED, ON ACCOUNT OF BADLY BLIGHTING HABITS OR OTHER REASONS.

Armored.	Grimes' Golden Pippin.	Reinette du Canada.
Bramley's Seedling.	Gascoyne's Scarlet.	Rhode Island Greening.
Beauty of Hants.	Golden Knot.	St. Edmond's Pippin (name doubtful).
Baltimore.	Jewett's Rest.	Senator.
Cellini.	Jones's Seedling.	Salop.
Daniell's Seedling.	Lodgemore Nonpareil.	Tyler's Kernel.
De Barritarelle.	Mere de Menage.	Takapuna Russet.
Dele Cobbian.	Mr. Gladstone.	Winter Greening.
De Flinting.	Nonsuch.	Winterstein.
Duchess of Oldenburg.	Ortley.	Wellington Pippin.
Early Richmans.	Orange.	Wallace Howard.
Esopus Spitzenburg.	Purity.	Winter Peach.
Exquisite de Bohine.	Peck's Pleasant.	Xmas Pearmain.
French Crab.	Prince Nicholas Michaelovitch.	
Fraise.		

PEACHES.

Variety.	First Ripe.	Colour.	Size.	Class.	Flavour.	Crop.
Ana Maria	Feb. 6	Rusts badly; fruit worthless	Small to medium	Free stone and skin	Excellent	Good.
Attkentland's Surprise	Feb. 6	Well coloured	Medium	"	Good	Fair.
Biggs's Red May	Dec. 23	Highly coloured	"	"	Medium	"
Bellegrade	Feb. 6	Yellow, red to sun	"	"	Fair	Heavy.
Bokhara	Feb. 18	Yellow and red	Large	"	"	Good.
Cooldige's Favourite	Dec. 30	Highly coloured	Medium	"	"	"
Early Alexander	Dec. 23	Highly coloured	"	"	Good	Fair.
Early York	Feb. 3	Yellow, red to sun	"	"	Medium	Heavy.
Fitzgerald	Feb. 17	Yellow and red	Medium to large	"	Good	Light.
Greenboro'	Feb. 14	Yellow and red, yellow flesh	Large	"	Medium	Good.
Hall's Early	Dec. 28	Yellow, red to sun	Medium	"	Good	Fair.
King of Clings	Jan. 10	Well coloured	"	"	"	"
Kalamazoo	Feb. 6	Rusts badly, fruit worthless	Medium	Free stone and skin	Good	Heavy.
Kia Ora*	Feb. 14	Yellow, red side	Medium	"	"	"
Mamie Ross	Feb. 17	Yellow and red	Large	Half-cling	Fair	Heavy.
Michilieu	Jan. 10	Yellow, red to sun	Medium	Free stone and skin	"	"
Pratt's	Jan. 20	Well coloured	"	"	"	"
River's Favourite	Feb. 14	Dark red	"	"	"	"
Sued	Feb. 6	Deep yellow and red, yellow flesh	Large	"	Excellent	Light.
Saunders	Dec. 18	Yellow, red to sun	Medium	"	Medium	Fair.
Sanakachiau	Dec. 25	Well coloured	"	"	Good	Good.
Triumph	Feb. 6	Rusts badly; fruit worthless	"	"	"	"
Ulates	Dec. 30	Gold and red, yellow flesh	Medium	Cling-stone	Good	Heavy.
White American	Dec. 28	Highly coloured	"	Free stone and skin	"	Good.
Wonderful	Feb. 6	Fruit very poor	Large	"	"	Very shy.
Washington	Mar. 1	Yellow, yellow flesh	"	Free stone and skin	Good	Fair.
	Mar. 1	Yellow and red	"	"	Medium	"

* Seedling from Elberta the same in all ways but more prolific.

NECTARINES.

Variety.	Remarks.
Goldmine ..	.. Highly coloured; good flavour; heavy cropper.
Early Rivers ..	.. Highly coloured; good flavour; heavy cropper.
Lord Napier ..	.. Good colour; fair flavour; moderate cropper.
Zealandia ..	.. Fruit small; poor flavour; moderate cropper.
Hunt's Tawny ..	.. Fruit small, poor flavour; moderate cropper.
Ausenne ..	.. Fruit small; poor flavour; moderate cropper.
Stanwick Elruge ..	.. Fruit small; poor flavour; moderate cropper.
New White ..	.. Fruit small; poor flavour; poor cropper.

At one time it was believed that peaches and nectarines would not succeed at Levin or in that neighbourhood. This impression was due to want of knowledge of peach-diseases and their means of control. The above report will show that the number of varieties of peaches and nectarines have proved a great success, this result being largely due to careful and consistent spraying for peach die-back, leaf-curl, and other diseases.

PEARS.

Variety.	Remarks.
Louise Bonne de Jersey ..	.. Excellent dessert; heavy cropper; strong grower.
Williams's Bon Chrétien ..	.. Strong grower; fair cropper; excellent dessert and canner.
Dr. Nelis ..	.. Poor quality; good grower.
Beurre Hardy ..	.. Excellent dessert; heavy cropper; strong grower.
Marie Louise D'Uccle ..	.. Good dessert; heavy cropper; good grower.
Buerre Clairmont ..	.. Good cooking and fair dessert; heavy cropper; good grower.
Vicar of Winkfield ..	.. Late; rather long in coming into bearing.
Beurre Diel ..	.. Excellent dessert; rather long in coming into bearing.
Doyenne du Comice ..	.. Excellent dessert; rather long in coming into bearing.
Princess ..	.. Poor quality; good cropper.
Fertility ..	.. Poor quality; good cropper.

On account of the youth of the majority of the trees it is yet somewhat early to furnish a full report.

LIST OF PEAR-TREES UNDER TEST AT WERAROA.

Beurre d'Amanlis.	Directeur Hardy.	Marie Louise d'Uccle.
Beurre Gris de Hiver.	Doyenne Bonsoch.	Mother.
Bergamot Rance.	Doyenne d'Etc.	Magnet.
Black Achan.	Dorset.	Marguerite Marvillat.
Bergamos Hanot.	Duchess de Bordeaux.	Mount Vernon.
Beurre Fougerey.	Directeur Varenne.	Madam Baltere.
Beurre de Capiaumont.	D'Arondean.	Maggie Seckle.
Beurre Bachelier.	Eva Ballet.	Monchallard.
Bergamot Cole.	Enile d'Evst.	Madam Lariel de Barnay.
Bountiful.	Elizabeth Sophia.	Notair Lepin.
Blanch.	Rycwood.	Prince Albert.
Beurre Mortillet.	Embassy.	President Carnot.
Beurre Joan Van Geer.	Fin Juliett.	Poure de Brays.
Baronne Melb.	Fertility.	Pitmaston Duchess.
Beurre Clairgeau.	Fondaute deThirriat.	Poure de Bernays.
Beacon.	Flemish Beauty.	P. Barry.
Beurre d'Aureaberg.	Fondants d'Automne.	Princess.
Beurre Bremeau.	Glen Morcean.	President Mass.
Beurre Dill.	Gregoire Bordillon.	President Durand.
Beurre de Jodgoine.	Gilgil.	Peach.
Beurre Mantelet.	Harrington's Victoria.	Housiette de Stungarat.
Beurre Blemenbach.	Howell.	Seneca.
Citron de Carmec.	Howell's Bergamot.	St. Michael Archangel.
Clapp's Favourite.	Hoosic.	Souvenir de Congress.
Conference.	Hughe's Victoria.	Sellad.
Comte de Lamy.	Isse Bonne.	Souvenir de Jules Guindan.
Calebasse Grosse.	Jargonelle.	Tyson.
Conseiller de La Cour.	Jeanne D'Are.	Thompson's.
Chamontel.	Krune.	Triumph d'Vienne.
Dr. Lucius.	Lawrence.	Vicar of Winkfield.
Dr. Nelis.	L. Inconnue.	Winter Cole.
Duchess d'Angouleme.	Le Lectier.	Winter Nelis.
Doyenne du Comice.	Louise Bonne de Jersey.	

VARIETIES THAT HAVE PROVED TO BE SUITABLE FOR CULTIVATION IN THIS DISTRICT.
Barry et al.

Variety.	Stock.	Date of Ripening.	Colour and Appearance.	Quality.	Bearing Qualities.
Angelina Ruedelt	Plum	..	Purple; short oval; large ..	Excellent flavour	Very prolific.
Auro Spath	(Description later)	..	..	..	Fair cropper.
Archduke	Plum	..	Purple; oval; medium ..	Culinary	Good cropper.
Baklan Purple	Purple; round; medium ..	Culinary	Good cropper.
Beauty of Kent	Purple; round; large ..	Good flavour	Fair cropper.
Bragdon's Gage	..	Feb. 1	Yellow; round; medium ..	Good flavour	Prolific.
Chick's Golden Drop	Yellow; dotted; red; short oval	Excellent dessert	Very prolific.
Chick's Late Red	..	The latest of all	Dark red; oval; medium ..	Firm flesh, good flavour	Prolific.
..	..	plums, buds	..	..	..
..	..	well on tree	..	..	..
Cutlew	Purple; oval; medium to large	Excellent culinary	Very prolific.
Gold's Prolific Damson	..	Feb. 14	Purple; round; smaller than Russian	Culinary; sweet	Prolific.
Columbia	Purple flushed, red; round; large	Excellent flavour	Good cropper.
Czar	..	Jan. 20	Purple; oval; medium to large	Culinary	Very prolific.
Dominion's Supurb	..	Feb. 6	Yellow-russety; round; medium	Excellent; good dessert	Prolific.
De Montford	Purple; round; medium to large	Good flavour	Prolific.
Denyer's Victoria	..	Feb. 10	Purple; round; medium to large	One of the best-flavoured	..
Denbigh	..	(Description later)	Light red, suffused darker ..	..	..
De Gasson	..	Jan. 26	Yellow; short oval; medium to large	..	Very prolific.
Diamond—Blue Diamond	..	Jan. 28	Purple; oval; very large	Excellent culinary	Good cropper.
Early Transparent	..	Mar. 1	Greenish-yellow; round ..	Excellent dessert	Fair cropper.
Early Oranah	..	Feb. 10	Red; round; medium ..	Culinary	Fair cropper.
Early Ravoca	..	Jan. 3	Purple; round; small	Good culinary	Prolific.
Goliath	..	Feb. 6	Red; oval; large	Good culinary	..
Grand Duke	..	Mar. 1	Dark purple; oval; medium to large	Excellent; sweet, rich flavour	Very prolific.
Herefordshire Damson	Purple; size larger than Russian	..	Very prolific.
Heron	Purple; round; medium to large	Culinary	Very prolific.
Jefferson	..	Jan. 20	Purple; round; medium to large	Excellent flavour	Very prolific.
Kirke's Black	..	Feb. 10	Yellow flushed red; oval; medium	Excellent flavour	Very prolific.
Mitchelson's Gage	..	Jan. 28	Purple; round; medium to large	Excellent flavour	Very prolific.
Monarch	..	Jan. 20	Purple; short oval or round; large	Excellent flavour	Fair cropper.
Mallard	..	Jan. 25	Purple; oval; medium to large	Good	Prolific.
Meredith's	Purple; round; medium	Excellent	..
McLaughlin	Purple; oval; medium	Good culinary	Very prolific.
Pond's Seedling	Light red; oval; very large	Culinary	Good cropper.
Purple Gage	..	Feb. 18	Dark purple; round; medium	Excellent; gage family	Fair cropper.
Russian Damson	Dark purple; round; large damson	Excellent flavour	Very prolific.
..	Dark purple; round; large damson	Excellent; the best for preserves	Very prolific.
..	Best on peach stock, but is
..	good on plum.

