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RURAL ECONOMICS.

AN ANALYSIS OF DAIRY-FARMING IN AUCKLAND AND TARANAKI.

E. J. FAWCETT, M.A. (Cambridge), Farm Economist, Fields Division.

BROADLY speaking, rural economics may be divided into two sections: (1) The economics of farm management; (2) the economics connected with the disposal of primary products. So far as the New Zealand Department of Agriculture is concerned, it is directing the whole of its attention to the side of farm management. It is held in certain quarters that problems connected with the disposal of produce are of even greater importance than production, and undoubtedly marketing, transport, co-operative measures, and finance are most essential features. Their study and control, however, may be best left to those bodies at present organized to deal with them.

The analysis of management factors can be of very great help to farmers, both those at present on the land and those who are aiming to become landholders. The systematic collection and analysis of facts relative to a large number of farms provides a fund of information which no one farmer has the opportunity of studying in any other way, and the information becomes of great value as a guide in land-purchase and general farm management. But the value of the deductions that may be made depends on the accuracy of the information collected, and the collection of information depends entirely on the co-operation of farmers. Up to the present time we have been met with entire good will, and the foundation has been laid for extended sound work in the future. The method adopted at present is to visit the farms of the selected groups at the end of the season, and collect data relative to the past year. It is found that most farmers are able to give a fairly accurate record of the season's working, and any small faults are statistically "flattened out" when a large number of farms are considered.

THE DAIRY-FARMING INVESTIGATION.

An analysis of the production and costs of some two hundred dairy-farms in South Auckland and Taranaki has recently been completed, and a detailed report is in hand for publication. The following notes provide a brief review of the information obtained.

Although the farms are somewhat scattered they are all situated in good dairying districts. Some are not fully developed, and the variation in returns from them is affected by this condition to a certain extent.

The first object of the investigation was to decide what is the most important feature in dairying. The figures demonstrate that it is production per acre. Much stress is laid on the importance of increasing production per cow, and rightly so, but it should always be remembered that it is possible to keep a few high-producing animals on a farm by understocking. Interest, rates, and general maintenance have to be paid on the whole of the farm, and unless each acre is producing its fair share the expenses connected with it have to be met from the rest of the farm. Therefore the first thing is to aim at high production per acre.

The question which then arises is, What methods should be adopted to get high per-acre yields? The analysis shows that the factor of most importance is to stock the farm to capacity. This necessitates proper pasture-management and preservation of food for winter feeding. Of next importance in production is the factor of herd-average. The number of cases in which high herd-averages result in high per-acre production is not so great as where high carrying-capacity is associated with high per-acre production. It is possible to procure a high average of butterfat per acre from comparatively low-producing cows, provided the land is stocked to capacity. We therefore come directly back to the fact that the proper feeding of the herd is of greater moment than breeding high producers. Too often have farmers sold the poor cows in their herd, expecting to produce a greater total of butterfat from fewer cows. This is quite sound if the farm is overstocked, but when there is sufficient feed for all the animals, it is unsound to cull unless the discarded animal can be replaced by a higher producer. This point has probably been too often missed.

Small farms on the average show a higher per-acre production than do large farms, and especially is it noticeable that high herd-averages are associated with small areas. A high carrying-capacity of heavy-producing cows should be aimed at, and, as might be expected, these two features are generally associated. Where, further, they are associated with farms of an economic area, a high per-acre production on an economic basis is secured. It would appear that the two management factors most directly connected with these ideal conditions are heavy top-dressing and an adequate supply of labour. It is very obvious from the data analysed that heavy-producing farms are heavy-manuring farms, and as production drops manure used for top-dressing drops proportionately. It will be asked, Is this heavy manuring an economic proposition? From the information which is here reviewed the answer is undoubtedly in the affirmative. As previously mentioned, high-production farms carry a greater number of cows per 100 acres, so that when manuring is considered from the cow viewpoint the amount is less per animal even though heavy per acre. When interpreted in terms of manure used per pound of butterfat produced, it is found that the heavy-manuring farms use considerably less than do low-

production farms. In other words, heavy top-dressing gives low manure cost per pound of butterfat, and light top-dressing gives high cost.

So far as labour is concerned, it is used in two ways—firstly, for operations in the milking-shed; secondly, for other farm work, mainly directed toward food-production and general maintenance work. The importance of expert milkers is undisputed, as also is the attitude of the milker towards the herd. In this connection, family labour should be better than hired help as a general rule. The question of labour is bound up with size of farm and size of herd. Generally speaking, it is a fact that high production is found on farms where the greatest amount of labour is available. As production per acre drops, so does the number of people employed on any given area. The number of cows milked per person employed is practically the same throughout—namely, about 16½ cows per person. On the high-producing farms of medium size the amount of butterfat produced per person is higher, despite the fact that there are more people employed. The greatest density of labour is found on small areas, but production per person is low.

The expenses of maintaining a dairy-farm are comparatively simple in nature. It is supposed by many people that herd-replacement constitutes a regular item of expense, but this is not always so. The average number of young animals drafted into our herds every year has in the past amounted to about 21 per cent., but this figure has included increase in total dairy cows, which has averaged 6·8 per cent., and the actual replacement is approximately 15 per cent. Where a farmer maintains his herd from his own heifers the cattle account should show a small profit, as young stock are gaining in value all the time. It is on farms where springing heifers or cows in milk are bought to replace culls that replacement becomes an appreciable expense. This applies perhaps especially on small farms, where as big a milking herd as possible is kept, in order to earn the required income. Maintenance expenses over all the farms surveyed average about £5 per cow, and this can be accepted as a sound general figure. The main item is for manures, but, as before mentioned, high expenditure on fertilizers is justified.

The next single item of importance is for local bodies' rates, which may become a serious matter if not watched. At the present time, however, it would appear that the services rendered warrant their cost. The average rates on these farms represent the interest on £3 4s. per acre. Put in another way, it may be suggested that the services given by local bodies has increased the value of the land by £3 4s., either as an earning unit or through an increase in comfort for which the occupier is willing to pay.

THE SMALL FARM UNIT.

As an indication of the possibilities of dairying on a comparatively small area of land, the position of some fifty farms of an average area of 57 acres may be given. These farms are all of high-production capacity, averaging 125 lb. of butterfat per acre. At 1s. 4d. per pound the gross takings per farm averaged £534 from 25·5 cows, including some £56 derived from pigs and cattle.

The expenses amounted to £138 10s. per farm, or approximately £5 10s. per cow. Wages allowed amounted to £178 10s. or £7 per cow, leaving a balance of £217 for interest. If £217 is capitalized at 7 per cent., we find that it represents £3,100. The value of stock and plant averaged £605, leaving £2,495 as the value of the land and improvements, equal to £43 per acre. As the average amount of mortgage held per farm was £1,500, the farmer's own capital amounts to £1,600. Thus the total income of the family from the farm is £178 10s. as wages and £112 as interest, or £290 10s. altogether. Therefore, if land producing 125 lb. of butterfat per acre can be bought at £43 the position is sound, provided the proportion of capital represented by mortgage is not too high, and assuming that the family is content with £178 10s. as wages. If they are not content with this amount, they must either produce more butterfat per acre or pay less for the land in the first place.

CONCLUSION.

In conclusion, it may be advanced that dairying is the most intensive type of farming possible for New Zealand under our present economic conditions. It is capable of employing intensive labour when the combination of area and productivity is correct. There are two methods which may be adopted to ensure maximum labour utilization—namely, the employment of labour by owners of large areas suitable for dairying, or by gradual adjustment in the size of farms till the economic family unit is obtained for different classes of soil. The latter method allows of maximum density of rural population, which suggests that it should be the national aim in all land-settlement schemes where conditions permit.

AGRICULTURAL LEGISLATION OF 1928.

F. S. POPE, Assistant Director-General of Agriculture, Wellington.

THE legislation enacted during the parliamentary session of 1928, and directly affecting matters coming within the scope of the Department of Agriculture, consisted of the Rabbit Nuisance Act, 1928; the Noxious Weeds Act, 1928; the Orchard and Garden Diseases Act, 1928; the Canterbury College and the Canterbury Agricultural College Amendment Act, 1928; and the Reserves and other Lands Disposal Act, 1928, (section 12).

The following matter gives the main points to be noted in connection with these Acts, but any one likely to be specially affected should obtain a copy of the particular Act which concerns him from the Government Printer, Wellington, who will supply it on request at a small charge.

RABBIT NUISANCE ACT, 1928.

This Act consolidates, and in some respects alters and adds to, the law in regard to the rabbit nuisance. It repeals the Rabbit Nuisance Act, 1908; the amending Acts of 1918, 1920, and 1921; section 35 of the Finance Act, 1923; section 65 of the Finance Act, 1924; and

section 44 of the Finance Act, 1926. It comes into force on 1st January, 1929, on which date the other Acts mentioned cease to operate.

It makes no radical changes in the law as administered by the Department of Agriculture in those parts of the Dominion where Rabbit Boards are not operating, or as administered by the Boards in their districts in regard to destruction of rabbits generally. The comparatively important changes it effects in those connections are as follows :—

Inspectors are given the same power in respect of unoccupied Native freehold land not held in severalty as they possess on unoccupied Crown land or unoccupied Native customary land—namely, the power to enter upon such land and take measures for the destruction of rabbits thereon. But in the case of Boards' Inspectors the provisions of subparagraph (*a*) in section 89 of the Act should be borne in mind.

The Department, or a Rabbit Board in its own district, when obliged to undertake the rabbiting of a property because of the "owner's" neglect to do so, is authorized to collect and sell the skins, giving the owner credit for three-quarters of the net proceeds when charging him for the cost of the rabbiting.

It is provided that the protection of an animal, or bird, as a natural enemy of the rabbit need not apply throughout the Dominion as hitherto, but may be given in respect of specific districts.

The Minister of Agriculture, as well as a Rabbit Board in its own district, is given power to erect rabbit-proof fences on private or Crown lands and, with swing-gates, across roads.

The keeping of live rabbits in possession is prohibited save with a permit from the Minister of Agriculture, thus enabling rabbits bearing valuable fur, such as Angora and Chinchilla rabbits, to be kept under approved conditions.

The control of the importation of live rabbits is transferred from the Minister of Internal Affairs to the Minister of Agriculture.

Power is given to make regulations regarding the standardization and sale of rabbit-poison.

The unauthorized removal of carcasses or skins of rabbits from land, as well as the unauthorized laying of poison or destruction of rabbits on land, is prohibited.

Persons who, without authority, persist, after warning, in going on Crown lands while rabbiting is in progress are liable to a penalty.

With the above-mentioned exceptions, and some changes of minor importance, the law as affecting persons and lands outside the districts of Rabbit Boards, and as affecting the destruction of rabbits generally, whether within or outside of Boards' districts, remains as hitherto.

The Act, however, makes considerable alterations as regards Rabbit Boards and their districts, in respect of which matters the law, largely owing to changes in the legislation governing local bodies in general,

had become in many respects difficult to interpret and to administer satisfactorily. Further, the gradual approximation which had taken place in the functions of the three types of Boards described below made it desirable to eliminate any unnecessary suggestion of difference between them, when practically the only ground for such differentiation had become a variation in their rating-powers. The following notes will indicate the nature of the more important of these alterations:—

Under the old legislation there were three distinct kinds of Boards, as follows:—

(1) Those hitherto known as Part II Boards: These were formed by the live-stock owners of the district; there was no limit of area; the basis of rating was the number of stock carried; and there was a Government subsidy of £1 for £1 on the rates collected, with a specified maximum rate of subsidy.

(2) Those hitherto known as Part III Boards: These were formed by the general ratepayers of the district; the minimum area was 2,000 acres; the minimum number of ratepayers was ten; the basis of rating was either the rateable value of all rateable property, or its acreage; and there was a Government subsidy of £1 for £1 on the rates collected, with specified maximum rates of subsidy.

(3) Those hitherto known as Part IV Boards: These were formed by the ratepayers; the minimum area was 1,000 acres; the minimum number of ratepayers was three; the basis of rating was the capital value of all rateable property; and there was no Government subsidy.

Nominally, one of the main changes now made is that there will be only one kind of Board in future; but as, with the exception mentioned later, any Board will be able to levy its rates on any of the bases now applying to the three different kinds of Boards, the change is more one of form than of substance. There are, however, these two material differences: (1) Boards may now be formed on any of the several bases of rating, including the acreage basis; and (2) in future those Boards that were formed under Part IV of the old Act will receive a Government subsidy of £1 for £1 if their area is not less than 20,000 acres, whereas hitherto they have not been eligible for such subsidy.

As indicated in the last preceding paragraph, Boards may change their basis of rating from the stock-carrying basis to the rateable-value basis or acreage basis; from the rateable-value basis to the acreage basis; or from the acreage basis to the rateable-value basis, in every case upon a poll of the ratepayers concerned. There is, however, no provision for changing from the rateable-value or acreage basis to the stock-carrying basis, and consequently this class of change cannot be made.

The rate of Government subsidy to the Boards, whether already existing or established in the future, has not been changed, but Boards formed in the future with an area of less than 20,000 acres will receive no subsidy.

Power is given for the amalgamation of Boards, and for making changes in their boundaries, but no provision is made for abolishing Boards. Should this become necessary in any instance, special legislation will be required.

The machinery provisions in regard to rating have been brought into harmony with present-day requirements.

The general election of members of the Boards has been altered to be on the same date as the general election of members of County Councils, which arrangement will be a great convenience to many electors. Provision is made for postal voting to be brought into force by regulations if found desirable.