PLUMS—continued.

Variety.	Stock.	Date of Ripening.	Colour and Appearance.	Quality.	Bearing Qualities.
<i>European.</i> —continued.					
Roine Claude Conte-D'Athens	..	Jan. 7	Purple; oval; medium	Good flavour	Prolific.
Smith's Orleans	..	Feb. 12	Greenish purple; round; medium to large	Culinary	Good cropper.
Sultan	..	Jan. 20	Purple; round; medium to large	Culinary	Prolific.
Transparent Gage	..	..	Yellow, dotted red; medium; round	Good flavour	Fair cropper.
Washington	..	Feb. 12	Yellow, flushed red; round; large	Excellent flavour	Good cropper.
<i>Prunes.</i>					
Giant	Plum	..	Red; oval; large	Excellent flavour	Very prolific.
"	Peach	..	Red; oval; large	Excellent flavour	The same as on plum.
Golden Prune	Plum	..	Yellow; round; medium	Excellent flavour	Prolific.
Imperial	..	Feb. 12	Red; oval; large	Excellent flavour	Very prolific.
Petite d'Agout	Peach	..	Purple; oval; medium	Good flavour	Prolific.
Robe d'Argent	Plum	Feb. 12	Dark purple; oval; medium	Excellent flavour	Prolific.
"	Peach	..	..	..	Prolific.
Silver Prune	Plum	..	Yellow flushed red; medium	..	Prolific.
Spandour	..	Jan. 28	Purple; oval; medium	Good flavour	Prolific.
Tragedy	Peach	..	Purple; oval; large	Excellent flavour	Prolific, when settled down.
Waikato	Plum	..	Red; oval; medium	..	Prolific.
"	..	..	..	..	Prolific.
<i>Japanese.</i> —Prunes.					
Akarama	Peach	Jan. 3	Red; large	Fair culinary	Very prolific.
Apple	..	Feb. 15	Purple; round; large	Fair flavour, firm flesh	Very prolific.
Bofan	..	Jan. 24	Red; oval; medium	Fair flavour; firm flesh	Very prolific.
Barbark	..	Feb. 1	Dark red; round; large	Good flavour if thinned	Very prolific.
Doris	..	Mar. 5	Purple; round; small	Poor	Very shy.
Hay's Seedling	..	Mar. 7	Purple; round; medium	Fair flavour; watery	Prolific; would not travel.
Ogon	..	Feb. 1	Yellow; round; medium	Good flavour if thinned	Very prolific.
Purple Monster	..	Mar. 8	Purple; round; large	Best-flavoured Jap. we have	Light cropper; weak tree.
Shipper	..	Mar. 8	Purple; oval; large	Fair flavour; firm flesh	Prolific; good packer.
Satsuna	..	Mar. 8	Purple; oval; purple flesh	Fair flavour; firm flesh	Prolific; good packer.
Wright's Early	..	Jan. 3	Red; large	Fair culinary	Very prolific; require thinning.

EUROPEAN PLUMS OF INFERIOR MERIT OR NOT BEARING.

Autumn Compote.	Greengage.	Reine Claude Rouge.
Autumn Beauty.	Gisbornes Bonum.	Reine Claude de Bayay.
Blue Imperatrice.	Guthrie's Late Greengage.	Red Imperial.
Brandy Gage.	Harper's Early.	Saunders.
Belle de Lauvain.	Kanawaba.	Smith's Prolific.
Coe's Violet.	Late Gem.	St. Martins Quietech.
Clyman.	Maybals.	Takapuna Drop.
Evans's Greengage Early.	Newton.	Victorian Gage.
Evans's Early.	Prince Eaglebert.	Waterloo.
Fellenberg (Prune).	Pianette.	Williams (Prune).
Fairleigh's Prolific Damson.	Prince of Wales.	Yellow Magnum.
Frogmore.	Pourpreé.	

GOOSEBERRIES.

Name.	Colour.	Description.	Remarks.
Alma	White ..	Medium; round ..	One of the best to crop.
Broom Girl ..	Green ..	Large; round ..	One of the finest flavour; very prolific; good in every way.
Crown Bob ..	Red ..	Medium; round ..	A famous variety for cropping; good dessert.
China Orange ..	Yellow ..	Medium; round ..	Fine dessert; fair crop.
Duke of Edinburgh	Red ..	Large; oval ..	Heavy bearer; upright growth; improvement on Roaring Lion.
Early Sulphur ..	Yellow ..	Medium; round; smooth	The earliest in use among ninety varieties; good cropper.
Farmer's Glory ..	Red ..	Large; oval ..	The most profitable of all, because of its cropping powers and size; the favourite with the market growers.
Golden Purse ..	Yellow ..	Large; round; hairy ..	Very fine dessert; crops well.
Golding's Greenreef ..	Yellow ..	Medium; round; hairy ..	Good cropper.
High Sheriff ..	Yellow ..	Large; round ..	Perhaps the best dessert of all; large and fruity.
Ironmonger ..	Red ..	Medium; round ..	This is the variety known in England as "Red Rough"; best of all for jam.
Ploughboy ..	Red ..	Medium size; oval, smooth	Good dessert; crops well.
Pineapple ..	Yellow ..	Large; round ..	Fine dessert; fair cropper.
Warrington ..	Red ..	Medium; round ..	Famous as a preserving variety, and good dessert.
Weeping Red ..	Red ..	Large; oval ..	Crops well; very sweet and good flavour; hangs long out bush; the latest.

APRICOTS.

Variety.	Remarks.
Royal, on peach stock	Fruits fairly.
Royal, on plum stock	Barren.
Cullin's Early Peach, on peach stock ..	Moderate crop.
Grosse Peach, on peach stock	Moderate crop.
Ambrosia, on peach stock	Moderate crop.
Ambrosia, on plum stock	Barren.

CHERRIES.

Cherries have not proved a success, the humidity of the soil and climate proving unfavourable.

NOTE.

In connection with the foregoing report it is to be remembered that varieties of fruits which succeed well in the Wairaroa district may prove quite unsuitable for other parts of the Dominion, although a comparison of the above with reports on fruit-testing at other experimental stations will demonstrate that a number of varieties of the different classes of fruits will succeed under various soils and climatic conditions.

CO-OPERATIVE EXPERIMENTS, NORTH ISLAND, SEASON 1909-10.

THE following is a summary of the experiments conducted in the North Island, and on the west coast of the South Island, during the season 1909-10 by farmers, under the direction of the Fields Instructor, Fields and Experimental Farms Division. As space does not permit of more than a brief outline of the work undertaken being given in the *Journal*, type-written reports giving details of the various experiments have been supplied to the organizations and individuals conducting the experiments, and copies of these can be obtained upon application being made to the Fields and Experimental Farms Division, Department of Agriculture, Wellington.

SWEDE VARIETY TRIALS.

A large number of plots were sown to test different varieties of swedes in various districts, some of the yields from which are tabulated below. Aphis affected almost all the experiment plots in nearly every district, and much damage was also done by the various insect pests, such as the cabbage-moth, &c., which feed upon the leaves. A certain percentage of the plots, too, suffered from "rot," but not to any considerable extent. Club-root was very prevalent in some of the crops grown in the Manawatu, Feilding, and Rangitikei districts, and, while some varieties were badly attacked, others remained almost if not quite immune. The following are notes upon some of the experimental crops:—

Mr. J. Knight, Feilding—

Garton's Superlative : Free from club-root.
Sutton's Magnum Bonum : Only slightly affected.
Sutton's Crimson King : Considerably affected.
Sutton's Elephant : Very considerably affected.
Hurst's Monarch : A good deal of club-root present.
Webb's Imperial : Considerably affected.
Nimmo and Blair's Standard : Considerably affected.

Mr. H. Booth, Feilding—

Garton's Superlative : Almost free from club-root.
Garton's Monarch : Almost free from club-root.
Sutton's Champion : Almost free from club-root.
Sutton's Crimson King : Much affected.
Sutton's Elephant : Much affected.

Mr. J. Balsillie, Kairanga (the percentage of the roots affected was calculated when recording

Sutton's Elephant : 60 per cent. affected with club-root.
Sutton's Crimson King : 75 per cent. affected with club-root.
Sutton's Champion : 5 per cent. affected with club-root.
Garton's Superlative : 5 per cent. slightly affected with club-root.
Sutton's Magnum Bonum : 1 per cent. slightly affected with club-root.

Mr. Strode-Penny, Sanson, reports -

Hurst's Monarch and Sutton's Elephant : Badly affected with club-root.
Garton's Superlative and Sutton's Champion : Only very slightly affected.

The following table shows the yields:—

SOFT TURNIPS.

Some eighty-eight plots were reported upon from among the number put in. The object of the experiment was to endeavour to discover if there were any varieties immune from the soft-rot, or less liable to the attacks of leaf-parasites than other varieties. Among others were included the following varieties—Hurst's Fosterton Hybrid, Garton's Selected Old Meldrum Green-top Yellow, Garton's Michaelmas Yellow Purple-top, Sutton's Early Six-weeks, Sutton's Long-keeping, Sutton's Mikado, Sutton's Waite's, Eclipse, Challenge, Early Marvel, Hurst's Purple-top Mammoth, Garton's Lincolnshire Red, Centenary, Garton's Pioneer Turnip Swede, Hurst's Purple-top Yellow Aberdeen, Sutton's Imperial Green Globe, Yates's Pomeranian White Globe, Sutton's Aberdeen Green-top Yellow, Hurst's Imperial Green Globe—and many others. None of the varieties proved immune from turnip soft-rot when rot was present in the paddock.

Some of the plots put in by Mr. J. Balsillie, Kairanga, containing the following varieties—Sutton's Long-keeping, Sutton's Mikado, Sutton's Early Sheepfold, Sutton's Aberdeen Green-top Yellow, Garton's Centenary, Garton's Inches Bronze-top, and Challenge Yellow Tankard—were left in order to see if there were any individual plants which would prove immune from the disease. At the time the record was made (14th June) not a single sound root was found in the field—a decided and conclusive proof that there were no disease-resistant plants among the varieties sown in that experiment.

Mr. J. A. Macfarlane, Ben Lomond, reports that upon some weedy and badly cultivated land Garton's Selected Pomeranian White Globe and Sutton's Imperial Green Globe did fairly well with him under unfavourable circumstances.

Under similar circumstances Mr. G. L. Marshall, Turahina, found Sutton's Aberdeen Greentop Yellow, Sutton's Centenary, Sutton's Mikado, and Sutton's Early Sheepfold made better growth than other varieties in the trial.

In order to still further test the resisting-power of different varieties of soft turnips to soft-rot, the following varieties, being recommended by the growers as most likely ones to prove disease-resistant, were obtained: King and Co's Invincible Hardy Yellow Turnip, Sutton's Favourite Purple-top Aberdeen, Vilmorin's Yellow Aberdeen Purple-top, Carter's Champion Green-top Hybrid, Garton's Green-top Scotch.

This experiment was undertaken by Mr. J. Knight, Feilding. On 2nd June, 1910, there had been a very large percentage of loss through soft-rot in all the plots, Vilmorin's Yellow Aberdeen Purple-top being perhaps slightly less affected than the others.

Although it may be advisable to test still further varieties with a view to discovering such as may be slightly less susceptible to disease, it would appear that the remedy lies rather in giving attention to the health of the soil—by early ploughing and frequent cultivation, so as to expose the soil to atmospheric influences as much as possible; by liming, so as to render the soil less congenial to the many low forms of life which spread plant-diseases in the soil; by keeping up the balance of fertility in the soil, so as to promote a quick and healthy growth in the young plant; by avoiding the growing of plants belonging to the same order upon the same land except

at judicious intervals; and by cleaning the land from weeds during the winter months, so that such parasites as pass the winter in various forms and are dependent for food upon the weeds in their immediate neighbourhood may be in this manner destroyed for lack of food.

MANGEL VARIETY TRIALS.

The following experiment among others was conducted by Mr. Hugh Burrell, Feilding:—

Sown on 6th December, 1909, in drills 28 in. apart, and manured with 2 cwt. Japanese superphosphate, 1 cwt. bonedust, 1 cwt. kainit, $\frac{3}{4}$ cwt. ammonium sulphate, and $\frac{1}{2}$ cwt. salt. The crop weighed on 16th June, 1910:—

Variety.	Yield per Acre. Tons.
Sutton's Crimson Tankard	42.4
Nimmo and Blair's Long Red	50.3
Nimmo and Blair's Champion Yellow Globe	51.5
Sutton's Prize-winner Yellow Globe	62.1
Garton's Gatepost Large Yellow Intermediate	56.8
Garton's Improved New Sugar	42.4
Nimmo and Blair's Prizewinner Yellow Globe	42.9

Mr. F. S. McRae, Palmerston North, obtained an average yield of 87 tons of Sutton's Prizewinner Yellow Globe and 64 tons of Garton's Mammoth Long Red, while Golden Tankard Variety yielded 57 $\frac{1}{2}$ tons.

Many growers recommend the globe and tankard varieties for well-drained dry country, and prefer the long varieties for land of a wetter nature.

EARLY *versus* LATE PLOUGHING.

To test the benefit derived from early ploughing, Mr. Strode-Penny, Sanson, carried out the following experiment:—

Soft Turnips.—Plot 1, ploughed on 27th September, yielded 20 tons, while plot 2, ploughed on 10th December, yielded only 11 tons. Both plots were sown on 15th December.

Swedes.—Plot 1, ploughed on 27th September, yielded 18 tons, while plot 2, ploughed on 10th December, yielded 10 tons. Both plots were sown on 15th December. The take on the early-ploughed land was about 75 per cent. better than on the late ploughing, and the roots on the early ploughing were about double the size of those on the late ploughing.

TURNIP MANURES.

A few manurial experiments with turnips and swedes were carried out, but, owing to the ravages of blight and rot, especially among the soft turnips, it was difficult to obtain very definite results, as in all cases the crops were damaged, and in many completely destroyed. Among many other trials were the following:—

Mr. Brechin, of Pahiatua, applied small dressings of the following manures by themselves when sowing turnips, with the results stated:—

No manure yielded 48 lb. of roots per plot.
Basic slag yielded 78 lb. of roots per plot.
Sulphate of potash yielded 70 lb. of roots per plot.
Bonedust yielded 101 lb. of roots per plot.
No. 3 manure yielded 78 lb. of roots per plot.
Complete turnip fertilizer yielded 104 lb. of roots per plot.
Nitrate of soda yielded 22 lb. of roots per plot.

This experiment shows the benefit derived from the use of a complete fertilizer adapted to the requirements of the plant grown.

Mr. Fagan, Sanson, experimented with patent turnip fertilizers, as shown in the following table :—

EXPERIMENT WITH PATENT TURNIP FERTILIZER. FAGAN, SANSON.
1909-10.

Plot.	Yield.	Manure per Acre.	Soluble Phos- phoric Anhydride per Acre.	Insoluble Phos- phoric Anhydride per Acre.	Insoluble Nitrogen per Acre.	Soluble Dipotassic Oxide per Acre.	Cost per Acre.
	Tons.	cwt.	lb.	lb.	lb.	lb.	s. d.
1	16.8	2 $\frac{1}{4}$	9.24	20.7	6.75	5.85	11 4
2	20.4	2 $\frac{3}{4}$	18.5	13.37	7.4	3.12	13 9
5	12.3	2 $\frac{1}{4}$	..	24.72	14.82	..	11 4
6	18.3	2 $\frac{1}{4}$	16.11	9.85	5.98	2.94	13 4
X	12.3	2 $\frac{1}{4}$	37.12	3.15	..	..	11 3

This experiment is of value, as it confirms the results of Mr. Brechin's trials, and shows a large increase whenever a complete fertilizer suited to requirements of the crop and soil is made use of. In plots where potash has been omitted and the phosphoric acid given in an insoluble form, the same return was obtained (viz., 12.3 tons) as in the case of plot X, where 2 $\frac{1}{4}$ cwt. per acre of superphosphate was used, containing a very large proportion of soluble phosphates and only a very small proportion of insoluble, no potash, and no nitrogen. The largest increase is obtained in plot 2, where the nitrogen in an insoluble form is 2.37 times the amount of dipotassic oxide used, the soluble phosphoric anhydride is 2.5 times the amount of insoluble nitrogen, and the insoluble phosphoric anhydride is 1.8 times the amount of the insoluble nitrogen. Any mixture with a percentage composition at about this ratio would probably give excellent results upon this and similar soils.

Mr. Basillie, Kairanga, conducted an experiment with swedes upon a soil where, according to analysis supplied by him, there is an excess of magnesia over lime. Slag and bonedust here gave better results than superphosphate and gypsum, and when gypsum was added to the slag and bonedust mixture still better results were obtained. A deficiency of lime, as indicated by the analysis made, is clearly borne out by the results of the experiment, and an application of lime to this soil would be highly beneficial. A very large number of soils in the North Island would be greatly benefited by the occasional application of lime in the form of lime-carbonate; in many cases no very satisfactory results will be obtained by the use of artificial fertilizers until this want has been supplied.

FORAGE CROPS.

In addition to other experiments, some 33 experiments with maize were carried out, 2 with sorghums, 13 with lucerne in different parts of the country, 4 with millets, several with kale and rape, and some 8 or 10 with mixed forage crops. Below are tabulated a few of the experiments and results :

MANURIAL EXPERIMENTS WITH FODDER CROPS, 1909-10.

	Manure.	Cost per Acre.	Yield per Acre.
Palmerston Hospital—			
East Coast Horsetooth Maize	Bonedust, superphosphate, sulphate of ammonia, sulphate of potash, kainit	£ 1 10 0	Tons. 30
Japanese Barnyard Millet . .	2 cwt. superphosphate, $\frac{1}{2}$ cwt. blood and bone, $\frac{1}{2}$ cwt. sulphate of potash, $\frac{1}{2}$ cwt. gypsum	0 19 0	28
P. Anderson, Rongotea			
Motiti maize	2 cwt. superphosphate, $\frac{1}{2}$ cwt. sulphate of potash, $\frac{1}{2}$ cwt. sulphate of ammonia	2 $\frac{1}{2}$ cwt. per acre cost 1 0 0	44
J. Campton, Masterton			
Funk's Yellow Dent	2 cwt. superphosphate, $\frac{1}{2}$ cwt. sulphate of potash, $\frac{1}{2}$ cwt. sulphate of ammonia	1 8 0	40
J. O. Batchelar, Palmerston—			
Motiti maize	1 cwt. superphosphate, $\frac{3}{4}$ cwt. bonedust, $\frac{1}{4}$ cwt. sulphate of potash, $\frac{1}{2}$ cwt. sulphate of ammonia	1 3 0	33 $\frac{3}{4}$

Many farmers are unaware that there are a very large number of varieties of maize, some of which are supposed to take only fifty days to mature from the time of sowing, while others will take 180 days or longer. As the maize only attains its best feeding-value when the cob is formed and the corns are in the milk stage, it is very necessary when growing it for dairy feed to select a variety whose period of growth is suited to the climatic conditions of the district, and which will mature about the date at which it will be required for use. The varieties tested last season included, among others, the following:

Short season varieties: Cinquattino, North Dakota White Flint, Brunning's Red Hogan, Ninety Day, King of the Earlys.

Medium season varieties: Funk's Yellow Dent, Somerton White, Motiti, Select Moruya, Eclipse, East Coast Horsetooth.

Long season varieties: Hickory King, Red Cob Ensilage, Brazilian Flour Corn.

Sorghum: Early Amber Cave variety, which probably requires a somewhat longer season than an average variety of maize.