The raising of loans by Boards formed by stock-owners has been provided for; hitherto only Boards elected by the general ratepayers could raise loans.

The end of the Boards' financial year has been changed from 31st December to 31st March.

Although boroughs and town districts are excluded from Boards' districts, the Boards are given general powers for enforcing the destruction of rabbits within adjacent boroughs and town districts.

Boards are to consist of six members, but where the acreage is less than twenty thousand the number may be as low as three.

Where the rating is on an acreage or rateable-value basis, owners of less than 10 acres are exempt.

At elections of members of Boards, where there are not more than forty electors, persons nominated by a majority of the electors shall be declared elected.

Boards may levy differential rates according to the degree of rabbit-infestation.

Boards receiving subsidy from the Government must not pay any ratepayer for rabbiting his own land.

Boards must administer Part I of the Act (in regard to destruction of rabbits generally) within their own districts, but must not rabbit Crown land, or Native freehold land not held in severalty and of which no person is in actual occupation, without the consent of the Minister of Agriculture; provided that any Board may hand over to the Minister of Agriculture the administration of Part I in its district, whereupon subsidy will cease to be payable to the Board.

Speaking generally, it will be found that, without adding to the burdens of either the taxpayers or the occupiers of land, the new Act will greatly facilitate the control of the rabbit nuisance in the Dominion.

NOXIOUS WEEDS ACT, 1928.

This is merely a compilation of the existing legislation as contained in the Noxious Weeds Act, 1908, and the Noxious Weeds Amendment Acts, 1910, 1921, 1923, and 1927; consequently it makes no real change in the present law. The new Act comes into force, and the other Acts

mentioned cease to operate, on 1st January, 1929. It will be a great convenience to all concerned to have the whole of the law on this subject consolidated into one Act.

Seeing that the expressions "Second-schedule weeds" and "Third-schedule weeds" are in fairly common use, it may be as well to point out that in the new Act the numbers of the several schedules are changed; what was the Second Schedule to the 1908 Act becomes the First Schedule to the 1928 Act, and what was the Third Schedule becomes the Second Schedule. Thus Californian thistle becomes a First-schedule weed, and broom becomes a Second-schedule weed. This, however, does not alter the law in regard to these or other plants. It is only the names of the schedules that are changed.

ORCHARD AND GARDEN DISEASES ACT, 1928.

With the necessary modifications, the above-written notes on the Noxious Weeds Act apply in this case also. The Acts to be superseded are the Orchard and Garden Diseases Act, 1908, and the Orchard and Garden Diseases Amendment Acts, 1914 and 1920. Here also the numbers of the schedules are changed.

CANTERBURY COLLEGE AND CANTERBURY AGRICULTURAL COLLEGE AMENDMENT ACT, 1928.

As far as Canterbury Agricultural College (Lincoln College) is concerned, this Act provides that the Board of Governors may grant renewals of certain leases in circumstances set out in the Act.

It also provides that in connection with elections of members of the Board of Governors the rolls of electors shall be closed for twenty-eight (instead of fourteen) days before the day of the election.

RESERVES AND OTHER LANDS DISPOSAL ACT, 1928 (SECTION 12).

This section sets apart the Weraroa Experimental Farm of the Department of Agriculture, together with the closed road intersecting it, as an endowment for agricultural research, experiment, and instruction, and authorizes the subdivision and leasing of the land and the use of the revenue therefrom for the purposes mentioned. The land is not to be sold, but parts of it may be declared reserves for purposes of the General Government.

CORRECTION.—In the notes on the agricultural legislation of 1927 published in the *Journal* for January last, the words "(unless they are sold)" should be deleted from the paragraph numbered (2) under the heading of "Apiaries Act, 1927," on page 21.

Cases of Poisoning in Animals.—During the official year 1927–28 seventeen specimens of ingesta and organs from animals suspected of having been poisoned were submitted for examination by the Department's Chemical Laboratory. In several instances of mortality in pigs suspicious amounts of sodium chloride (common salt) were found in the stomach-contents. Strychnine was found in one case, powdered nux vomica having apparently been administered in mistake for a harmless drug to the animal (a dog).

ENSILAGE AND PASTURE MANAGEMENT.

THE TRENCH SILO.

G. W. WILD, B.Ag., Instructor in Agriculture, Hamilton.

ALTHOUGH the making of ensilage has long been practised to some extent in New Zealand dairying districts, it is only during the last two or three years that it has become at all general. Roots and hay have always been the staple winter fodder for dairy cows, and roots must remain so wherever a farm is being broken in from the rough. Under such conditions the laying-down of land to crop is usually a preparatory measure to the ultimate establishment of permanent pasture. But with the great improvement in our grasslands of recent years, due mainly to the liberal use of phosphatic manures, dairymen have become less and less favourable to giving over a good pasture to the plough. For several reasons root crops have proved less profitable in the course of time. This is due to many factors—the waning of the natural soil-fertility, the invasion of certain aggressive weeds such as Californian thistle, the prevalence of diseases, and the ban imposed by dairy factories on forage-tainted milk. This last factor means that all root crops have to be carted out to stock and allowed to wilt before being fed to dairy cattle. There are also the vagaries of the climate—wet springs when cropping is delayed, and dry periods sometimes prolonged to such an extent that root crops become practically a failure.

The drought experienced in Auckland Province last season is a case in point. Supplementary forage crops were generally a failure, and growers were "let down" badly. On the other hand, crops other than annuals are finding increasing favour with dairy-farmers. The permanent grass crop is supreme in this respect, and intensive manuring and better control and management of grassland has brought about great improvement in permanent pastures. The grass crop is at least a certainty until the New Year, and up till that time the portion of it that cannot be consumed by the dairy cattle can be conserved as ensilage. The utilization by grazing of all the spring grass is next to impossible, but as hay and ensilage it forms an insurance against periods of uncertain growth. Ensilage is a fodder that is available to dairy stock shortly after the material is harvested. It can also be kept a year or two, or even more, if necessary, and for this reason alone it is the most valuable succulent fodder.

The foregoing remarks, of course, must not be taken as depreciatory of the value of good hay in the diet, nor as advocating the abandonment of hay production or auxiliary cropping under all conditions.

The present article is written mainly to deal with the labour-economy factor as it affects ensilage. The stack-ensilage method, besides being wasteful of material, usually requires a gang of men for its successful handling. Groups of farmers work in excellently together, yet this system has certain disadvantages. With the present methods of stacking the gang is required for four or five days under the best conditions. If for any reason the gang cannot be kept intact for this length of time the operation is often unduly prolonged. This results in the ensilage running to high temperature, and is the cause of the

brown and charred types so often met with in the stack form. Furthermore, the helpers have to be repaid in kind, so that farmers often are engaged in making ensilage and hay for three or four weeks, and even more. Other operations on the farm tend to be curtailed, and the dairy herd does not always receive the attention it should. The stack method also usually involves the erection of derricks, and other equipment which require extra time and labour for their utilization.

For these reasons many farmers have sought a way to harvest their ensilage crop entirely with their own labour, and thus be self-contained. The hillside silo, and the pit and trench forms, offer these advantages. These types are usually to be found on rolling country, where the "depth" can be obtained. There seems no reason why the trench form, with certain modifications, may not be used under practically all conditions. The construction of such a trench can be done by farm labour, whereas there are few farmers in this country who would undertake the erection of a costly concrete tower silo. These concrete silos cost in the region of £2 per ton capacity, and other mechanical devices such as cutters and blowers are also required. The cost is generally prohibitive here, and with these silos the labour problem is again accentuated at filling-time.

The Trench System.

The storage of ensilage in a trench or pit, although perhaps the first method employed by man, is still one of the most practical ways of preserving this fodder. Provided the fundamental principle of air-exclusion is acted upon and air-exclusion can be obtained only by pressure on the material — then the trench method will prove an undoubted success. Although the most wasteful method is the stack form, when ensilage is badly made in a pit or a trench the waste is also high. Through an incomplete understanding of the principle farmers often dig a pit in sloping ground, with the result that the ensilage is exposed on three sides, for under such conditions the material will settle unevenly and "pull" away from the earth walls.

A trench should therefore be dug on level ground (see Fig. 1) which slopes sharply away at one end. This end will form the mouth of the trench, and from it the ensilage will be carted out to the stock. One end only—or, rather, portion of the end—is thus exposed, and this should be made airtight by boarding up with well-braced tonged-and-grooved timber. (An improvement would be a double bulkhead of timber into which earth could be thrown and rammed down.) If not boarded, air penetrates here, and the adjacent material settles unevenly, tending to pull the ensilage away from the side walls. A properly constructed and filled trench silo should result in no more waste than is obtained with an expensive tower silo.

The trench silo is exceedingly popular in America. A New Zealand adaptation which embraces several improvements is practised by Mr. J. Sutherland, of Kihikihi, Waikato, who ensiles 50 to 55 acres of grass by this system each year. By the use of a home-made, horse-drawn sweep Mr. Sutherland is able to obtain constant pressure on the material while building, and the loss at the sides of his trench is practically nil. The sweep shown in Figs. 2 and 3 allows all these desirable features to be employed.

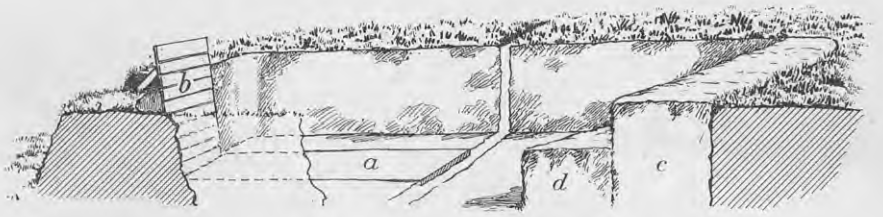


FIG. 1. DIAGRAMMATIC SKETCH OF TRENCH SILO IN BANK.

(*a*) Concrete track into trench; (*b*) tongued-and-grooved boarding at mouth; (*c*) first section of material built up at end of trench; (*d*) second section building.

NOTE.—The diagram represents a side section of the trench, and is broken in middle so that both ends may be shown.

The trench, as its name implies, should be long in proportion to its width. It should also be reasonably deep—at least 7 ft. The sides of the trench should have a batter of 1 in 12 if the land is moderately stiff, and, say, 1 in 8 if the soil is light and crumbly. It is an advantage to have the corners of the trench rounded off to allow better packing there. As the material is usually carted out during the wet winter and spring months, Mr. Sutherland has concreted three-quarters of the way along the bottom of his trench, and also some distance out to give solid access.

For constructing a trench silo a single-furrow hand plough, a scoop, and one or two horses are required. Several trench silos dug in pumice sand last season show no signs of falling in, and from my observations of these I consider that a batter of 1 in 8 is quite suitable for that type of country.

The trench is filled in the following manner. The "crop" is swept to the back of the trench, and either tipped into the trench or on the ground, to be afterwards pushed into the trench by the forkman. Any sort of sweep will do to bring the material to the trench at this stage. The material is filled in in sections—that is, a layer wide enough for two horses with the sweep to walk across is first built up, until it is flush with the ground surface. As soon as this is tramped firm, the horses with the loaded sweep are driven across it. The horses should be led a few times until they become used to the springy nature of the material under their feet. The material is now being tramped thoroughly, and thus forced into the sides of the trench. The sweep will often tip of itself when being driven across the trench; as the teeth engage in the material and as the horses go forward the whole load will flip over. The horses and the loaded sweep should be driven across this section until it is a few feet above the ground surface, then the extra material pushed over the side to the bottom of the trench again, another layer being thus built up. While this layer is being built up the horses are still driven across the first section. The heart of the material is always kept high, and to this and the thorough treading it receives is due the tight settling to the sides. When the second section is flush with the ground surface, the sweeps should be driven across it and consolidation secured in the same way. This must be continued until the whole trench is filled right to the mouth. The timber at the mouth

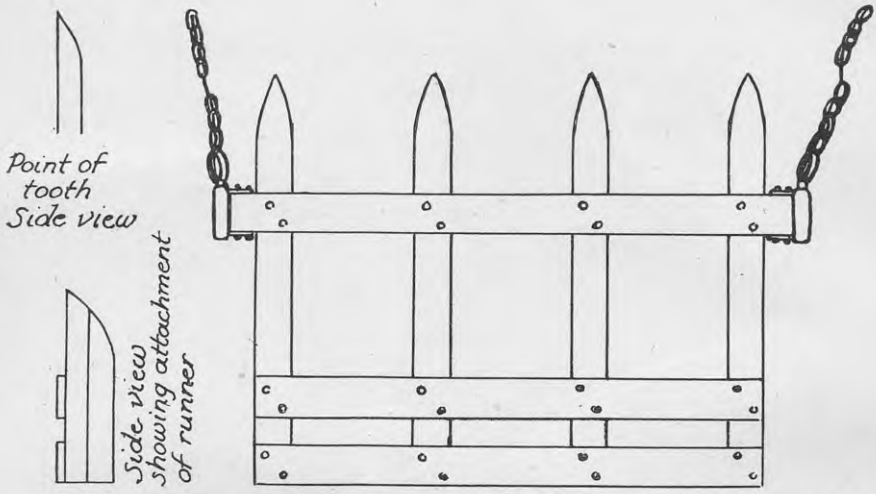


FIG. 2. HOME-MADE SWEEP FOR USE IN TRENCH OR PIT ENSILAGE MAKING.