Millets: Japanese Barnyard, Golden Millet, Foxtail Millet, all of which should be available for feeding purposes before the maize crops are ready. They are only suited to good-quality light soils, or to well-drained clay loams.

Lucerne: Several small trials were put in, with a view to testing the suitability of soils and climates to the various districts for lucerne-growing. Successful results were secured by Mr. J. J. Dalrymple, Bull's; Mr. Hector Booth, Feilding; Mr. J. G. Brechin, Pahiatua; and Messrs. Ellis Bros., Bull's, all of which were on sandy or alluvial soils. Many other plots were likewise put in, but it is as yet too early to report upon the permanency of lucerne in these districts. As a rule farmers do not pay sufficient attention to the preparation of the land before sowing, or to the cleaning of the crop after sowing, especially during the winter season. Liming, and working same well in, is likewise necessary on most soils, and, until these points are attended to satisfactorily, stands of lucerne are not likely to be obtained, even on soils well suited to its growth.

OAT TRIALS.

VARIETY AND MANUREL EXPERIMENTS WITH OATS, 1909-10.

Variety.	G-rower.	Date sown.	Date harvested.	Seed per Acre.	Fertilizer.	Yield per Acre.	Remarks.
Triumph	T. Massey, Sanson	Oct. 15	Jan. 20	Bushels. 2½	1 cwt. No. 3	..	..
Garton	"	" 15	" 14	2½	"	..	..
Tartar King	R. Warriner, Greatford	Sept. 17	" 10	2	2 cwt. blood and bone	..	..
New Rival	"	" 17	" 12	2	"	..	..
Algerian	"	" 17	" 8	2	"	..	..
						Bushels. About 50	Stood well; plump and good quality; no blight.
						About 40	Triumph variety preferred.
						39	Rusted badly.
						30	Unable to rust; lean and light.
						49	Strong and clean.

The following tabulations give results for the most part of the first year's trials of the Australian varieties of wheat under test. It is too early at present to report definitely upon them, but it is anticipated that among the varieties certain will be found well adapted to some of the soils in New Zealand, and will be extensively grown in the near future:—

VARIETY AND MANURIAL EXPERIMENTS WITH WHEAT, 1909-10.

Variety.	Grower.	Date sown.	Date harvested.	Seed per Acre.	Fertilizer per Acre.	Yield per Acre.	Remarks.
Yandilla King	D. Crabb, Marton	Sept. 2	Jan. (end)	Bushels.	Cwt.	Bushels.	Badly rusted.
Red Tuscan	R. Chambers, Hawke's Bay	Aug.	Jan. 6	21	"	36	Dead-ripe.
Federation	"	"	"	"	"	38	
Yandilla King	"	"	"	"	"	30	
White Tuscan	"	"	"	"	"	22	
Comeback	"	"	"	"	"	36	Dead-ripe. Stands well, and matures eight days earlier than Marshall's
Federation	D. Fraser, Bull's	"	18 weeks after sowing	24	"	35	White. More affected by rust than Federation.
Marshall's White	"	"	"	"	"	26	All varieties badly affected by blight.
Power's Pile	O. McElroy, Feilding	Oct. 14	"	2	1/2 super. and 1/4 bone-dust	12	
Yandilla King	"	"	"	2	"	10	
Red Chaff	"	"	"	2	"	18	
John Brown	"	"	"	2	"	13	
Marshall's White	T. Masters, Sanson	Sept. 14	Jan. 27	2	"	33	Good quality. Stands well; not subject to blight.
Federation	"	"	"	2	1 cwt. of No. 3	25	
Marshall's White	H. L. Stantiali, Greatford	Oct. 11	Feb. 2	23	"	17	
John Brown	"	Oct. 11	"	23	"	27	
Comeback	G. Warriner, Greatford	Sept. 17	Jan. 15	24	1 1/2 bone super.	40	(Yield is computed.) Much improved.
"	Shaw and Son, Masterton	Late	"	2	"	28	No blight.
River Plate	"	"	"	2	"	24	Rather lean.
Tuscan	"	"	"	2	"	27	Good quality.
Farragan	McGregor Bros., Masterton	"	Jan. 18	2	"	22	Strong; clean; hard straw.
Comeback	"	"	"	2	"	26	Farragan preferred.
John Brown	"	"	"	2	"	24	Inclined to lodge.
White Tuscan	"	"	"	24	"	26	

TOP-DRESSING PASTURES.

These experiments may be classed into two divisions—those upon which the grass is cut and weighed, and those upon which the records are made by the number of sheep depastured thereon.

Mr. G. L. Marshall, Turakina, in the winter of 1908 dressed 5 acres at the rate of $4\frac{3}{4}$ cwt. slag per acre, costing about £1 ls. per acre. Average number of sheep carried per acre, from 18th February, 1909, to 14th January, 1910 (330 days), 4.29. Unmanured plot, same period, 2.11.

The sward of the manured portion was vastly improved, both in density and in composition, and the sheep grazed thereon were in better condition than upon the unmanured land. The experiment is still being carried on, and, so far, the $4\frac{3}{4}$ cwt. of slag given in the winter of 1908 has continued to double the average carrying-capacity of the 5-acre paddock upon which it was distributed.

A somewhat similar experiment upon a totally different class of country is now being conducted by Mr. Hector Booth, Feilding.

Several areas of $\frac{1}{4}$ acre each of old pastures were dressed in different districts. Many of these experiments were in their second year. Separate reports of these have been prepared, and are available for circulation.

Wherever a suitable mixture has been used considerable benefit has resulted. At Porewa, for instance, slag alone gave little return, but when potash was added a very large increase was obtained, and in two seasons a heavy dressing of slag and potash has proved considerably more remunerative than a dressing of superphosphate, bone, and potash, costing the same money. Exactly the reverse has taken place on Mr. A. H. Russell's plots, at Tumanui, where the greatest gain has been from the combination of bone, superphosphate, and potash. These two instances serve to illustrate the need of discovering what mixture to use when top-dressing a pasture. As a general rule, on heavy land where the rainfall is abundant and well distributed, basic slag will be found most suitable, and the probability is that potash will not be required. On very light lands it will probably be found advisable to add some nitrogenous manure to the fertilizer used. Upon medium-light land in a fairly dry climate, or on land subject to long spells without rain, a mixture of superphosphate, bone, and potash will most likely give the best results.

Very few soils in the north are well supplied with lime, and a periodic dressing of the same would not only stimulate the growth of the clovers, but also assist to keep the stock in a healthy condition. Where clovers and the better grasses are notably deficient, some means of partially reseeded the pasture must be adopted, if it is hoped to obtain the best results from the use of artificial top-dressings for worn-out pastures.

EXPERIMENTS UPON BARREN LANDS.

Several plots were put in on the *pakahi* area at Westport known as "Waite's Pakahi." On these soils the rush is burnt off and grass-seed sown upon it. "Nothing" is the result obtained. The same occurs if the land is ploughed up and sown down. After a heavy dressing of lime and a further dressing of slag, superphosphate, and sulphate of potash, and abundant cultivation, a mixture of grasses was sown down upon a plot half an acre in extent, and this resulted in an abundant crop of hay. Subsequently a very fair stand of grass was secured by ploughing, liming at the rate of 1 ton per acre, fallowing, and the addition of $2\frac{1}{2}$ cwt. of basic slag.

Some further experiments have been begun on Mr. Gibbs's property, near Takaka, where somewhat similar soils exist, results of which will be to hand shortly.

THE MANAGEMENT OF BROOD MARES.

(By H. C. WILKIE, F.R.C.V.S., late Govt. Veterinarian.)

ONE of the first things a farmer wants to know as foaling-time approaches is what mares are in foal, and although in some cases there can be no doubt, in many others he does not find it easy to decide.

On making inquiry among his neighbours he finds the methods of testing this matter are both diverse and peculiar, from pouring water into the ears to giving the mare sharp exercise, followed by a drink of cold water, to make the foal jump.

No diagnostic methods which have for their object the jumping of the foal are advisable, nor until pregnancy has advanced more than half-way are they of any avail.

The signs of pregnancy in the mare are the following :—

1. Cessation of heat is the earliest sign of pregnancy, but it must not be too implicitly relied upon, as it is subject to great variation.

2. Enlargement of the abdomen usually commences three or four months after conception, but in some cases, especially in mares with their first foal, the enlargement is by no means apparent until very near foaling.

3. Enlargement of the udder in mares with their first foal occurs between two and three months after conception.

The udder becomes rounded, loses its wrinkles, and the teats become prominent.

This enlargement subsides, and reappears again several times during pregnancy.

This sign of pregnancy I regard as a certain one; it is well marked in mares carrying their first foal, and is often, too, seen in older mares. However, as it does not inconvenience the mare, it often remains unnoticed.

4. A disposition to lay on fat and an increase in weight is, of course, a well-known sign of pregnancy.

Positive evidence of pregnancy is obtained by manipulation through the abdominal wall, the vagina, or the rectum.

5. In the first method the palm of the hand is pressed just below the flank and 10 in. in front of the stifle on the left side. If pregnancy is advanced a hard mass is felt, and the movements of the foal are perceptible.

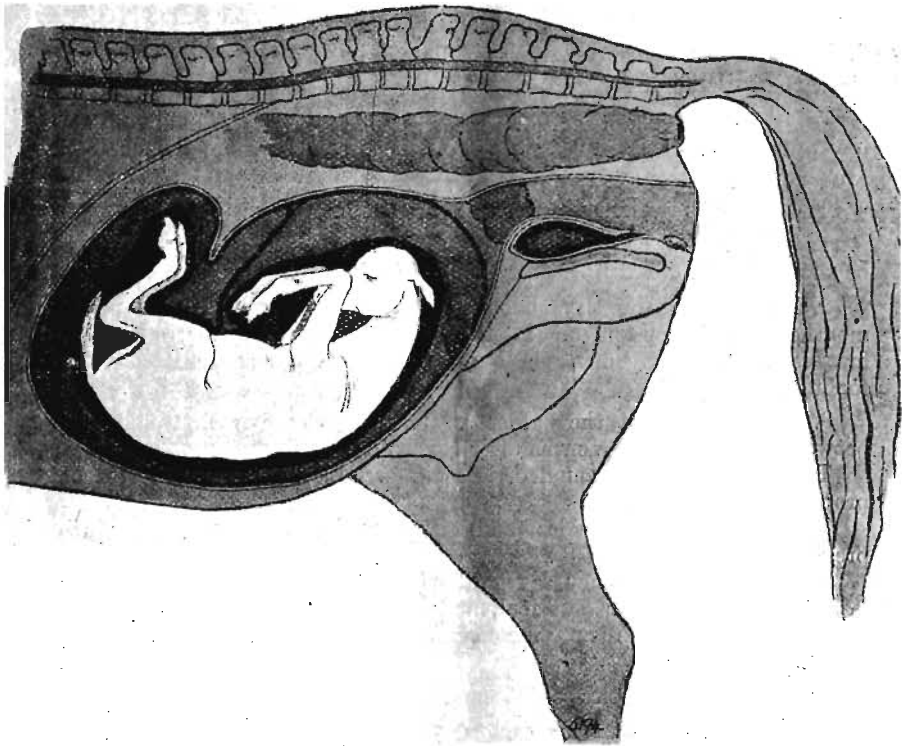
When applying this method the closed fist should not be forcibly punched against the foal's head, as I have often seen done, because it is very possible to produce abortion by violence of that kind.

6. Examination through the vagina is not of much value in mares, and the method called ballottement is, on account of the horizontal position of the body, altogether useless.

7. *Auscultation* (from the Latin *auscultare*, to listen), with a view to the detection of the pulsations of the foal's heart, is, on account of the marked intestinal sounds and thickness of the abdominal wall, of little service in the mare.

I have, however, on a few occasions distinctly recognized the foetal heart-sounds on examining thoroughbred mares, but never in coarser-bred animals.

The *uterine souffle*, caused by the blood passing through the enlarged uterine vessels—a whirling sound—and the *funic souffle*, caused by the pulsation in the umbilical cord, are to be readily detected in small animals, but cannot be recognized in mares.



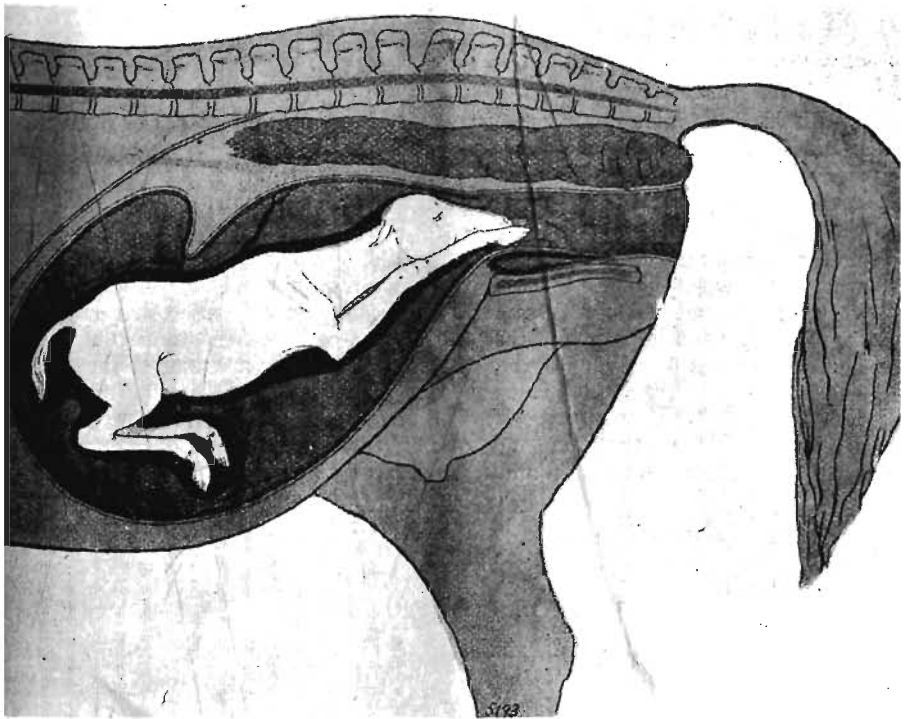
A.—This is a diagram showing the foetus as it lies in the mare's womb during the time of its development and up to the commencement of labour. The spine is shown in section, and beneath it in wash is the lower bowel or rectum. Underneath this is the vagina, separated from the womb by the "os uteri," which is closed during pregnancy. Beneath the vagina is seen the bladder, and a section of that portion of the pelvis upon which it rests. The foetus is enclosed by a black mass, which diagrammatically represents the membraneous bag called the amnion, containing a fluid in which the animal floats. The chorion is indicated in the dark lining to the womb. It is between this membraneous bag and the womb that the placenta is situated. The placenta is the organ by means of which the foal receives nutritive elements and discards waste material from its circulation. There is a third membrane, omitted here for the sake of clearness. It is called allantois (from the Greek word *allas*, a sausage), and is a sausage-shaped bag containing the urine, which passes from the navel of the foal during the later stage of intra-uterine life.

8. Examination through the rectum is one of the best and most certain of all methods for recognizing pregnancy in mares.

The rectum is emptied of its contents, and the hand passed over the brim of the pelvis. The palm of the hand is then pressed downwards, and the uterus with its contents may be felt immediately below.

In the early stages of pregnancy it may be necessary to raise the abdomen by passing a sheet under it and pressing it upward, but a little experience soon enables one to do without this on most occasions.

If the foal is over the mid-term of pregnancy, the hand usually meets with the top of his head, or sometimes, if the hand is well advanced, with the knees, and he makes a slight movement under the hand. The foetus



B.—This is a diagram showing the foetus after it has been turned in the uterus by the contractions of that organ, and has ruptured its enclosing membranes by straightening its fore legs. It is now ready to be expelled from the womb.

should not be pressed upon or manipulated in any way, but as soon as his presence is known the hand should be at once withdrawn, or much damage may result.

The position of the foal as he lies in the uterus before labour commences is not as you see it in most of the fearful and wonderful books on amateur horse-doctoring.

That position which you will recognize in diagram B is the position of the foal when it is ready to be expelled by the act of parturition.

Throughout the whole time the foetus is developing in the uterus it lies upon its back, as shown in diagram A, curled round with the head bent down to the breast, the legs are doubled, and the knees rest on either side of the face.

When parturition commences what takes place first of all is that the womb makes certain convulsive contractions.

These contractions first turn the foal on to his side, and finally reverse his former position altogether.

This treatment drags the umbilical cord, for, as you see in the diagrams, this cord is attached to that portion of the placenta which occupies the upper part of the womb.

A few more convulsive contractions of the uterus cause the foal to kick out and straighten his fore legs, and this action in normal parturition bursts the enclosing membranes, and the foetus is then quickly expelled.

This is what normally takes place.

All kinds of abnormalities occur, and in connection with the rupture of the membranous envelopes of the foetus I have seen on several occasions the outer membrane or *chorion*, assume such a thick and tough condition that it had to be cut through, as the foal could not burst it and the fingers could not tear it.

I remember one case of this kind, to which I was called in a great hurry, where the owner thought the womb was coming out (and indeed it looked very like it), and had put on a most complicated sort of truss of ropes and straps to keep it in. In this case the uterine contractions were so strong and labour was so advanced that the mare would have expelled the foal enclosed in the membranes had she been allowed to stand or lie, but she was kept moving about by the aid of a strong man and whip. As soon as I allowed the mare to stand, and took off the truss, the foal was expelled with the membranes intact; and in such cases as these, if assistance is not at hand, of course the foal must die suffocated, because respiration becomes necessary as soon as the umbilical cord is broken.

IMPEDIMENTS TO BIRTH.

These are very varied, and depend more frequently upon some abnormal size or position of the foal than disorders of the organs of the mare.

The various positions which foals assume where there is a departure from the normal presentation form the most common obstructions to birth, and are more or less serious according to the difficulty of sufficiently altering the position to extract the foal.

There is hardly any conceivable position a foal cannot be found in these cases at times, but the most common are---

1. The fore legs presented, but the head turned back over the shoulder.
2. The head presented, but the legs not extended.
3. All four legs presented and the foal lying sideways.
4. Lying on the back, as in this diagram.
5. Tail only presented and the legs below the brim of the pelvis.

1. Here the head must be got round and the neck straightened, in most cases. I have extracted foals with the head curled round, when they were dead and the neck almost immovable, by passing a cord round the neck and removing the whole leg at the shoulder; but the head should be got round whenever possible.

2. The legs must be raised, brought into the passage, and corded. To effect this it is usually necessary to push back the foal as much as possible to allow room for getting up the legs.

3. This is a very bad presentation if any time be lost in making ineffectual efforts. It is necessary to rapidly find out which are fore and which are hind legs, push back the fore legs as far as possible, and extract by pulling on the hind ones.

4. In these cases the foal is usually dead, and the quickest delivery is effected by placing a cord round the neck, one round each of the fore legs, and extracting by ordinary traction.

5. This is often a troublesome presentation, and the foal must be pushed back as far as possible and the legs got into the passage, corded, and extracted in that way.

To extract a foal by the hind legs is far easier than by the fore ones, because the head does not require any attention, as it can then offer no obstruction.

In these cases, however, of what are called breech presentations the difficulty is in getting up the legs. That done there is no more trouble.

There are many other presentations I have no time now to go into, but none of them make extraction of the foal impossible.

When other means fail, the operation of *embryotomy*, or dismemberment of the foal, can be rapidly performed by a skilled and experienced practitioner, and there is no reason why so many mares should be lost in foaling as there are in this Dominion. With mares, however, time is of great value, and the more gentle and considerate the operator is to his patients the more successful will be his results.

These cases, as I know from several years' practical experience, are often laborious and exhausting to the practitioner. They require determination, coolness, a fair amount of muscular strength and endurance, a rational sympathy with the patient, and a good practical knowledge of the work.

RETENTION OF THE PLACENTA.

The placenta, or membrane which corresponds to the inner surface of the womb, and which contains the vessels through which nutrient elements pass from the dam to the foetus, normally is expelled in the mare either at the time of birth or immediately after it.

It is retained in the mare most frequently in cases of *abortion*, or when the birth has taken place several days before the normal average time.

It cannot be allowed to remain in the mare with impunity so long as it may in the cow. In the mare retention is always more or less dangerous, and, owing to its diffuse character, its rapid decomposition, and the readiness with which septic organisms obtain entrance to the system, it should never be allowed to remain more than a few hours.

Injections of lukewarm water will materially facilitate the separation of the placenta, but if this is not effected the best way is to thoroughly wash the hands, first with soap and water, then in spirit, and finally dress them with carbolized oil.

One hand should be inserted as far into the womb as possible, and the placenta peeled off all parts which can be reached. The placenta attached to any parts out of reach may then be removed by gentle traction, slightly twisting at the same time.