Dimensions.—Overall width, 8 ft. 6 in.; overall depth, 5 ft. 6 in.; length of tooth from front beam to point, 1 ft. 10 in. *Teeth:* Four hardwoods, 4 in. × 2 in., spaced equidistant. *Front beam:* Hardwood, 6 in. × 2 in., projecting 4 in. on each side to give attachment to 1 in. iron strap. *Foot-planks:* Two or three, ordinary wood, for driver to stand on. *Runners:* Each tooth has a 4 in. × 2 in. hardwood runner attached; this lifts sweep at back and gives point of teeth better penetration. *Chains:* Attached to iron strap on beam by large ring; swivel fixed about 18 in. from ring.

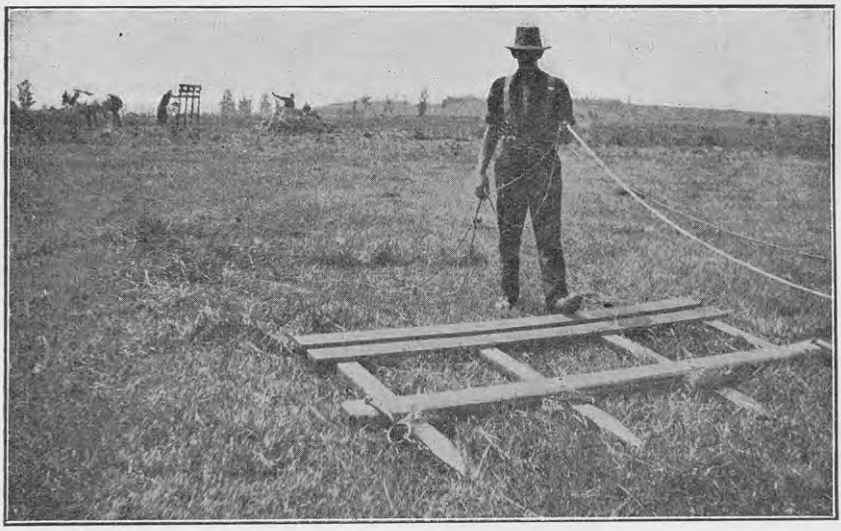


FIG. 3. HOME-MADE SWEEP IN OPERATION.

Mr. Sutherland with sweep in foreground. Sweep in background has gone over trench, and is being righted.

should project a few feet above the level of the ground, so as to give the sweep a guide in to the trench. It is at this spot that consolidation is often underdone and that the material "sumps" badly when settling. If the mouth is not boarded the material will force itself into the mouth or roadway, and in so doing "tie" round the corners. This results in arresting the downward trend of the material, and air-locks and areas of spoilage are formed.

If the trench is built to the right dimensions in relation to the crop two or three days will be taken to fill it—that is, if the crop is to be completely ensiled, the operation takes some four or five days. Each section will settle overnight; therefore each morning more material should be added to bring it up to ground-level again. In fact, it is better to leave the material a few feet above ground-level and high in the centre during the process of building.

As soon as the material is all flush with the ground the horses should be driven lengthwise instead of across the trench. The sweeps can be used to build up a few feet more, but they are inclined to tip at inconvenient moments and deposit half their load where it is not wanted. A sledge is best for topping off, and should have runners 1 ft. high to give clearance. (Some type of sweep that could be driven lengthwise over this material, and which would not tip until necessary would be a decided improvement.) During this operation the sides of the material should be kept straight so that the material will settle into the trench. It may be necessary to use a hay-knife to keep the sides straight. Horses will pull a sledge to a height of 6 ft. to 8 ft. quite easily if a lead-up is given them. This would take the form of extra material thrown down at the end for them to walk up.

When the building is finished this can be cut off square and thrown to the top of the stack now above the ground. At least 18 in. to 24 in. of earth should be put on as soon as the building is completed, as the stack heats quickly at the top. The earth should be well tramped, and be left high in the centre to shed the rain. If the trench has been constructed to the right dimensions the material, when completely settled down, should be within 1 ft. of the top of the trench, either above or below ground-level. More earth should then be used to bank up the sides. The result is then a mound of earth, well tramped and airtight, with no ensilage showing at all. The trench should, of course, be fenced against stock, as cattle, if allowed access, will camp on the earth or horn it up, thus allowing rainwater and air to penetrate to the silage.

CALCULATING SIZE OF ENSILAGE TRENCH.

A heavy crop of grass will return about 3 tons of hay per acre, and this is equivalent to about 9 tons of green grass. As ensilage made under the trench method, this will be about 6 to 6½ tons per acre. The weight of this ensilage per cubic foot averages about 45 lb.

If 1 cubic foot of ensilage weighs 45 lb., a trench 1 ft. long, 8 ft. high, with a mean width of 13 ft., would hold about 2 tons, arrived at as follows:—

$$\frac{8 \times 13 \times 45 \text{ (lb.)}}{2{,}240 \text{ (lb.)}} = 2 \text{ tons approx.}$$

To ascertain the length of a trench of the above-stated dimensions necessary to hold 65 tons of ensilage (the heavy crop of a 10 acre field),

divide the tonnage by the capacity per running foot, and the required information is given. For example, 2 tons = 1 running foot of trench ∴ 65 tons divided by 2 = 32½ ft., the length of trench necessary.

Similarly, in the case of a field of 10 acres producing a good fair crop of 5 tons of ensilage to the acre = 50 tons, the length of trench necessary would be approximately 25 ft.

As regards the mean or average width of trench figured on above, it may be added that the width of these silos at top should be about 14 ft., so as to allow the horses to tread and pack the material when being driven across. Allowing 1 in 8 for batter of walls—which is sufficient—the bottom width of trench would be 12 ft., giving an average width of 13 ft.

THE HOME-MADE SWEEP.

The construction of the home-made sweep used for carrying the cut grass to the ensilage trench is shown in Fig. 2. The sweep requires two horses, and although it will lift the green material from the windrow it is most efficient when the crop has been cocked up. The load can be tipped by lifting the sweep up at the back and urging the horses forward. The sweep is righted by lifting up the outside tooth near the point and urging the horses forward; the sweep then flips back into the working position.

The advantages of this sweep are that it is efficient and speedy; can be made on the farm; can be loaded and unloaded without the labour of forking; and can be driven over the material in the pit, thus consolidating it. Ensilage packed by driving the sweeps over it settles well to the sides of the trench, and there is a minimum of waste. Two men with two horses and a sweep can harvest 2 acres of grass for ensilage in a seven-hour day.

POINTS TO REMEMBER IN MAKING TRENCH ENSILAGE.

(1) Consolidation means air-exclusion and success.

(2) Board up the end of the trench.

(3) Concrete the track out in order to give a solid surface for carts.

(4) Add salt in the making, or, if mineral deficiency is suspected, add a complete "lick," sprinkling it as one would salt.

(5) Wilt the cut material slightly if it is very lush. The amber-coloured liquor which oozes out carries with it the minerals and easily digested constituents.

(6) Stack material each day. Under the method described the temperature tends to run high, and stacking each day controls it.

(7) Keep sides of the "stack" above ground straight, so that in settling the material will readily enter the trench.

(8) Keep temperature below 125° F. if possible. The various types of green ensilage are much superior to the brown.

Referee Seed-samples.—During the past year a series of referee samples was tested by the Agricultural Department's Seed Station on behalf of the International Seed-testing Association, eighty-seven other stations also participating. The results received showed that the work of the New Zealand station compared very favourably with that of the larger European stations.

SLOW DEVELOPMENT OF ACIDITY IN CHEESE-MAKING.

BACILLUS SUBTILIS SHOWN TO BE A FREQUENT CAUSE.

G. F. V. MORGAN, N.D.A., N.D.D., Bacteriologist, Dairy Division, and J. CURLE, Dairy Instructor.

AT the present time the question of slow-working curds in the process of cheesemaking is one of wide interest to the dairy industry, the spasmodic or periodical occurrence of this nuisance being dreaded by dairy companies, factory managers, and workers alike. The chief concern from the companies' point of view is that the slow curd nearly always turns out to be one of very poor quality, having a tendency to inferior flavours instead of ripening normally. For the factory staff the trouble means working for long hours on raw material that experience has taught can only result in a very poor finished product. The problem of slow curds and failing starters has long been present in New Zealand, and some of the possible causes of the trouble have been investigated both in field and laboratory and a considerable amount of data collected.

In a typical case which occurred recently in the Wellington District the points primarily investigated were (1) whether the trouble originated from the milk as received at the factory possibly becoming contaminated at the farm with alkali-producing organisms of a putrefactive type, or of a type that would retard the development of a lactic ferment; (2) whether the trouble was due to the starter itself or to contamination of the milk for cheesemaking, after pasteurization, by the plants or vats. One point that seemed clear from the outset was that the cause was bacteriological, and not due to a chemical fault in the composition of the milk as was sometimes supposed.

In this outbreak the work of investigation was carried out at a small factory, having only six milk-suppliers, where the trouble had already commenced. Each supply of raw milk was sampled as it arrived at the factory, the samples being taken in thoroughly sterilized bottles. Other samples were then taken from the milk in each vat after it had been pasteurized and cooled and had remained long enough in the vats to be thoroughly mixed by the stirrers. Finally a sample was taken of the starter then in use at the factory, which was showing signs of failing.

The results of the bacteriological analysis of these samples pointed to the fact that certain spore-forming aerobes of the *subtilis mesentericus* group were at the source of the trouble. In view of the fact that both starter and cheese milk were pasteurized, and that organisms of the *Streptococcus lactis* type used as cheese starters are in themselves very virile and not likely to become attenuated or checked by the ordinary alkali-producing bacteria, this supposition seemed most likely to be justified.

The results above mentioned were as follows: The farmers' milk showed a normal bacterial flora, the growth of acid-producing organisms of the *Streptococcus lactis* kind and acid-producing "weeds" appeared

typical of normal cheese milks, and shake cultures in litmus lactose plates showed no sign of a preponderance of alkali-producing organisms. The same, however, was not the case with the samples of milk from the vats. These samples showed a heavy contamination by alkali-producing rods of the *subtilis* type, and on plating out in litmus lactose shake cultures a considerable amount of alkali appeared in the neighbourhood of these colonies, this being an indication of what was going on in the milk. The most surprising results, however, were obtained from the plate culture of the starter, which showed no trace of acidity development, only very occasional pin-point colonies of the *Streptococcus lactis* type, but a very large number of colonies of *subtilis*. (Two days later this starter was dead.)

The results of these experiments showed quite clearly that the fault did not lie with the farmers' milk, but that the milk became contaminated, after pasteurization, by the plant itself. (It has already been shown that *B. subtilis* is practically the only inhabitant of factory plants in parts of the system between the pasteurizer and the coolers.) It was also obvious that a starter which had once become fairly heavily contaminated with spore-formers of this type was unreliable and likely to fail at any time.

After these data had been collected at the factory, further work was carried out at the laboratory (Wallaceville) on the effects of this type of organism in milk, also its power to develop in and finally overcome pure culture starters. It was shown that contamination of active starters by *subtilis* in very small quantities has little effect on their action. However, if *subtilis* once obtained a firm footing it would increase rapidly in numbers, though its full effect might not be felt for four or five days after inoculation, when the starter appears to go quite dead. The results of daily subcultures of contaminated starters in the laboratory were checked by plating out when the subcultures were made, and showed a daily increase of *subtilis* colonies until the time when the starter was so weak that it took two days to coagulate at 70° F. Smears were also made at each stage. In connection with this daily increase in *subtilis* a curious fact was noted. The increase in *subtilis* seemed constant until the starter appeared dead, then suddenly decreased in number very rapidly till it seemed to have almost disappeared, and the *Streptococcus lactis* seemed to revive again and work normally for a time, though isolated rods still appeared. Whether this sudden incidence and almost total disappearance work in regular cycles is still being investigated; factory experience rather points to its probability.

One other point of interest observed in the laboratory was that in contaminated samples that were not subcultured daily there was a very marked increase in the amount of *subtilis* present, as compared with those that were regularly subcultured, also that starters incubated at a high temperature developed *subtilis* much more readily than those incubated at about 60° to 70° F.

During the time the laboratory experiments were being carried out a number of alleged slow milks from factories in various localities were tested. With one exception these milks were contaminated with organisms of the subtilis type to a fairly marked degree.

THE FACTORY EXPERIMENT.

It was then decided to try, under factory conditions, an active starter contaminated with *subtilis*, with an active pure starter as a control.

Organisms of the *B. subtilis* type found in the starters giving slow acid development when used in the cheesemaking were employed in a starter sufficient to work part of a vat of milk. In order to test this starter a vat was filled with pasteurized milk in the ordinary way, and after being well agitated was divided between two vats. One vat had a good normal working starter added; the other the starter to which had been added the contaminating culture obtained from the laboratory.

The first vat worked normally, acidity developing as looked for in good cheesemaking practice, while the other vat behaved in a manner similar to that obtained when working with what is commonly known as a slow or almost dead starter. At the time of setting, both vats had the same acidity by the alkaline and Marshall tests, and the same acidity in the whey when the curd was cut, while acidity developed to the same extent in each vat during the first two hours after setting. This is usually found to occur with slow starters. Slow starters develop acidity normally up to a certain point (about 0·16 on the alkaline test), and then, as in this case, acid development becomes slow and at times almost stops.

In this experiment the curd in the first vat, containing a good starter, was ready for the salt in six and a half hours from setting, while the curd in the vat with the contaminated starter was ten and a half hours reaching the same stage of maturity. The only difference noticed was that whereas in using the ordinary factory slow starter acid development is slow all the time, in this case there was a rapid development of acidity while the curd was draining, thus tending to show that although the culture used was highly contaminated there was also present a very active lactic acid germ.