After this operation the uterus should be irrigated with a weak anti-septic, used warm.

The adhesion of the placenta in the mare is not great, and no rough handling should be permitted.

MEAT-SHIPMENTS TO THE UNITED KINGDOM FROM NEW ZEALAND, AUSTRALIA, AND ARGENTINA.

THE Department has received the following cablegram from Buenos Aires, dated 9th March, 1911 :—

The following shipments were despatched from Argentina to United Kingdom ports during February, 1911 (compared with figures for February, 1900) :—

	1911.	1910.
Frozen beef (quarters)	106,168	130,725
Chilled beef (quarters)	129,141	81,514
Frozen mutton (carcases)	113,606	198,068
Frozen lamb (carcases)	27,236	25,492

A private report placed at the disposal of the Department states as under the quantities of frozen meat shipped from Australia to the United Kingdom during February, 1910 and 1911 :—

	1911.	1910.
Frozen mutton (carcases)	131,000	238,000
„ lamb (carcases)	81,600	54,000
„ beef (quarters)	10,000	16,500

The total shipments from New Zealand, Australia, and Argentina to the United Kingdom during the month of February of the last five years have been :—

Year.	Carcases Mutton.	Carcases Lamb.	Quarters Beef.
1911	585,000	561,000	301,000
1910	585,000	499,000	273,000
1909	612,000	464,000	239,000
1908	336,000	463,000	200,000
1907	482,000	381,000	125,000

The total shipments to the United Kingdom from the above sources from 1st January to 28th February of the last five years were :—

Year.	Carcases Mutton.	Carcases Lamb.	Quarters Beef.
1911	1,272,000	1,064,000	602,000
1910	1,150,000	870,000	511,000
1909	1,169,000	962,000	455,000
1908	711,000	825,000	420,000
1907	1,078,000	915,000	303,000

CORRESPONDENCE.

CONTROL OF CODLIN-MOTH.

R. J., Blackstone Hill, Otago,—

Will you please inform me of the best means of getting rid of codlin-moth. I have got it here for the first time in forty years: not a sign of it last year. This year the pears are badly affected. How do you account for it coming so bad in one year?

The Director of Orchards, Gardens, and Apiaries supplies the following note:—

Codlin-moth may be almost entirely suppressed by the judicious use of arsenate of lead, 1½ lb. (Swift's Brand) to 50 gallons water. This spray should be applied to the fruit by means of a good pump with a fairly fine nozzle. The first application is the most important, and should be made immediately the petals of the flowers have fallen, at which time the "eye" of the fruit is still open and is pointing upward. At this time the especial object is to lodge a small quantity of the spray in the eye, at which place the grub most frequently makes its attack. Later sprayings may be made as follows: (1) Seventeen days after the first spraying; (2) about the middle of January; (3) about the middle of February. Heavy or frequent rains will necessitate respraying. Arsenate of lead may be mixed with Bordeaux mixture (1½ lb. of the former to 50 gallons of the latter), which spray it is highly advisable to apply at least with the first two applications of arsenate for the prevention of fungus diseases. In conjunction with the above method, bandaging may be wisely employed for the first season as a further protection against codlin-moth. Strips of coarse sacking are tied round the trunks just below where the branches fork. These bandages should be removed at regular intervals and be dipped into boiling water to kill the grubs that have harboured in them. At this time (March) the greater portion of damage by codlin-moth is already done; for your crop will have suffered not only from the first flight, which doubtless migrated from some infested orchard to your own early in the season, but also from their offspring, one or two broods of which would seem to have been brought forth. This would account for the extensive damage that has been caused by this pest in a single season. Needless to say, the ground about the trees should be kept as clean as possible, all fallen fruit, pruning, &c., being burnt up from time to time. Such debris provides suitable shelter for codlin-moth in the pupal form.

CATERPILLARS IN TOMATOES, AND CABBAGE APHIS.

G. H., Utanerua, Picton, writes,—

My tomatoes this year are affected more or less with a large green grub. Neighbours report the same trouble. The grub bores holes in the young tomato, which causes it to wither and drop off. Would the washes be of any use? Also, what is the best wash to use for cabbages? My cabbages are largely affected with, in my opinion, the ordinary aphis.

The Director of Orchards, Gardens, and Apiaries replies,—

From your description I should say that the pest which is boring into your tomato fruit is the tomato caterpillar (*Heliothis obsoleta*); the larval form of this insect is most destructive to green and ripening fruit. Timely spraying with arsenate of lead (at the rate of 1½ lb. (Swift's brand) to 50 gallons water) kills the pest before it has accomplished much injury. Practically nothing can be done with those caterpillars which are already in the fruit; arsenate of lead, however, will largely prevent further ravages. To avoid the attack of tomato-fungus diseases, careful growers always spray their plants at intervals with Bordeaux mixture (using 3 lb. lime, 3 lb. bluestone to 50 gallons water), commencing when they are well established after transplanting and about 9 in. in height. Later in the season, when the fruit is formed, 1½ lb. arsenate of lead is added to each 50 gallons Bordeaux mixture to prevent the attack of caterpillar. I mention this as a good general line to follow in your case. A nozzle such as the "Cyclone," which will throw a fine forcible mist, enables the operator to reach with ease both the upper and the

lower sides of the leaves and fruit—provided, of course, the plants have been properly pruned.

Cabbage aphid should be treated immediately on its first appearance, as with favourable weather-conditions it multiplies exceedingly rapidly, and the leaves curl over and afford it protection from sprays. Several applications at short intervals of the following spray should prove effective: 1 lb. strong tobacco or 3 lb. waste tobacco, 3 lb. soft-soap, 20 gallons water. Boil the tobacco and soft-soap in a closed vessel containing 2 gallons water for half an hour; strain this fluid into 18 gallons water; apply through a good nozzle as before. I may add that in spraying with Bordeaux-arsenate-of-lead spray the object is to cover all parts of the stem, leaves, and fruit with a fine film of wash; whereas in spraying cabbage for aphid the only object is to thoroughly wet the aphid.

CANARY-GRASS.

G. A. H. D., Meringa, Taumarunui, writes,—

I hear much about canary-grass, and if you can put me in the way of any information as to its merits I shall be obliged to you.

The Director of Fields and Experimental Farms replies,—

Canary-grass (*Phalaris commutata*) has during recent years been largely advocated as a winter-forage plant. It yields an immense amount of succulent herbage, and grows well during the winter months. Although apparently best adapted for warm localities, it will endure large amounts of frost without injury. Canary-grass has been grown for several seasons on the experimental farms, but it has not yet been demonstrated whether it will prove a success in mixed pasture, and its permanence on grazing-land has not yet been sufficiently ascertained to warrant an opinion being given. The general impression at present is that it will probably succeed better as a fodder plant than as an addition to our ordinary permanent mixtures. The success that has attended the cultivation of canary-grass in Australia indicates that it is likely to prove extremely valuable here, but its grazing capacity and capability of withstanding sustained feeding must be ascertained before advising its use in ordinary pastures. The seed is always expensive, considering the amount that can be produced and the ease with which it is harvested.

POULTRY FOR IMPERIAL EXHIBITION.

AN exhibit of frozen dressed poultry has been prepared by the Live-stock and Meat Division and forwarded to London for display at the Imperial Exhibition, which will open at the Coronation period. The collection consists of:—

8 Black Orpington chickens	..	4½ months,	weighing 38 lb.
8 " " "	..	4 " "	48 lb.
4 White " "	..	5 " "	36 lb.
8 Silver Wyandotte "	..	5 " "	39 lb.
12 White Leghorn "	..	5 " "	63 lb.
6 Silver Wyandotte hens	..	1½ years,	"
6 White Orpington "	..	14 weeks,	57½ lb.
10 Pekin ducklings	..	14 " "	47 lb.
12 Indian Runner ducklings	..	5 months,	30 lb.
6 White Rock chickens	..	14 weeks,	30 lb.
6 Pekin ducklings	..	(young),	55 lb.
6 geese	..	" "	37 lb.
2 turkeys	..	" "	"
2 geese	..	" "	"

The chickens and hens were reared and fattened at the Burnham Poultry-station by Mr. J. Rose, manager; the ducklings, &c., were fattened by Messrs. Clarke and Pounsford; and the whole were dressed by the latter firm.

MARKET FOR FEATHERS.

THE High Commissioner has forwarded a report by the Produce Commissioner, dated 13th December, upon the sale of a consignment of fowl and duck feathers shipped by the Live-stock and Meat Division of the Department.

The feathers were sold by auction on 8th December by Messrs. Hale and Son, London, and realized as follows:—

		s.	d.	
No. 1.	1 bale dark fowl-feathers	..	..	0 2 $\frac{1}{4}$ per pound.
No. 2.	1 " " "	..	..	0 2 $\frac{3}{4}$ "
No. 3.	1 " " "	..	..	0 2 $\frac{3}{4}$ "
No. 4.	1 " mixed fowl-feathers	..	..	0 4 "
No. 4A.	1 bag white fowl-feathers	..	..	0 8 "
No. 5.	1 bale dark "	..	..	0 2 $\frac{3}{8}$ "
No. 6.	1 " " duck-feathers	..	..	1 0 "
No. 7.	1 " " fowl-feathers	..	..	0 2 $\frac{3}{8}$ "
No. 8.	1 " white duck-feathers	..	..	1 7 "
Nos. 9 to 17.	9 bales fowl and duck feathers (mixed)	..	..	1 7 "

There was a fairly good attendance of buyers in the auction-rooms, and every lot sold under good competition.

Since the sale inquiries have been made by buyers as to whether there is a prospect of larger and regular supplies of feathers—especially duck—being obtained from New Zealand. The quality of those now sold has met with approval, and if shipments could be regularly made there is every prospect that the demand for them will be good, and that prices similar to those now given would be realized.

(The above feathers were consigned to London upon the closing of the Departmental Poultry Depots at Auckland and Christchurch.)

CROPS, PASTURES, AND STOCK.

Most of the harvest in the late districts has been secured in good order. The yields of wheat and barley are fully up to anticipations, but of oats are very irregular; and the same remarks may be applied to the quality of the respective cereals. A larger proportion than usual of oats is being reserved for chaff. The recent heavy rains have vastly improved pastures, rape, and turnips, growth being rapid and blight having been greatly diminished. There are fears, however, in some districts that the season is too far advanced for the production of a sufficiency of feed to carry stock over the winter, stocks of hay and ensilage being very small, and already, in many cases, encroached upon. Maize has been of great service as green fodder on dairy farms in the North Island, sustaining the milk-yield during the dry period. The dairy-produce output, however, is materially reduced. Lambs have not fattened well, and a large proportion of those slaughtered for export are very light. Both sheep and lambs have been slaughtered in large numbers, but now that feed prospects have improved there may be some slackening of the rush to the freezing-works, and the quality may improve. Fat cattle are scarce, but fat pigs are plentiful.