The contaminated starter received from the laboratory was sub-cultured at the factory on the day following its receipt, and tested 0·76 per cent. acidity. On the day it was used it tested 0·70 per cent., while the starter used in the control vat was 0·90 per cent. when used.

The following table gives a comparison between the times and acidities of the cheese made with the contaminated starter, a typical slow starter, and the control vat with a normal active starter:—

Time.	Control Cheese (Active Starter).	Experimental Cheese (Starter and *B. subtilis*).	Ordinary Slow Cheese (Slow Starter).
	Acidity Percentage.	Acidity Percentage.	Acidity Percentage.
Setting	0·19	0·19	0·19
Cutting	0·13	0·13	0·13
1½ hours ..	0·14	0·14	0·14
3 hours	0·18	0·17	0·16
5 hours	0·86	0·27	Commencement of slowness.
6½ hours ..	1·00	..	Considerable variation in times and acidities.
7½ hours ..	..	0·73	
10 hours ..	..	1·00	

Samples taken at various stages from the experimental vat showed that *B. subtilis* was present in considerable numbers in the starter on the day it was used, though *Streptococcus lactic* was also present and apparently healthy. A sample from the vat after pasteurization and the addition of starter showed that *subtilis* was beginning to get ahead. Samples taken at various acidities during the cooking stage showed a steady increase in *subtilis;* and a final sample taken from the "white whey" when cheddaring showed a very great development of *subtilis*, but also showed an increase in virility of the *Streptococcus lactis*.

CONCLUSION.

In conclusion, it may be stated that apart from a considerable amount of *subtilis* appearing in samples of slow milks and slow starters, the conditions found in cheesemaking are suitable for the development and propagation of this organism. In the first place, pasteurized milk is a good medium for its growth; and, in the second place, its spores can remain virile in the pasteurization plant itself, close to the pasteurizer. Experiments have shown that *subtilis* can remain alive and grow beside an active culture of *Streptococcus lactis*. Its biological characteristics show that it is capable of producing marked alkalinity in milk followed by an alkaline peptonization of casein, with the production of ammonia. This accounts for the slow curd developing weak spongy characteristics when maturing.

IMPROVEMENT OF DETERIORATED HILL COUNTRY.

THE annual report of the Fields Division for 1927–28 remarks on this subject as follows:—

The experiments on regrassing secondary-growth country and investigations into the best methods of bringing deteriorated hill country back have been continued, and articles relative to the work have been published in the *Journal*. The past summer and autumn have seen many thousands of acres of secondary growth burnt and sown, and it is pleasing to report general acceptance by the farming community of the hardier grasses and clovers such as brown-top, Danthonia pilosa, and Lotus major, as important ingredients of the seed mixtures sown. This, it is felt, is essentially a step in the right direction. There are still minor differences of opinion as to how much seed of each should be included in the mixture, and many are inclined to adhere to cocksfoot even on the poorer and harder secondary-growth country. It matters little whether cocksfoot is sown or not; the essential thing is to include from 1½ lb. to 2 lb. brown-top, 3 lb. Danthonia pilosa, and ½ lb. Lotus major per acre. Crested dogstail is of outstanding merit for the first three years, and from 3 lb. to 4 lb. should be used; ½ lb. to 1 lb. of white clover, and 6 lb. to 8 lb. of perennial rye-grass provide rapid feed, but these will not last excepting under top-dressing. Other species, such as paspalum, yarrow, kikuyu, and subterranean clover, may also be worth while. Considerable experimental plantings of kikuyu have been made on hill country in Taranaki.

In hill-country work, as compared with that on easy ploughable country where modification of the soil habitat by ploughing, reseeding, manuring, and tripod-harrowing is possible, it is a question of choosing species adapted to the soil conditions as they exist or come to exist after the burning-off of the rubbish. The more the question is studied the more important become those species that can persist and spread under low soil-fertility standards; those that will persist in the shade of secondary growth should this get temporarily out of control; those that will carry a fire and that will recover rapidly once the area has been burned off. Lotus major, paspalum, brown-top, Danthonia pilosa, yarrow, New Zealand rice-grass, and Poa pratensis are outstanding in this respect.

POTATO-CULTURE.

DESCRIPTIONS OF SOME OF THE MORE IMPORTANT VARIETIES.

(Concluded.)

J. W. HADFIELD, H.D.A., Agronomist, Fields Division.

IN the following pages are given a further and final number of descriptions and illustrations of varieties of potatoes most commonly grown in New Zealand, the majority of which are eligible for inspection under the official certification system. Explanatory matter will be found in the introductory article, under the heading of "Scheme of Varietal Descriptions," pages 152–155 of the September *Journal*.

MAJESTIC (FINDLAY'S).

Origin.—Raised by A. Findlay, of Auchtermuchty, Scotland, and introduced into commerce by him in 1911.

Habit.—Tall, open, and vigorous. Commences to spread very early.

Stem.—Wings straight. Colour 1.

Leaf.—Distinctive light ashy green. Leaf and leaflets flat and smooth.

Inflorescence.—Prominent and tall. Flowers creamy white, large, numerous, and persistent.

Tuber.—Kidney, tapering somewhat to heel end (pear-shaped). Eyes shallow. Skin white and smooth. Sprouts faint pink. Flesh white. A freshly dug tuber has a peculiar soapy or cheesy texture on cutting.

Maturity.—Early main crop.

NOTES.—This variety is one of the most popular in Great Britain. Healthy lines are available in New Zealand. Its cropping power is excellent, and the variety should be much more widely grown.

FIG. 15. MAJESTIC (FINDLAY'S).

SHARPE'S EXPRESS.

Origin.—Introduced to commerce by Charles Sharpe, of Sleaford, England. Origin not known.

Habit.—Medium height, spreading, open, and vigorous.

Stem.—Wings waved. Colour 0–1.

Leaf.—Medium green and glossy. Numerous secondary leaflets.

Inflorescence.—Inconspicuous. Flowers red-purple, and rare. Buds drop before opening.

Tuber.—Kidney, tapering to heel end (pear-shaped). Skin white and smooth. Eyes shallow. Flesh white to intermediate. Sprouts pink.

Maturity.—First early to second early.

NOTES.—An excellent variety of fair cropping power, the cultivation of which might profitably be extended.

FIG. 16. SHARPE'S EXPRESS.

SNOWDROP OR WITCH HILL.

Origin.—Produced by John Perkins, of Northampton, prior to 1881, and reselected by Dobbie and Co. as resistant Snowdrop. This variety is of historical interest in view of the fact that it was the first to be definitely observed as immune to wart disease. What are generally referred to as Snowdrop Kidney, Snowdrop, and Witch Hill are identical.

Habit.—Vigorous and of medium height. Spreading dense foliage.

Stem.—Wings waved. Colour 0–1.

Leaf.—Medium green. The leaflets have a characteristically thin and wrinkled appearance.

Inflorescence.—Inconspicuous and rarely standing above top of plant. Flowers creamy white, but rarely formed. Bolters occur bearing erect trusses of flowers.

Tuber.—Kidney (long oval) and flat, often tapering to heel end (pear-shaped). Skin white and smooth. Eyes very shallow. Flesh white. Sprouts pink.

Maturity.—First early to second early.

NOTES.—Excellent quality, but susceptible to late blight. Has been grown in this country for many years.

FIG. 17. SNOWDROP OR WITCH HILL.

BRESEE'S PROLIFIC.

Origin.—Probably similar to the American Bresee's Prolific, a seedling of Garnet Chili raised in 1861 and brought into commerce in 1869.

Habit.—Medium vigour and height. Very open and spreading, almost trailing. The habit is very characteristic, the terminals of the branches tapering off and in appearance much like a tomato plant.

Stem.—Tends to zig-zag and bend at the nodes. Colour 0–1.

Leaf.—Small and medium green. Leaflets widely spaced.

Inflorescence.—Small and short, bearing scanty white flowers.

Tuber.—Oval, flattened to kidney; generally small in size. Skin smooth (except on heavy land) and of a pale straw colour, turning pale flesh colour on exposure to light (most pronounced in young tubers). Eyes shallow, mainly at rose end. Skin round eyes pink, and the eye (generally three buds) picked out in deeper colour. Sprouts pink.

Maturity.—Early main crop.

NOTES.—A good all-round variety, and recognized as the poor man's potato owing to its ability to yield satisfactorily on light land. Large areas of Bresee's Prolific are grown under the names of Magnum Bonum and Early Puritan. Northern Star is a common rogue, although its distinct habit should enable it to be recognized easily.

FIG. 18. BRESEE'S PROLIFIC.

GOLDEN WONDER (LANGWORTHY).

Origin.—The original Maincrop was produced by James Clark, of Christchurch, England, about 1876. Maincrop and Magnum Bonum were raised from the same seed-ball taken from Early Rose. Maincrop was later distributed by J. Niven, Perth, Scotland, about 1905, under the name Langworthy. Golden Wonder was distributed by Brown, of Peashell Farm, Arbroath, in 1906, and resembles Langworthy in every way, except that it has a thick brown russet skin.

Habit.—Tall, vigorous, open, and very upright.

Stem.—Wings straight. Colour 3 in basal portions of stems.

Leaves.—Medium to dark green, and wrinkled (mosaic often present).

Inflorescence.—Tall and prominent. Flowers purple with white tips; numerous, but fall early.

Tuber.—Long, tapering to heel end (pear-shaped). Skin white in Langworthy, and very thick brown russet in Golden Wonder. Eyes shallow, mainly at rose end. Flesh intermediate. Sprouts blue.

Maturity.—Late main crop.

NOTES.—Golden Wonder shows very little promise of extensive culture in this country, mainly owing to its appearance. Langworthy is more popular, especially in the South.

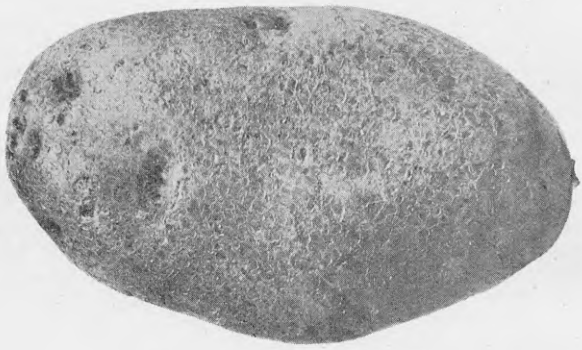


FIG. 19. GOLDEN WONDER.

EPICURE.

Origin.—Raised by J. Clark, from a cross between Magnum Bonum and Early Regent. Introduced into commerce by Sutton and Son in 1897.

Habit.—Upright and open growth, with characteristic flat top. Fairly tall and vigorous for such an early variety.

Stem.—Wings prominent and waved. Colour 2, and somewhat pink.

Leaf.—Dark and very glossy.

Inflorescence.—Short and inconspicuous. Flowers white and rare.

Tuber.—Round and irregular and deeply notched. Eyes deep, with prominent bump above the eye. Eyes well distributed. Skin smooth and white, often blotchy and turning pink on exposure to light. Flesh white. Sprouts pink.

Maturity.—First early.

NOTES.—Probably the most important early variety grown in New Zealand, and has gained this position on its cropping capacity and disease resistance. It

FIG. 20. EPICURE.

is, however, very badly infected with wilt disease and corticium, some lines being very unproductive on this account. When left to maturity the tubers develop internal brown-spot (referred to by graders as "rust"). Bolters occur frequently, and are much later and taller, and flower more profusely.

EARLY REGENT.

Origin.—Not known.

Habit.—Spreading, open foliage of medium height and vigour.

Stem.—Wings slightly waved. Colour 0–1.

Leaf.—Light green.

Inflorescence.—Of medium height, producing a few white flowers.

Tuber.—Oval, notched at heel end, distinctly flat on the underside, and rounded on the upper. Skin smooth and creamy white. Eyes shallow and few, mainly produced on upper surface and towards rose end. Sprouts pink. Flesh white.

Maturity.—First early.

NOTES.—A popular and high-quality early. Grown in the South mainly for the seed-trade of the North Island, where the variety is popular for garden culture. This variety is one of the parents of Epicure.

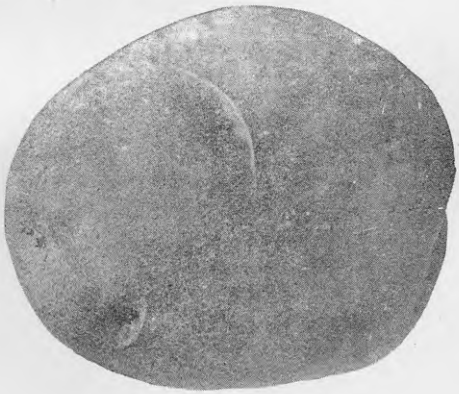


FIG. 21. EARLY REGENT.

KERR'S PINK.

Origin.—Fortyfold x Smith's Early. Raised by James Henry, in Scotland, in 1907. Introduced into commerce by Mr. Kerr, seedsman of Banff, in 1917.

Habit.—Tall, upright, open, and very vigorous.

Stem.—Wings waved. Colour 1–2, extending to midrib of leaf and flower stalk.

Leaf.—Dark green, large, and broad.

Inflorescence.—Very tall and prominent. Flowers very numerous and white.

Tuber.—Round and somewhat flat. Eyes deep. Skin red and rough. Flesh white. Sprouts pink.

Maturity.—Late main crop.

NOTES.—This variety has been in New Zealand for a number of years. It is difficult to say why it has not been grown more extensively, but this is probably on account of the diffidence with which any red potato (apart from Dakota) is accepted. It is a particularly heavy cropper, and of satisfactory keeping and cooking quality.

FIG. 22. KERR'S PINK.

ROBIN ADAIR.

Origin.—The writer is indebted to Mr. J. H. Nimmo, of Nimmo and Blair, Ltd., Dunedin, for the information that many years ago this potato was grown by Mr. Shepherd, at Adair, near Timaru, under the name of Cardinal. It was renamed Robin Adair by Mr. Nimmo, and has been grown ever since under that name. Robin Adair tallies fairly well with the description given by British authorities for Cardinal, except that the flower colour is creamy white, whereas it is red-purple in Cardnial.

Habit.—Medium height and vigour. Very spreading and open.

Stem.—Wings waved. Stem colour 2 to 3.

Leaf.—Light green. Leaflets small.

FIG. 23. LEFT—KNOWLER (A SELECTION FROM ROBIN ADAIR); CENTRE—SMOOTH-SKIN ROBIN ADAIR; RIGHT—ROUGH-SKIN OR NETTED ROBIN ADAIR.

Inflorescence.—Tall and prominent. Flowers numerous and creamy white

Tuber.—Kidney to long flattened, often curved. Skin red, sometimes very smooth, other times netted. When netted the tuber is shorter and more blunt at rose end. Both types have been raised from the one selection, and the variation is probably due to environment. Eyes shallow and evenly distributed. Flesh white, often streaked with red. Sprouts pink.

Maturity.—First to second early.

NOTES.—Not grown extensively, but there is a good demand for seed for the North Island trade. *Knowler* is a selection from Robin Adair originating from Southland. It differs from Robin Adair mainly in the skin splashed with colour. The variety was raised by Henry Knowler, and was named by T. D. Lennie, seedsman, now of Christchurch.

KING EDWARD VII (FELLSIDE HERO).

Origin.—Raised by a Northumberland grower who called it Fellside Hero. It eventually came into the hands of Mr. Butler, of Scotter, who named it King Edward VII and placed it on the market in 1902.

Habit.—Tall, erect, moderate vigour, open.

Stem.—Wings waved. Colour 2.

Leaf.—Younger leaflets small and narrow; the last pair tends to enfold the terminal.

Inflorescence. — Inconspicuous. Flowers red-purple tipped with white, but rarely formed. Buds pink.

Tuber.—Oval to kidney, often tapering (pear-shaped). Skin smooth, white, splashed with pink. Eyes shallow. Flesh white. Sprouts pink. The tuber illustrated is not so long as the normal tuber.

Maturity.—Early main crop.

NOTES.—A good cropping variety, but apparently at its best only in certain localities. In England it commands a higher price than other varieties owing to its quality and the fact that it does not darken readily after being once cooked. It has never become popular in this country as a commercial variety, possibly, as merchants have remarked, because it cannot be sold either as a red or a white table potato. Bolters and wildings are common. Red King Edward, Red King, and Rob Roy are selections from King Edward in which the tuber colour is entirely pink.

FIG. 24. KING EDWARD VII.

BRITISH QUEEN.

Origin.—Raised by Findlay, and placed in commerce in 1894.

Habit.—Medium height, vigorous, compact, and branching.

Stem.—Wings straight. Colour 2.

Leaf.—Dark leaflet, broad, smooth, and glossy. Secondary leaflets small and numerous.

Inflorescence.—Prominent; flower-stalks coloured. Flowers numerous and creamy white, the clusters being very large. Buds dark.

Tuber.—Oval to kidney. Skin white and smooth. Eyes shallow, with well developed bump above the eye. Flesh white. Sprouts pink.

Maturity.—Second early.

NOTES.—All lines examined have been mixed, and it is doubtful if pure seed is available. Commonly grown in Great Britain, and seventy-five varieties are recorded as being synonymous.

SUTTON'S ABUNDANCE.

Origin.—Magnum Bonum x Fox's Seedling, raised by J. Clark, and introduced by Sutton and Sons in 1886.

Habit.—Tall, vigorous, upright, compact.

Stem.—Wings waved. Colour 2.

Leaf.—Dark green and glossy. Secondary leaflets numerous and large, giving the leaf a crowded appearance.

Inflorescence.—Very prominent and large, with clusters of white flowers.

Tubers.—Tubers oval to round, somewhat flat. Eyes shallow. Skin white. There is generally a blue-purple coloration at the heel end and on the runners during the growing-season. Flesh clear white. Sprouts blue.

Maturity.—Early main crop.

NOTES.—Still commonly grown in Great Britain, and no doubt in this country also. No pure lines have been inspected. It is reported that ninety-five varieties in Great Britain are synonymous with Abundance.

MAGNUM BONUM.

Origin.—Raised by J. Clark; supposed to be a seedling of Early Rose. Introduced by Sutton and Sons in 1876. Formerly widely grown in Great Britain, but rarely now.

Habit.—Tall, upright, open, and vigorous.

Stem.—Colour 0–1. Wings slightly waved.

Leaf.—Light green, with red marks at base of leaf and leaflets.

Inflorescence.—Not prominent. Flowers fairly numerous, light-red-purple, tipped with white. Buds reddish purple.

Tuber.—Kidney (long oval). Eyes shallow and mainly at rose end. Skin smooth and white. Flesh white. Sprouts pink.

Maturity.—Late main crop.

NOTES.—Bresee's Prolific has been grown for many years under the name of Magnum Bonum. Apparently no pure stocks are available.

SALE OF LICE-INFESTED SHEEP.

IN his annual report for 1927-28 the Director of the Live-stock Division, Mr. J. Lyons, M.R.C.V.S., deals with this matter as follows: "During the past season there has been an increase in the number of sheep exposed for sale affected with lice. This was more particularly in the North Island, and far too many prosecutions had to be taken. No doubt the dry season and the consequent shortage of water was to some extent accountable for this. Still, it would appear that the dipping had been carried out in a more or less perfunctory manner, and was done more to comply with the Act than to rid the flocks of these parasites. If the practice of exposing lousy sheep for sale is to be stopped—and it is my intention to see that this is done—more stringent measures will have to be taken. The ordinary prosecution does not seem sufficient to stop the practice. In future it is intended to stop the sale of all lice-infested sheep, to be followed by a prosecution, and in the case of second or subsequent offences a heavy penalty will be asked for."

BOYS' AND GIRLS' AGRICULTURAL CLUBS.

TARANAKI AND WANGANUI DISTRICT COMPETITIONS, SEASON 1927–28.

J. M. SMITH, Instructor in Agriculture, New Plymouth.

THE season of 1927–28 saw a general all-round improvement in the work and an increase in the entries of the boys' and girls' agricultural schools in the Taranaki and Wanganui districts. With practically all the available schools in Taranaki engaged in club work there is now really no room for much further extension so far as this district is concerned; but in the Wanganui region a large number of schools from Marton to Taihape were brought into the scheme during the past year. Competitions on lines similar to those of preceding seasons were conducted. Crop-growing was carried out in both North and South Taranaki and Wanganui, while competitions for calf-rearing were also conducted in the two former districts.

CALF-REARING.

The number of calves judged for the past two seasons was as follows:—

	1927.	1928.
North Taranaki	117	154
South Taranaki	283	344

Each succeeding year has shown a decided improvement in the general condition of the animals brought forward for judging. It may be taken that the competition is bearing fruit in that the competitors are adopting better methods following on the lessons learnt each year. Following on the increasing entries the list of judges has been considerably enlarged in each district, as judging now takes from a fortnight to three weeks to complete. The improvement in the calves being brought forward has also meant that championship judging at one centre has had to be resorted to. With so many good calves it has been impossible to separate them unless judged together, and the group winners in both the type and condition classes are now brought to one convenient centre and the championship animals there selected. The two classes for "light" (Jersey-Ayrshire) and "heavy" (Shorthorn-Friesian) breeds were adhered to as in the past.

In both of these classes there are two distinct competitions, one for condition and the other for type. While recognizing the importance of type, the competition is chiefly concerned with the rearing of the calf. The word "condition" appears to create a wrong impression in the minds of some farmers, who hold that dairy stock should not be allowed to carry any condition. With dairy stock, however, condition does not imply an animal carrying a large amount of surplus flesh, but one in a sound healthy state, in working or milking condition. So it should be with the club calves—condition not being interpreted as fat and ponderous, but meaning a well grown, bright, healthy, well cared for calf.

Judging was carried out during the latter part of November and early December, points being awarded on the same basis as in previous

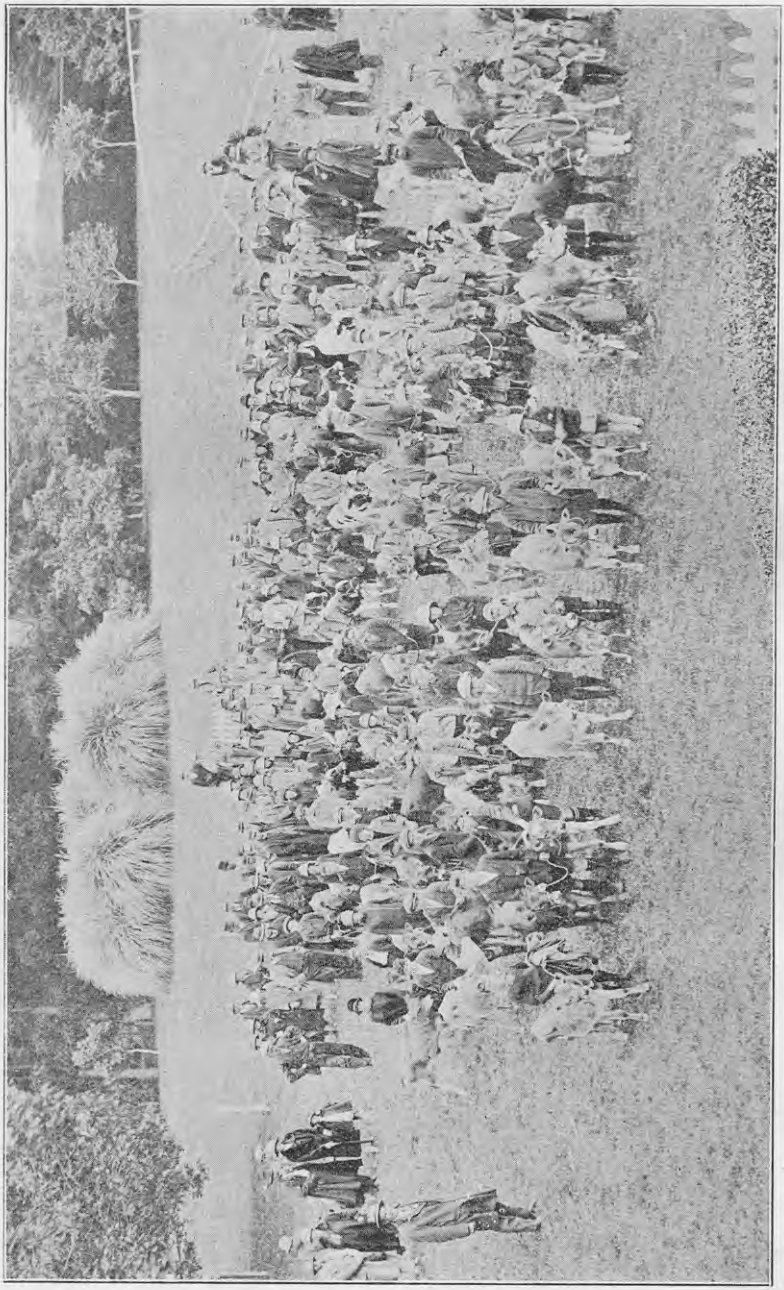


FIG. 1. GENERAL ASSEMBLY OF COMPETITORS FOR CALF CHAMPIONSHIP JUDGING AT ELTHAM.

years. During the group judging, which is carried out at the various schools, every advantage is taken of the opportunity it presents to give demonstrations in connection with dairy stock to the competitors and parents, who usually assemble in large numbers. It is felt that these demonstrations form one of the most important parts of the competition, and the judge's comments and remarks are closely followed by both children and adults. With a view to continuity the competitors are encouraged to bring animals previously judged for further judging, and during the season under review thirty-three animals, ranging from yearlings to four-year-olds, were presented in this way.

FIG. 2. EIGHTEEN-MONTHS-OLD HEIFERS PRESENTED FOR SECOND JUDGING AT MIMI SCHOOL.

Under the system practised the young animals are not lost sight of as they develop.

In North Taranaki the championship for the Jersey-Ayrshire class was won by Norman Marsh, of Mangorei; and in the Friesian-Shorthorn class the animal reared by Roy Hicks, of Tikorangi, was placed champion. The champion dairy-type Jersey-Ayrshire class heifer was that reared by Eric Spencer, of Upper Mangorei; while Eileen O'Byrne, of Egmont Village, won the type championship in the Friesian-Shorthorn class. In South Taranaki the championship for condition in the Jersey-Ayrshire class was won by R. Anderson, of Toko; while E. Betts, of Okaiawa, won in the Friesian-Shorthorn class. The dairy-type champion in the Jersey-Ayrshire class in this district was won by H. Schnebelli, of Tokaora; and that for the Friesian-Shorthorn class by Ray Shannon, of Cardiff.

CROP-GROWING.

The season of 1927–28 was probably one of the worst, so far as crop-growing is concerned, that has ever been experienced throughout the Wanganui-Taranaki region. A comparatively dry spring was followed by an abnormally dry summer, and early autumn was not conducive to heavy yields. The droughty condition was probably most severe in the coastal districts of North Taranaki.