SOME OF THE COMMON AILMENTS IN FOALS.

THE paper under the above title, by Mr. H. C. Wilkie, F.R.C.V.S., late of the Veterinary Division, which appeared in Journal for February (p. 100) is reprinted as Bulletin No. 9 (new series), and copies can be had free on application to officers of the Live-stock and Meat Division, or to the Editor, Publications Section, Department of Agriculture, Wellington.

HEMP AND TOW GRADING RETURNS.

FEBRUARY, 1911.

Hemp.—The total number of bales graded was 8,897, as compared with 14,516 for the corresponding month of last year, a decrease of 5,619 bales. For the twelve months ending 28th February the number graded was 118,798, as compared with 99,123 for the previous twelve months, or an increase of 19,675 bales. Worked out on a percentage basis the quantity of each grade dealt with during the month was as follows: Superior, nil; fine, 6·91; good fair, 45·56; fair, 43·0; common, 3·25; rejected, 0·48; condemned, 0·8: total, 100.

Tow.—During the month 3,486 bales were dealt with, as compared with 4,921 for the corresponding month of last year, a decrease of 1,435 bales.

HEMP AND TOW GRADED THROUGHOUT THE DOMINION DURING
FEBRUARY, 1911.*Hemp.*

Port.	Superior.	Fine.	Good Fair.	Fair.	Common.	Rejected.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland	33	454	678	78	10	71	1,329
Napier
Foxton	125	1,024	1,222	114	21	..	3,106
Wellington	108	1,002	1,178	61	2	..	2,951
Blenheim	84	..	..	..	..	..	84
Pictou	192	103	..	..	9	..	310
Lyttelton
Dunedin	60	157	84	..	..	..	301
Bluff	8	108	663	37	..	..	816
Totals	615	4,054	3,825	290	42	71	8,897
Percentages of total	..	6·91	45·56	43·0	3·25	0·48	0·8	100

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	12	250	319	76	657
Napier ..	..	..	..	..	..
Foxton ..	175	533	298	..	1,006
Wellington ..	193	807	127	11	1,138
Blenheim ..	..	..	6	..	6
Pictou ..	98	129	53	..	280
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	10	..	..	10
Bluff ..	..	28	309	42	379
Totals ..	478	1,757	1,112	129	3,486

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF THE CURRENT AND PRECEDING SEASONS.

Month.	Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bal-s.	Kauri-gum, Cases.	Supdry.
October, 1910	49,010	800	10,551	60,014	9,150	3,189	94,815	23,330	36,947	3,632	1,232	3,089	56 carcasses pork.
" 1909	103,746	49,600	4,049	57,221	13,716	3,995	..	41,079	24,847	1,105	631	7,882	..
November, 1910	62,926	29,877	5,554	105,759	27,749	55,551	76,594	331	28,646	6,850	2,300	4,339	911 carcasses pork.
" 1909	56,467	40,973	11,073	99,951	33,019	49,480	..	21,955	26,448	4,151	734	4,383	..
December, 1910	82,405	157,172	13,155	182,051	67,162	50,080	..	..	9,716	4,524	109	5,363	686 carcasses pork.
" 1909	90,245	86,345	25,199	164,314	68,867	72,056	..	2,613	2,128	7,389	1,618	8,742	..
January, 1911	175,337	287,120	13,568	90,405	46,375	127,199	..	16	399	15,234	3,302	7,094	590 carcasses pork.
" 1910	86,431	252,193	22,537	87,934	39,717	122,399	2,391	15,839	1,634	11,305	4,704	5,662	..
February, 1911	242,030	450,406	24,994	86,368	46,667	70,030	23,694	200	..	4,428	1,302	2,113	1,369 carcasses pork.
" 1910	190,093	414,408	23,798	97,766	62,192	102,182	4,724	8,600	..	4,223	2,314	4,827	1,719 "
March, 1910	222,058	413,179	22,134	77,319	42,029	64,266	2,899	3,636	..	9,152	2,490	2,959	798 carcasses pork.
" 1909	215,793	406,982	22,031	43,235	31,271	85,994	5,421	16,858	..	4,955	1,447	8,107	..
April, 1910	209,120	559,166	29,355	46,524	44,032	32,920	21,835	1,934	12	10,179	2,951	4,250	627 carcasses pork.
" 1909	281,412	525,211	19,511	21,783	29,164	27,468	15,051	16,975	..	5,910	786	580	..
May, 1910	310,196	622,232	38,276	9,588	28,384	25,123	81,052	..	3,010	10,017	2,346	3,150	1,293 carcasses pork.
" 1909	261,886	675,070	39,961	4,307	17,508	39,259	135,346	139,297	3,500	6,171	972	2,473	..
June, 1910	299,596	555,777	60,286	485	17,963	21,260	13,707	..	8,988	6,180	2,681	7,104	658 carcasses pork.
" 1909	108,094	302,721	29,029	6	12,406	12,157	88,974	223,563	3,500	1,768	790	3,762	..
July, 1910	241,906	384,753	71,160	..	595	12,816	20,604	1,106	8,649	6,695	1,437	8,272	2,448 carcasses pork.
" 1909	164,437	231,053	31,929	1,479	3,650	22,471	77,909	170,701	5,473	4,429	632	10,260	..
August, 1910	94,468	97,899	16,440	634	..	5,381	33,970	273	22,629	1,378	720	6,793	362 carcasses pork.
" 1909	63,219	117,316	41,029	3,601	1,721	6,575	27,207	234,998	9,149	2,348	1,286	887	..
September, 1910	104,925	26,416	8,420	22,644	41	6,589	40,876	3,863	7,721	2,680	597	1,682	255 carcasses pork.
" 1909	70,815	73,827	22,272	9,686	974	6,575	1,040	62,372	40,006	1,552	484	10,325	..

THE BRITISH PRODUCE-MARKET.

HIGH COMMISSIONER'S CABLED REPORTS.

THE following are cabled market reports received by the Department from the High Commissioner, London, during the monthly period prior to publication of the *Journal*. Unless otherwise specified, the prices quoted are average market prices on spot at date of message. Grain is *ex granary* or spot.

11th February, 1911.

Mutton.—There has been no alteration in the market since last week—viz., Canterbury 4½d., North Island 4d., per lb.

Lamb.—The market is weak; stocks of lamb on hand are heavy for early in the season. Canterbury is extremely scarce. Canterbury 5¾d., other New Zealand 5¾d. Australian 4½d., per lb.

Beef.—The market is quiet but steady. New Zealand hind quarters 3¾d., fore quarters 3¼d., per lb.

Butter.—The market is rather unsteady on account of some holders of butter forcing sales. Buyers will not buy more than immediate requirements. There is a prospect of improvement to-day. New Zealand choicest 104s., Danish 118s., Australian 100s. Siberian 102s., per cwt.

Cheese.—The market is slightly weaker, with less demand. New Zealand finest white 57s., coloured 60s., per cwt.

Hemp.—The market is somewhat steadier. New Zealand good fair £19 5s., fair £18 15s., Manila fair current £18 15s., per ton. Forward-shipment: New Zealand good fair £19 5s., fair £18 15s., Manila fair current £18 15s., per ton.

River Plate Meat-shippments.—The following shipments of frozen mutton and lamb were received from Argentina during January, 1911:—

	Mutton Carcases.	Lamb Carcases.
London	86,000	31,109
Liverpool	93,174	61,707
Hull	23,060	1,000
Southampton	8,210	6,783
Cardiff	4,121	2,578
Plymouth	1,250	500
	221,815	103,677
January, 1910	134,666	18,207
Butter to all ports, 5,344 cwt.		

18th February, 1911.

Mutton.—Trade for all classes of mutton has been very slow, and prices are barely maintained. Stock is moderate. A large proportion are heavy weights, which are difficult to sell. North Island, 3¾d. per lb.

Lamb.—The market is dull, with very little business doing. The supply exceeds the demand. No change in prices, and quotations show a weaker tendency. Canterbury 5¾d., New Zealand other than Canterbury 5¾d., per lb.

Beef.—The market is quiet; stock of frozen beef is small, and supplies of American chilled beef are small. Nominally New Zealand hind quarters 3¾d., fore quarters 3¼d., chilled about the same price.

Butter.—The market is steady, with a moderate inquiry. A large supply on hand. Superior grades are in demand. There are a few complaints of fishiness in New Zealand butter. New Zealand choicest butter 105s., Australian 101s., Danish 123s., per cwt.

Cheese.—The market is quiet but firm. New Zealand finest white 56s. 6d., coloured 59s. 6d. per cwt.

Hemp.—The market is quiet. The output from Manila for the week was 26,000 bales.

Cocksfoot-seed.—The market is quiet but firm. Bright clean New Zealand 17 lb. seed 73s. per cwt.

Wool.—The market is firm, with a hardening tendency. Bradford tops: 36's (low crossbreds) 1s. 1d., 40's (low crossbreds) 1s. 1½d., 44's (medium crossbreds) 1s. 2¼d., 50's (half-breeds) 1s. 6¼d., 56's (quarter-breeds) 1s. 9d., 60's (merinos) 2s. 1½d., per lb.

Kauri-gum.—The market is firm, and there is a large demand for better grades. Ordinary to fair three-quarters scraped £8 5s., fair half-scraped £5, brown fair half to three-quarters scraped £4 5s., brown pickings common to good £2 2s. 6d., bush fair to good pale and amber scraped £8 2s. 6d., per cwt.

25th February, 1911.

Mutton.—The market is quiet. There is a good demand for prime qualities, which are scarce, but there is a dull sale for heavy carcasses of mutton, which are in large supply. Canterbury 4d., North Island 3½d. (light weight), 3¼d. (heavy weight), per lb.

Lamb.—The market is weak, and there is a dull sale for all lamb. Canterbury 5¾d., New Zealand other than Canterbury 4¾d., Australian 4d., Argentine 4d., per lb.

Beef.—The market is dull, and there is no change in prices—viz., New Zealand fore quarters 3½d., hind quarters 3¾d., per lb.