The crops grown were mangolds and carrots in both Wanganui and South Taranaki, and mangolds and chou moellier in North Taranaki. In this latter district the soils vary very considerably, and it was felt that by continuing with root crops only the interest and value of the work was flagging in those localities where roots could not be successfully grown. In replacing carrots by chou moellier it was hoped that new interests and hopes would be revived. In this success was met with, and it has been pleasing to see schools on poorer soils coming well to the fore in these competitions. The further growing of two varieties of mangolds in North Taranaki also created new interests—not only with the competitors but with their parents. The roots grown were as follows: Wanganui—Mangolds (Prizewinner); carrots (Matchless White). South Taranaki—Mangolds (Prizewinner); carrots (Matchless White). North Taranaki—Mangolds (Prizewinner and Long Red).

The failure of a large number of plots to see the season out is still a matter of concern, although the climatic condition during the past season were responsible as regards many of the crops other than mangolds. That this latter crop lived up to its reputation as a withstander of dry conditions is proved by the heavy yields obtained. The destruction of plots by stock is still a regrettable feature and will, in many instances, remain so for many years. Unfortunately, the interest taken by some parents is not great enough to ensure that the child's plot is stock-proof.

FIG. 3. CHAMPION CROP OF MANGOLDS GROWN BY H. WILLIS, MATAPU.

This crop gained first prize for South Taranaki, and won the Stewart Wilson Cup championship for the Dominion. The grower is seen on right.

The outstanding success of the year was the splendid mangold crop of 188 tons 7 cwt. per acre grown by H. Willis, of Matapu School. Twenty-one crops weighed out at over 100 tons per acre, and a large number at over 90 tons. The average yield in South Taranaki was 71 tons 12 cwt., from sixty-five crops; in Wanganui 62 tons 10 cwt., from forty-eight crops; and in North Taranaki 46 tons 2 cwt., from forty-seven crops.

The results for the championships were as follows, the places referring to schools in each case:—

	Tons.	Cwt.
North Taranaki:—		
Mangolds:		
1st, V. Penwarden, Tataraimaka	127	2
2nd, Doris Jupp, Tikorangi	90	9
3rd, E. Corlett, Ratapiko	98	0
Chou Moellier:		
1st, J. Brown, Norfolk Road	59	3
2nd, J. Dryden, Egmont Village	42	18
3rd, R. Giles, Urenui	43	7
Best-kept plot: R. Gyde, Egmont Village.		
South Taranaki:—		
Mangolds:		
1st, H. Willis, Matapu	188	7
2nd, A. Muggeridge, Auroa	130	3
3rd, R. Bird, Ngaere	117	0
Carrots:		
1st, L. Philpott, Ohangai	58	16
2nd, C. Treweek, Matapu	53	16
3rd, R. Tapp, Ohangai	47	17
Wanganui:—		
Mangolds:		
1st, A. McCandish, Ngaturi	134	0
2nd, M. Trembath, Ngaturi	130	19
3rd, M. McCandish, Ngaturi	127	8
Carrots:		
1st, N. Munro, Ngaturi	55	5
2nd, W. Ell, Waverley	47	8
3rd, E. Trainor, Ngaturi	51	2

It will be noticed that in some cases the weight figures do not coincide with the placings, but in these cases the differences were brought about by a difference with some other marks, probably for chart.

Exhibitions of the roots grown by competitors were again staged at the Wanganui, Hawera, and New Plymouth winter shows, and were very favourably commented upon.

CHALLENGE TROPHIES.

The Stuart Wilson cup for the most outstanding performance in connection with boys' and girls' clubs throughout the Dominion was won for 1927–28 by H. Willis, of Matapu, South Taranaki. The Henry Lane and Co. Dominion challenge shield for the greatest number of points in club work was won by the Tikorangi school, North Taranaki.

Senior Clubs.

The season under review was the second in which senior clubs had been in operation in South Taranaki, and the first in North Taranaki. These competitions, which form an intermediate stage between the

junior clubs and the farmers' competitions, lend themselves to experimental and demonstration work, and, distributed as they are over a wide range of soil and climatic conditions, the results are of considerable interest. In South Taranaki two crops were grown—Prizewinner mangolds and Matchless White carrots—and there was a total of twenty entries. In North Taranaki the competition was confined to Red Intermediate mangolds, with twelve entries.

The trial carried out in South Taranaki comprised the use of kainit with mangolds and sulphate of potash with carrots. In the case of both crops the whole plot was sown with a phosphatic manure mixture, and then half of the plot given an extra dressing of kainit at the rate of 3 cwt. per acre for mangolds, and of sulphate of potash at 1 cwt. for carrots. The average yields worked out as follows :—

	Tons.	Cwt.
Mangolds—		
Phosphatic manure	56	0
Phosphatic manure and kainit	54	0
Carrots—		
Phosphatic manure	39	13
Phosphatic manure and potash	42	7

In North Taranaki the whole ¼-acre plot was given a dressing of the standard phosphatic manure and then divided into quarters, one quarter receiving kainit at the rate of 3 cwt., the second quarter 30 per cent. potash at 2 cwt., the third quarter muriate of potash at the rate of 1 cwt., and the last quarter left as a control. The trial gave the following per-acre results :—

	Tons.	Cwt.
Control	42	11
Kainit	46	11
30 per cent. potash	40	7
Muriate of potash	45	7

The competition winners were as follows :—

	Tons.	Cwt.
South Taranaki :—		
Mangolds :		
1st, A. Philpott, Ohangai	99	6
2nd, R. Harding, Ohangai	77	19
3rd, R. Corlett, Awapuna	71	10
Carrots :		
1st, H. Feather, Manaia	44	2
2nd, W. Dakers, Manaia	40	8
3rd, H. Symes, Auroa	38	17
North Taranaki :—		
Mangolds :		
1st, J. Corlett, Ratapiko	82	5
2nd, L. Goodrich, Mangorei	58	18
3rd, A. Phillips, Mimi	53	10

As in past years, the hearty co-operation between teachers, instructors, and supervisors did much towards the success of the season's operations.

Manufacture and Export of Casein.—During the year ended 31st March last 1,771 tons of lactic and 462 tons of rennet casein, making a total of 2,233 tons, were manufactured for shipment, as compared with 1,613 tons lactic and 151 tons rennet casein for the previous year. The annual report of the Dairy Division states that the quality of the casein continues to be uniform and of a high standard.

POTATO-MANURING EXPERIMENTS IN CANTERBURY, SEASON 1926–27.

METHODS OF APPLICATION OF FERTILIZERS.

A. W. HUDSON, B.Ag., B.Sc., Crop Experimentalist, Fields Division.

IN continuation of the experiments on phosphate, potash, and nitrogen manuring of potatoes previously carried out (see *Journal*, February, 1927), five further trials were made in the 1926–27 season. Two of these trials were largely concerned with methods of applying the fertilizers used.

The practice of sowing artificial fertilizers in the row with the seed potatoes (referred to herein as "manure with seed") has of recent years been replaced largely by the drilling of the manures through every coulter of the manure-drill prior to sowing of the seed. This latter method will be referred to here as "predrilling," and may be termed "manuring of the ground" as against "manuring the seed." No reliable information on the relative merits of the two methods was available, so it was decided to test the point on two farms. Both experiments were conducted in the same way, except that in one case predrilling was done eight days and in the other twenty-three days before planting; also, in the first case the potatoes were ploughed in and the manure with seed applied by hand, while in the latter case planting was done with a machine.

The treatments used were as follows:—

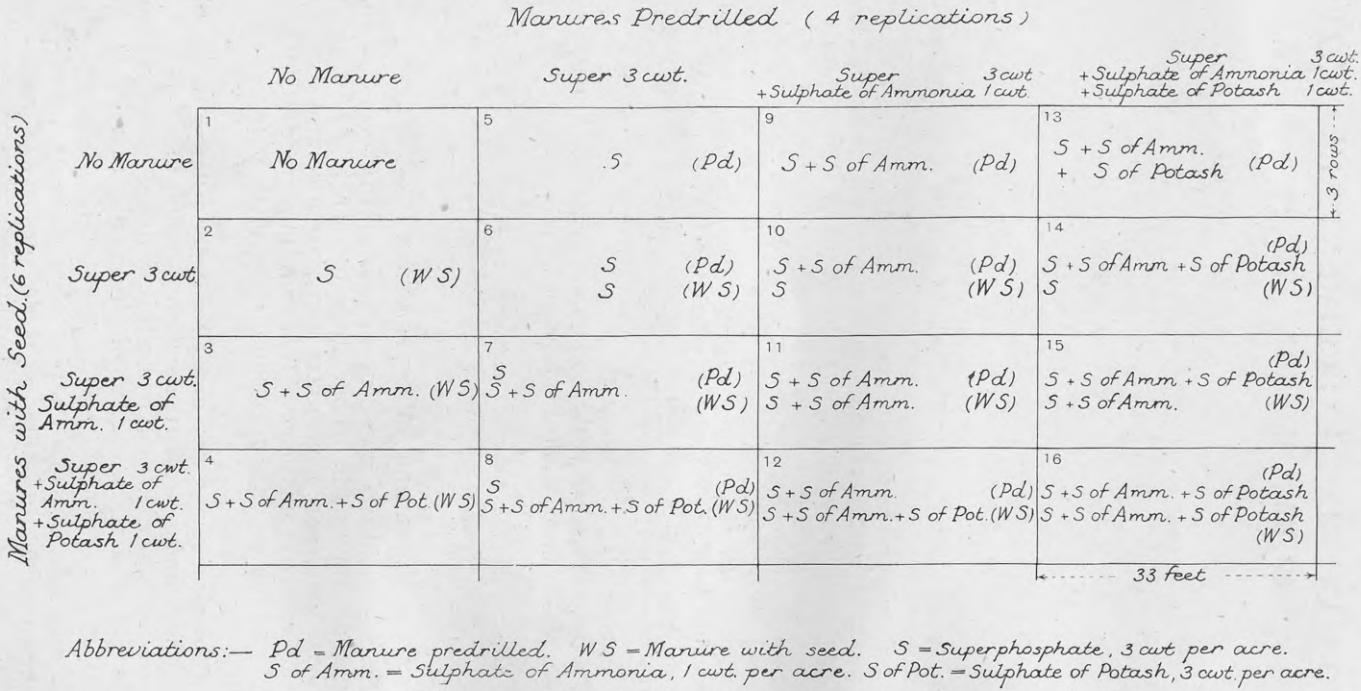
	Quantity per Acre.
(1) No manure.	
(2) Superphosphate, 44/46 per cent. tricalcic phosphate	3 cwt.
(3) Super 3 cwt., and sulphate of ammonia (20 per cent. nitrogen) 1 cwt., per acre	4 cwt.
(4) Super 3 cwt., sulphate of ammonia 1 cwt., and sulphate of potash (48 per cent. K_2O) 1 cwt., per acre	5 cwt.

METHOD OF EXPERIMENTS.

Predrilling of fertilizers was done in parallel strips, each ½ chain wide by 3 chains in length. Four strips of each of the treatments specified above were sown, hence there were sixteen parallel strips each ½ chain wide and 3 chains long. To ensure uniform cultivation the empty drill was run over the no-manure strips in the same way as on the manured ones.

Later the same manures were applied with the potatoes, which were planted in rows running across the sixteen ½-chain-wide strips. Each plot was three rows in width and replicated six times. This resulted in sixteen different treatments, each of which occurred twenty-four times over the area. Fig. 1 illustrates the arrangement diagrammatically.

Digging was done by hand, the rows being marked off into ½-chain lengths (corresponding to width of predrilled plots). Sorting into various grades was carried out with a potato-sorting machine.



Abbreviations:— Pd = Manure predrilled. WS = Manure with seed. S = Superphosphate, 3 cwt per acre. S of Amm. = Sulphate of Ammonia, 1 cwt. per acre. S of Pot. = Sulphate of Potash, 3 cwt. per acre.

FIG. 1. DIAGRAMMATIC PLAN SHOWING ARRANGEMENT OF POTATO MANURIAL TREATMENTS.

Each treatment replicated twenty-four times in each experiment. Treatments are numbered 1 to 16 in left top corner each section. Quantities of manure per acre range from 3 cwt. to 10 cwt. of mixture in Treatment 16.

Experiment 1 : On Farm of S. McIntosh, Kaiapoi.

Manures predrilled, 18th and 19th October, 1926. Crop planted, 26th and 27th October. Potatoes ploughed in and manures with seed applied by hand (Figs. 2 and 3). Variety : Dakota. Previous history of field : 1925–26, wheat ; 1924–25, potatoes, which followed a twelve to fifteen-year-old pasture.

OBSERVATIONS DURING PERIOD OF GROWTH.

In early December all rows having had manure with seed showed a stronger growth than the controls. The super plots were decidedly pale in colour as compared with those that received nitrogen, which were quite a deep green. At this time the predrilled manures did not show any visible effect on growth.

On 13th January the predrilled manures were having an easily discernible effect on growth of tops (Fig. 4), and from this time onwards both methods of application of the fertilizers appeared to be equally effective as measured by appearance of the tops.

The plots which received nitrogen were much more healthy and vigorous in appearance than those having super alone. The latter still maintained a better growth than the no-manure plots.

FIG. 2. PLOUGH WITH DISK ATTACHMENT FOR MAKING SMALL FURROWS IN POTATO-PLANTING.

Used for planting experimental crop on McIntosh's farm ; manure was applied evenly along small furrow.

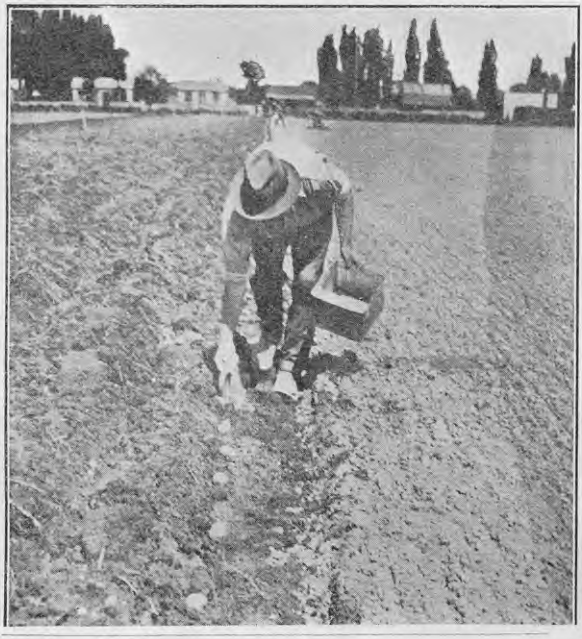


FIG. 3. APPLYING MANURES BY HAND IN McINTOSH'S EXPERIMENT.

Manures were weighed out in small quantities sufficient for one row 2 chains long. Uniform distribution was assured by spreading the manure a little more lightly than required, the remainder then being evenly distributed over that already applied.

FIG. 4. TYPICAL PORTION OF EXPERIMENTAL CROP ON McINTOSH'S FARM, IN JANUARY, 1927, SHOWING EFFECT OF VARIOUS TREATMENTS AND METHODS.

The following table summarizes the results of the experiment:—

Table I.—Results of Experiment on Farm of S. McIntosh, Kaiapoi.

No. of Treatment.	Treatment (see Fig. 1).	Yield in Tons per Acre.				Cost of Manures per Acre.			Profit from Use of Manure.		
		Table.	Seed.	Small.	**Total.**	£	s.	d.	£	s.	d.
1	No manure	5·88	2·59	0·56	9·03	..			..		
	Manures with Seed.										
2	Super	7·24	2·73	0·54	10·51	0	18	0	3	7	0
3	Super + sulph. of amm. ..	7·51	3·25	0·68	11·44	2	0	0	3	17	0
4	Super + sulph. of amm. + sulph. of pot.	7·69	3·22	0·69	11·60	2	18	0	3	9	0
	Manures predrilled.										
5	Super	6·80	3·07	0·74	10·61	0	18	0	2	11	0
9	Super + sulph. of amm. ..	6·76	2·93	0·64	10·33	2	0	0	1	2	0
13	Super + sulph. of amm. + sulph. of pot.	6·76	2·92	0·74	10·42	2	18	0	0	3	0
	Super with Seed on Predrilled Manures named below.										
6	On super	7·22	3·09	0·69	11·00	1	16	0	2	19	0
10	On super + sulph. of amm. ..	7·64	3·11	0·72	11·47	2	18	0	3	2	0
14	On super + sulph. of amm. + sulph. of pot.	7·56	3·12	0·71	11·39	3	16	0	2	0	0
	Super + Sulphate of Ammonia with Seed on Predrilled Manures named below.										
7	On super	7·34	3·31	0·77	11·42	2	18	0	2	10	0
11	On super + sulph. of amm. ..	7·78	3·42	0·76	11·96	4	0	0	2	18	0
15	On super + sulph. of amm. + sulph. of pot.	7·82	3·40	0·78	12·00	4	18	0	2	2	0
	Super + Sulphate of Ammonia + Sulphate of Potash with Seed on Predrilled Manures named below.										
8	On super	7·38	3·25	0·72	11·35	3	16	0	1	13	0
12	On super + sulph. of amm. ..	7·55	3·15	0·66	11·36	4	18	0	0	18	0
16	On super + sulph. of amm. + sulph. of pot.	7·57	3·32	0·71	11·60	5	16	0	0	7	0

Notes.

In estimating the monetary return from each treatment the following values per ton are assigned to the various grades: Table, £3; seed, £1 10s.; small, no value. From £4 to £4 10s. per ton is reckoned to be the local average of the past seven or eight seasons' values of table potatoes for May delivery. Digging and cartage costs are about £1 to £1 10s. per ton, according to the conditions of digging and distance of cartage to rail. Hence £3 per ton seems a reasonable value to assign to table potatoes in the ground. Seed will vary in value from nothing to £6 or £7 per ton according to the demand, variety, and purity. From £2 10s. to £4 is considered a fair average market value to give this class of potato, and, as the costs in digging and handling will be about the same as for tables, seed are valued at £1 10s. per ton in the ground. Since small (pig) potatoes are generally left on the ground they are here considered valueless.

The *per ton* charges enumerated will be practically the same whether the crop is one of 10 tons or one of 11 tons. On the other hand, *per acre* costs, such as ploughing, cultivating, moulding, &c., will vary per ton, decreasing with increased yield and increasing with decreased yield. Such operations, however, cost the same per acre for manured as for unmanured crops.

Costs of manures: These have been calculated on the following approximate prices per ton: Superphosphate, £6; sulphate of ammonia, £22; sulphate of potash, £18.

Profit resulting from use of manures: The amount in this column represents the value of the increase over no manure less the cost of the manure (for example, treatment 2, super, 3 cwt., with seed). Thus 7·24 tons table potatoes at £3 per ton are worth approximately £21 14s., and 2·73 tons seed at £1 10s. are worth £4 2s., a total value of £25 16s.; deducting cost of 3 cwt. super at £6 per ton, 18s., there remains a net amount of £24 18s. per acre. The value of the crop on the no-manure plots is £21 11s. per acre. Hence there is a £3 7s. greater return as a result of using 3 cwt. of super.

COMMENTS ON TABLE I.

To facilitate comparison of the results of the various treatments Table I is divided into six parts, the principal considerations being embodied in the first three parts. The necessary comparisons in these parts have been examined statistically, and where significance occurs it will be indicated. The numbers in brackets given below indicate the number of treatment referred to (see Fig. 1).

Manures with Seed.—Super (2) has given a significantly higher yield of about 1⅘ tons of table potatoes than no manure. The seed and small do not differ significantly in the two treatments. The difference in total yields is about 1½ tons in favour of the super.

Super + sulphate of ammonia (3) is significantly better than super (2) in all grades.

Treatment (4) containing potash does not differ significantly from treatment (3), and in any case it has not increased the monetary return.

Manure predrilled.—Super predrilled (5) is poorer in yield of table potatoes and better in yields of seed and small than super with seed (2), although the totals do not differ significantly. The effect of difference in yields of the various grades has quite a marked influence on net profit as shown in the last column, treatment (2) giving 16s. per acre better return. This provides a very excellent example of the necessity of the determinations not only of total yield but of the yields of the different grades.

Super + sulphate of ammonia (9) and super + sulphate of ammonia + sulphate of potash (13) have both yielded significantly lower in table, seed, and total than the corresponding treatments (3) and (4) applied with the seed.

Of the three treatments predrilled it will be seen that any difference there may be is in favour of the super alone (5), and that both sulphate of ammonia and sulphate of potash have failed to increase the yield. In this experiment the method of applying the manure with the seed has proved the better.

Combination of Manures with Seed and Manures predrilled.—None of these treatments is of sufficient merit to have caused additional profit from its use, and although the heaviest yields have resulted from treatments (11) and (15) the cost of the heavy dressings of manure has lessened the resultant profits.

The consistency with which the mixture of super and sulphate of ammonia with seed has proved a little better than the super alone, irrespective of what the predrilling treatment consisted of, can be seen

if treatments (3), (7), (11), and (15) are compared with (2), (6), (10), and (14) respectively.

Effect of Treatments on Percentages of various Grades.—The percentage yields of table potatoes throughout have proved to be very consistent, and range from 64·1 to 66·6, with the exception of the super with seed, treatment (2). In this case the yield of table potatoes was 68·9 per cent. of the total yield. It proved to be significantly higher than the no-manure plots, which gave 65·1 per cent. of tables. The super (2) gave a correspondingly and significantly lower percentage of seed and small kinds. The super had 26·0 per cent. of seed and 5·1 per cent. of small, while all other treatments ranged from 27·1 to 29·0 per cent. of seed and from 5·8 to 7·1 per cent. of small.

Experiment 2 : On Farm of H. McLenaghen, Killinchy.

Date manures predrilled, 7th October, 1926. Crop planted with potato-planter on 30th October. Variety: Up-to-Date. Previous history of field: Grass for several years.

OBSERVATIONS DURING GROWING-PERIOD.

From the time that the plants appeared above ground a marked superiority of the plots having manure with seed over no-manure plots was apparent. The predrilled manures showed no effect until some time after the crop was through, and on 11th January, 1927, these plots appeared to be just as strongly grown as those having manure with seed. All plots having sulphate of ammonia and sulphate of ammonia + sulphate of potash were a much deeper colour than those having straight-out superphosphate. On 11th January the plots were very similar in appearance to those on McIntosh's farm (Fig. 4).

A complete summary of the results is given in Table 2 (next page).

COMMENTS ON TABLE 2.

Manures with Seed.—The very considerable and significant increase in the yield of table potatoes of about 1½ tons as a result of using super with the seed (2) provides a handsome margin of profit to the extent of £4 per acre.

The addition of sulphate of ammonia to super (3), although increasing the yields of seed, small, and total yield to a significant extent, has failed when the financial side is considered. The yield of table potatoes in treatment (3) is lower than that of super (2), although not to a significant extent. A further comment on this is made below. The mixture containing potash (4) has in no way improved the yield over that of treatment (3) when potash is omitted.

The superiority of the treatments (2), (3), (4) applied with the seed over the corresponding treatments (5), (9), (13), which were predrilled, is very obvious. In every case, except in the comparisons between the seed and small on the two superphosphate treatments, the differences are significant.

Manures predrilled.—Treatments (5), (9), (13) indicate that under this method of application both sulphate of ammonia and sulphate of potash have been instrumental in increasing the yield. Since the increases are far from being profitable they have not been submitted to statistical examination.

Table 2.—Results of Experiment on Farm of H. McLenaghen, Killinchy.

No. of Treatment.	Treatments (see Fig. 1).	Yield in Tons per Acre.				Profit from Use of Manure.
		Table.	Seed.	Small.	**Total.**	
1	No manure	3·78	3·32	0·51	7·61	..
	Manures with Seed.					£ s. d.
2	Super	5·29	3·61	0·53	9·43	4 0 0
3	Super + sulph. of amm.	5·16	4·05	0·68	9·89	3 4 0
4	Super + sulph. of amm. + sulph. of pot.	5·18	3·79	0·69	9·66	2 0 0
	Manures predrilled.					
5	Super	4·30	3·51	0·58	8·39	0 18 0
9	Super + sulph. of amm.	4·61	3·43	0·57	8·61	0 13 0
13	Super + sulph. of amm. + sulph. of pot.	4·79	3·57	0·57	8·93	0 9 0
	Super with Seed on Predrilled Manures named below.					
6	On super	5·41	3·60	0·55	9·56	3 10 0
10	On super + sulph. of amm. ..	5·55	3·71	0·59	9·85	2 19 0
14	On super + sulph. of amm. + sulph. of pot.	5·99	3·70	0·52	10·21	3 7 0
	Super + Sulphate of Ammonia with Seed.					
7	On super	5·15	4·11	0·69	9·95	2 7 0
11	On super + sulph. of amm. ..	5·29	4·14	0·73	10·16	1 14 0
15	On super + sulph. of amm + sulph. of pot.	5·39	4·21	0·68	10·28	1 4 0
	Super + Sulphate of Ammonia + Sulphate of Potash on Predrilled Manures named below.					
8	On super	5·31	3·79	0·65	9·75	1 10 0
12	On super + sulph. of amm. ..	5·25	3·94	0·74	9·93	0 8 0
16	On super + sulph. of amm. + sulph. of pot.	5·58	3·77	0·67	10·02	0 5 0

Combinations of Manures with Seed and Manures predrilled.—Like the experiment on McIntosh's farm, some of the heavily manured plots have given the highest yields with, in the main, low monetary returns. The consistent effect of super + sulphate of ammonia applied with the seed in its relationship to super is again evident, although it has behaved somewhat differently than in previous experiments. Treatments (2), (6), (10), and (14), in which super has been applied with seed across all predrilling, are consistently higher in the yield of table potatoes and lower in seed, small, and total than (3), (7), (11), and 15 respectively, in which the nitrogen has been used. Hence the sulphate of ammonia, although increasing the total yield, has had the undesirable effect of reducing the yield of the more desirable table potatoes. Since the nitrogen has caused an increase in weight of crop, accompanied by a reduction of the number of tubers reaching the large size, it is obvious that there must have been a considerable increase in the number of tubers actually formed, and under more favourable conditions of growth a greater number of these could be expected to

attain a greater degree of size. The rainfall figures given below give a good idea of the type of growing-period experienced.

Potash used with the predrilled treatments shows a regular increase in table potatoes, although in the case of the mixture applied with the seed (4) it has been quite useless. Each of the treatments (13), (14), (15), and (16) should be compared with that immediately above it. With the exception of treatment (14) none of the potash plots has given a better monetary return than the same treatment without potash.

Effect of Treatment on Percentage of various Grades.—The no-manure plots had 49·7 per cent. of table potatoes and 43·6 and 6·7 per cent. of seed and small potatoes respectively. In every case where super alone was sown with the seed the percentage of table potatoes was highest and the percentage of other grades correspondingly low. Treatment (2) gave 56·1 per cent. of table, 38·2 per cent. seed, and 5·7 per cent. small; treatment (6) gave 56·5 per cent. of table, 37·6 per cent. seed, and 5·9 per cent. small; treatment (10) gave 56·4 per cent. of table, 37·7 per cent. seed, and 5·9 per cent. small; treatment (14) gave 58·7 per cent. of table, 36·2 per cent. seed, and 5·1 per cent. small.