Butter.—The market is quiet but rather steadier for best qualities. New Zealand choicest butter 106s., Australian 102s., Danish 122s., per cwt.

Cheese.—The market is a shade weaker. New Zealand finest white 56s. 6d., coloured (supplies are increasing) 58s., per cwt.

Hemp.—The market is dull, and very little business doing. Large shipments are arriving. New Zealand good fair £19 5s., fair £18 15s., Manila fair current £19, per ton. Forward shipment: New Zealand good fair, £19 10s., fair £18 15s., Manila fair current £19 10s., per ton. The output from Manila for the week was 23,000 bales.

Cocksfoot-seed.—The market is quiet but firm. Bright clean New Zealand 17 lb. seed 74s. per cwt.

Wheat.—The market is weak and inactive. New Zealand long-berried wheat 33s., short-berried 32s. 6d., per quarter of 496 lb.

Oats.—The market is steady, with an improved demand. New Zealand short Sparrow-bills, per quarter of 384 lb., 19s.; Danish, per quarter of 320 lb., 16s. 9d.

Beans.—The market is steady, but the demand only moderate. New Zealand f.a.q. (old crop) 35s. per 504 lb.

Peas.—The market is rather quiet. New Zealand peas (partridge) 45s. per 504 lb.

Wool.—The market remains firm.

4th March, 1911.

Mutton.—The market is weaker, with a downward tendency. Canterbury 3¾d., other than Canterbury 3¾d., River Plate 3¼d., per lb.

Lamb.—The market is dull, on account of heavy arrivals. Stocks are accumulating. Canterbury 5¼d., other than Canterbury 4¾d., Australian 3¾d., per lb.

Beef.—The market is steady, and prices well maintained. Stocks of New Zealand beef on hand are light. New Zealand hind quarters 3¾d., fore quarters 3¼d., per lb.

Butter.—The market is quiet, but holders are firm for best quality. New Zealand choicest 106s., Australian 102s., Danish 120s., Siberian 106s., per cwt.

Cheese.—The market is firmer, and there is a better demand, especially for best New Zealand white at 57s. per cwt. Coloured, a moderate demand at 58s. per cwt. The market has been favourably affected by the Canadian-American agreement.

Hemp.—There is a better demand, and the market is firmer. New Zealand good fair on spot £20, fair £19, fair current Manila £19, per ton. Forward shipment: New Zealand good fair £20 5s., fair £19 5s., Manila £20 5s., per ton. The output from Manila for the week was 20,000 bales.

Wool.—The market remains firm.

Cocksfoot-seed.—The market is firm. Buyers have been offering for cocksfoot-seed more freely. Bright clean New Zealand 17 lb. seed 74s. 6d. per cwt.

Eggs.—The market is quiet but firm: a good demand for all descriptions. Italian 8s. 3d. to 10s. 3d., Danish 9s. to 10s. 9d., Hungarian 8s. 6d. to 9s. 9d., per 120.

Poultry.—The market is quiet, with no alteration in prices—viz.: Chickens—American 8d. to 9d., Russian 7½d. to 8½d., ducklings 6d. to 7d., turkeys 7d., per lb.

11th March, 1911.

Mutton.—The market is weak, and stocks are accumulating. Canterbury 3¾d., North Island 3¾d., Australian 2¾d., River Plate 3d., per lb.

Lamb.—The market is dull, with a downward tendency. Canterbury 5¼d., other than Canterbury 4¾d., Australian 3¾d., per lb.

Shipments of River Plate mutton and lamb were received during February, 1911, as under:—

Port.	Mutton. Carcases.	Lamb. Carcases.
London	75,556	15,978
Liverpool	174,831	30,040
Hull	14,417	2,140
Cardiff	12,336	1,400
Southampton	9,738	4,189
Newcastle	7,995	1,000
	294,873	54,747
February, 1910	239,931	18,222
	54,942	36,525

Beef.—The market is firm. New Zealand hind quarters 3½d., fore quarters 3½d., per lb.

Pork.—5½d. per lb.

Butter.—The market is quiet, with tendency in favour of buyers. Choicest New Zealand 106s., Australian 102s., Danish 118s., per cwt.

Cheese.—The market is firm, with a hardening tendency. White 58s. 6d., coloured 59s., per cwt.

Hemp.—The market is steady; there is not much demand, but prices are firm. New Zealand good fair £20, fair £19 5s., fair current Manila £19 10s., per ton. Forward shipment: New Zealand good fair £20 7s. 6d., fair £19 10s., Manila fair current £20. The output from Manila for last week was 32,000 bales. Stock of New Zealand hemp 458 tons.

Cocksfoot seed.—There is a better demand, and stocks on hand are light. Bright clean New Zealand 17 lb. seed 75s. per cwt.

Wheat.—The market is quiet, and small business is doing. New Zealand long-berried 33s., short-berried 32s., ex granary, per quarter of 496 lb.

Oats.—The market is firm, with more inquiry. New Zealand short Sparrowbills, per quarter of 384 lb. 19s. 6d., Danish, per quarter of 320 lb. 17s.

Beans.—The market is dull, and very little business is doing. New Zealand f.a.q. (old crop), per 504 lb., 35s.

Peas.—The market is quiet, with a tendency in favour of buyers. New Zealand partridge, per 504 lb., 44s.

Wool.—The market remains firm.

14th March, 1911.

The London Wool Sales have commenced. There is animated competition for all descriptions; trade is good, and manufacturers are busy. The Continental trade has improved steadily since the January series. Present prices are firm at closing rates of last sales. 116,000 bales of New Zealand wools are available.

The estimated values of New Zealand wools at the close of the first series of the London colonial-wool sales (7th February) were as follows: Merino—Superior, 11½d. to 1s. 1d. per lb.; medium, 9½d. to 11d. per lb.; inferior, 8d. to 9d. per lb. Crossbreds—Fine, 11d. to 1s. 2d. per lb.; medium, 9d. to 10½d. per lb.; coarse, 8d. to 10d. per lb.

LONDON MARKET PRICES OF POULTRY, DUCKS, AND TURKEYS.

THE High Commissioner reports, under date 23rd December, the following current wholesale prices of poultry, &c., on the Smithfield Market. The price of turkeys has increased a little on account of a great number of continental birds having been condemned for decomposition, caused, presumably, through having been killed in bad weather and packed while hot.

Surrey chickens, good quality; 1s. per lb.; Boston chickens, good quality, 10d. per lb.; American chickens, none on market; Russian chickens, frozen, 9d. per lb.; ducks, fresh, 9d. per lb.; ducks, frozen, none on market; turkeys, various continental, 9½d. to 10½d. per lb.; turkeys, English, according to size, 11d. to 1s. 3d. per lb.

THE LONDON MARKET FOR PORK AND POULTRY.

IN the High Commissioner's cabled market report of 11th March the price of frozen pork is given, and it is intended to include this information in the regular weekly advices published in this *Journal*. The market prices of poultry are also to be given regularly.

Instruction in Poultry-keeping.

Conditions under which Students are received at the Government Poultry-stations.

THE poultry-stations are at Ruakura, near Auckland ; Moumahaki, near Waverley ; Burnham, near Christchurch ; and Milton, near Dunedin.

A limited number of students are received and instructed under the following conditions :—

- (1.) They must pay their own travelling-expenses.
- (2.) At Moumahaki board and sleeping-accommodation are available at the Government Experimental Farm, at about 12s. per week ; students must, however, supply their own blankets. At Ruakura, Burnham, and Milton no Government accommodation is available, but board and lodging may be obtained privately within a convenient distance.
- (3.) Students are expected to stay at least six weeks at the poultry-station.
- (4.) They receive no wages, but must do such work in connection with poultry as the manager of the station may require of them.

It should be borne in mind that a few weeks spent on a Government poultry-farm will not make a student capable of managing a large plant, but it will be the means of enabling him to avoid many of the mistakes made by beginners.

PRACTICAL ADVICE.

The Department's Poultry Instructor (Headquarters, Wellington) is always prepared to visit those who are in the business, to give practical advice and instruction in all its branches, and also welcomes interviews at the offices with those who have not already started. In cases where attendance is not necessary or convenient, inquiries will be answered by letter. Intending poultry-keepers should avail themselves of the advantages offered, and thus avoid many of the mistakes frequently made by beginners.

ITALIAN BEES AND QUEENS OBTAINABLE AT THE GOVERNMENT APIARY, WAERENGA.

A QUEEN-REARING apiary is established at the Department's Waerenga Experimental Farm, Auckland, from which Italian queens and bees, bred and reared under the very best conditions, may be purchased. The Waerenga Apiary is an ideal site for the purpose, being some five or six miles from the nearest natural habitat for bees, and the whole property is entirely free from disease.

PRICES.

ITALIAN QUEENS.		s.	d.
Tested for purity of mating, each	.. ..	10	0
Tested and specially selected, each	.. ..	15	0
Tested and specially selected for queen-breeding, each	.. ..	25	0

(No untested queens will be sold.)

COLONIES OF BEES WITHOUT QUEENS.

Two-frame nucleus colony, each	.. ..	10	0
Three-frame nucleus colony, each	.. ..	12	6
Four-frame nucleus colony, each	.. ..	15	0
Full colony, on ten frames	.. ..	30	0

To the above prices must be added the price of the queen required.

Orders for two-frame colonies must be for two or more, so that they can be battened together to prevent them from being laid on their sides.

CONDITIONS OF SALE.

As a rule, queens bred during any season cannot be fully tested before about the end of November, a little earlier or later according to the season, but all orders received will be executed in rotation as rapidly as possible after the queens and bees are ready.

Colonies of bees will be sent on the regular Root-Hoffman Langstroth frames, in specially prepared well-ventilated boxes made for the purpose. Hives into which the frames and bees should be transferred on arrival had better be in readiness.

Queens will be sent free by post. The carrying-charges on colonies of bees must, however, be borne by the purchaser. In the absence of any other instructions they will be sent through a carrying company. The charges will be collected on delivery. The Department will place the bees free on the train at Wairangi.

Every care will be taken to insure safe transit, but no responsibility will be accepted after queens or bees are despatched.

Full postal and telegraphic address, and instructions, if any, should be sent with the order.

Orders must be accompanied by the proper remittance, and should be addressed to "The Manager, Waerenga Experimental Farm, per private bag, Auckland."

Cheques and money-orders should be made payable to "The Receiver, Department of Agriculture, Commerce, and Tourists," and not to any individual by name.

Cheques must have exchange added.

A leaflet containing further information may be had on application to the Department.