All the manured plots ranged from 51·3 to 55·6 per cent. of table potatoes, from 37·6 to 41·8 per cent. of seed, and from 6·4 to 7·4 per cent. of small. Hence all the manures increased the percentage of table potatoes and reduced the percentage of seed.

General Remarks.

The season under review was rather extraordinary in that the early summer was unusually wet and very favourable to growth, while the late summer was extremely dry. This is shown clearly by the following rainfall figures for Christchurch taken from the weather records published in the *Journal*:—

	Rainfall 1926–27. Inches.	Average Rainfall at same Station. Inches.
October	2·84	1·68
November	3·98	1·87
December	3·55	2·06
January	0·62	2·21
February	0·80	1·77
March	1·15	2·05

The dryness of the late summer caused crops to go off early, consequently the tubers did not develop, and crops in general produced a large proportion of seed and small tubers. Under the prevailing conditions the method of applying manure in the row with the seed gave much better results than predrilling. Whether this will be maintained in the future remains to be seen.

The effect of adding sulphate of ammonia to superphosphate was to increase the yield of all grades at McIntosh's (Kaiapoi), while at McLenaghen's (Killinchy) the increase has been in seed and small only, resulting, however, in a greater total weight per acre.

As in previous seasons, sulphate of potash failed to give results which warrant the recommendation of its use in Canterbury.

(To be continued.)

WAIMATE WEST DEMONSTRATION FARM.

NOTES ON OPERATIONS FOR YEAR 1927–28.

J. W. DEEM, Fields Superintendent, Wanganui.

THE season of 1927–28 in the Manaia locality was not of the best for milk production. The early spring was mild and cows started away well; then dry weather set in about the middle of September, with cold winds. This continued into November, when, about the middle of the month, fair rains were experienced. These were followed by drought conditions from the middle of December to the end of March. The dry conditions greatly affected the seasonal growth of grass, and were reflected in the herd production. To illustrate this, the butterfat returns for October were 1,894 lb., for November 1,844 lb., and for December 1,902 lb., with a drop to 1,594 lb. in January. This is the first time in the history of the farm that there has been a drop in butterfat in November, to be recovered in December.

The farm pastures were satisfactory during September and the early part of October, but, owing to the weather conditions mentioned above, they went off badly from the middle of October to the middle of November. A good recovery was shown in the early part of December, which lasted until the end of the month, from which date they became very bare and continued so until the end of March, after which there was a fair recovery. In the preceding year the grass-grub had been very bad on most of the farm. Careful feeding out of roots, ensilage, and hay was practised on the worst areas, and although the grass was thin on several of the pastures in the spring there has been a very good recovery, and unless a fresh attack is experienced during the current season the ultimate harm will not be great. At the same time it must be recognized that the carrying-capacity of the farm in the spring of 1927 was greatly reduced, and this to some extent accounts for the falling off in butterfat returns.

ROOT CROPS.

These crops consisted of 1 acre each of mangolds, carrots, soft turnips, and chou moellier. As in the past the sown crops had a great battle with fumitory and wild turnip. Most of the available labour on the farm was spent in weeding the mangolds and carrots in the early stages, and by the time the other crops received attention the dry weather had set in; consequently these crops were not very good.

The mangold and carrot crops made a wonderful recovery during March and April and yielded an average of 45 tons 10 cwt. per acre for carrots and 76 tons for mangolds. The carrots were only fair quality, but the mangolds were very good. A test between Matchless White and Sinclair's Champion carrots resulted in a win for the former with 46 tons 13 cwt. per acre, against 43 tons 4 cwt. for Champion. Red Intermediate mangolds were tested against Prize-winner, the yield weights being 87 tons 3 cwt. for Red Intermediate and 76 tons 1 cwt. for Prizewinner. Red Intermediate is a very fine mangold for this district and greatly preferable to Long Red or similar

varieties. The ideal practice would be to grow half of Red Intermediate and half of Prizewinner. The manure used for the carrots was three parts super and one part each of Nauru phosphate and bonemeal, at 4 cwt. per acre.

A mangold manurial trial was carried out with Prizewinner to test the various potassic manures, also to try the farm's standard mangold manure against Sulphurophosphate. The results were as follows:—

(Standard mixture: 3 parts super, 1 part Nauru phosphate, 1 part bonemeal.)

No. 1.	Yield per Acre. Tons.	cwt.
Standard mixture 5 cwt.; kainit 3 cwt., per acre	76	1
Sulphurophosphate 5 cwt.; kainit 3 cwt., per acre	49	5
Increase in favour of standard mixture	26	16
No. 2.		
Standard mixture 5 cwt.; kainit 3 cwt., per acre	76	1
Standard mixture 5 cwt.; muriate of potash 1 cwt., per acre ..	68	19
Standard mixture 5 cwt.; sulphate of potash 1 cwt., per acre ..	61	12
Standard mixture 5 cwt.; 30-per-cent. potash 1 cwt., per acre ..	61	12

This bears out the results of numerous previous trials, which indicate that it is the salt more than the actual potash that has the beneficial effect on mangolds, and we can only reiterate our previous advice to use in addition to phosphatic fertilizer 3 cwt. to 4 cwt. of kainit or salt in preference to other potassic fertilizers. In this connection the approximate prices per ton of potash fertilizers may be noted as follows: Sulphate of potash, £16; muriate of potash, £15 10s.; 30-per-cent. potash, £7 15s.; and kainit, £5 10s.

TOP-DRESSING OF PASTURES: A POTASH EXPERIMENT.

Previous tests had failed to indicate any improvement, either to the eye or through preference by stock, where 2 cwt. kainit, 1 cwt. 30-per-cent. potash, or ½ cwt. sulphate of potash per acre, had been applied for several seasons in addition to the usual phosphatic top-dressings. A definite feeding test was therefore carried out. Fields 2, 3, 6, and 7, of 12 acres each, were subdivided into eight 6-acre paddocks, after having been given the usual phosphatic dressing of 3 cwt. per acre. Water was laid on to each field. Fields 2, 3, 6A, and 7A were then dressed with potash, Field 2 getting kainit, Field 3 30-per-cent. potash, Field 6A muriate of potash, and Field 7A sulphate of potash. Each field received sufficient of one or other of the different potassic fertilizers to give it 30 lb. of actual potash per acre. The control Fields 2A, 3A, 6, and 7 received at the same time an extra 1½ cwt. of super per acre, so as to about equalize the monetary value of the different dressings. Arrangements were then made to graze the dairy herd the full twenty-four hours on each field. The system followed was to graze the four supered fields in rotation, and then the four potash fields, then to return to the super, and so on through the season, giving the herd a fresh field every morning. This was continued from 15th September to 30th March. By grazing the cows twenty-four hours in each field no loss of fertility was suffered by any area, as is so often the case when different day and night paddocks

are used. The following table gives the amount of milk produced by each field for the period :—

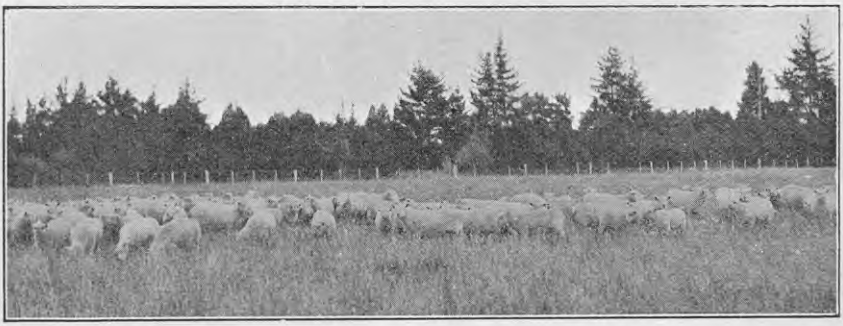
	lb.		lb.
Field 2, kainit	24,208	Field 2A, phosphates only ..	24,126
Field 3, 30 per cent. potash	24,117	Field 3A ,,	23,919
Field 6A, muriate of potash ..	24,139	Field 6 ,,	23,801
Field 7A, sulphate of potash ..	24,007	Field 7 ,,	24,258
Total	96,471	Total	96,004

This gives an increase of 367 lb. of milk over a period of 6½ months in favour of the potash-dressed fields. A small increase such as this is not significant, however, and cannot be accepted as being in favour of potash or otherwise without further evidence. So far as could be seen by the eye there was no difference in grazing except in Field 7A, which appeared to be kept shorter than Field 7. In the autumn, after the March rains, the fields which had received the extra super looked much greener than those which had had the potash. Unfortunately, by the time there was a fair growth of pasturage from the autumn rains the herd was practically dry. These top-dressings have been repeated and the test is being continued this season.

LUCERNE.

Lucerne continues to do well on the farm. The area of 8 acres was cut in November for ensilage. Green feeding started early in January and continued up to the middle of April. In addition to providing green feed for the herd of forty-eight milking cows and several store animals during this period, about 4 acres of one cut was hayed. Had it not been for the lucerne, feed for the herd would have been very short during January, February, and March.

The practice of sowing 1 bushel of Algerian oats with 2 cwt. of super after the last autumn cultivation has been followed on this stand for the past five years—about two-thirds receiving the oats and one-third kept as a control. So far the lucerne has not shown any signs of deterioration from the addition of the oats. The oats provide good spring grazing if required, and they nearly double the weight of green material for the first cut in November.



PORTION OF THE RUAKURA STUD SOUTHDOWN EWE FLOCK WITH LAMBS.

SEASONAL NOTES.

THE FARM.

HAYMAKING.

WHEN mowing permanent pastures it is generally desirable—weather permitting—to cut early, aiming at a light cut of good-quality hay rather than a heavier cut later in the season. Early cutting conserves a closer turf on the pasture than later cutting, which leaves the cocksfoot-plants very tufted, the white clover stunted, and consequently a good deal of bare ground.

The green plants when cut for haymaking contain from 70 to 75 per cent. of water. Before they can be conserved as hay this water-content must be reduced to between 15 and 20 per cent. The wind and sun are relied on to dry the green material, and of the two the wind is most satisfactory. Leaving the cut grass too long in the upturned swathes is to be avoided, as this tends to excessive bleaching. The use of the swathe-turner is extending, and this machine has much to commend it. It lifts and turns the swathe without breaking it, and the quickness with which it works allows of frequent turning, and thus full advantage can be taken of the drying effect of the wind. Undue sun-bleaching is thus avoided and the colour retained in the hay. There is always a space between the swathes where the ground is drying, so that when the swathes are turned they go on to this bare dry ground, and this helps the drying process.

When hay is stacked a slight fermentation takes place, which gives rise to heat, and a certain amount of water is evaporated from the warm stack. The aim of the skilled haymaker is to have his hay at just such a state of dryness that only the initial stages of heating are reached. Frequently when rather green or moist material is stacked excessive fermentation and heating take place, and an inflammable gas is produced which is responsible for the spontaneous combustion of haystacks. Stacks having so great a diameter and height that the heat produced by fermentation cannot escape as quickly as it is liberated are liable to fire, if the material has not been stacked in the best condition. The centre of the stack rises in temperature till firing or smouldering occurs. The danger-point is the middle of the stack at about 6 ft. from the ground. Below this point the weight of hay above squeezes out the air and prevents fermentation, while above and around this the heat can escape to the outside. The heat will escape more readily from a long narrow stack than from one which, although containing the same amount of material, is shorter and wider. Stacks placed in sheltered corners near plantations are more apt to heat than stacks well out in the paddock and exposed to the wind.

The direct baling of hay from the field has recently been undertaken in some dairying districts, but this method requires settled weather at haymaking for its successful adoption. Under suitable conditions the method has several advantages over stacking. Less labour is required to harvest the crop. The bales can be more easily housed and covered than a stack, and consequently there is

less loss from the weather. There is less waste in feeding out, and the hay rations can be more easily measured and carted out to the stock. The baling plants in use can usually put through about an acre an hour, and the charge is about £2 per 100 bales weighing 70 lb. to 80 lb. each. The cost of baling is, roughly, 10s. per ton.

Corrugated roofing-iron makes a very efficient cover for a stack, and the loss in a well-built stack roofed in this way is less than 5 per cent., whereas the loss in uncovered stacks is often over 25 per cent. When the iron is placed so that the corrugations run parallel to the slope of the roof, some timbering is usually required to keep the iron in place. Probably as good a method as any is to join the sheets of iron together lengthwise in sections with ordinary spouting-bolts, so that each section is long enough to cover from one side of the stack to the other—the corrugations running parallel with the length of the stack. The iron should be weighted down by kerosene-tins filled with earth.

PASTURE MANAGEMENT.

The appearance of abundant rank grass in pastures at the end of November and in early December is frequently followed by a sharp drop in milk-yield by dairy cows. Every endeavour should be made to keep the grass short on dairying pastures, either by mowing the rank growth, or by adopting a definite rotational grazing scheme over part of the farm. Most dairying grassland has an average yearly carrying-capacity of nearly a cow to 2 acres, but during November and December the pasture is capable of carrying at least a cow to the acre. Accordingly in late October, when vigorous grass-growth starts, nearly half the farm should be shut up for hay and ensilage; once a good reserve of hay and ensilage has been built up the number of cows carried on the farm can be safely increased.

During November and December a careful grazing rotation should be practised, and the dairying pastures left closely grazed after feeding off. Under ordinary conditions the best plan is to run the cows in the best grass-growth during the day, and to clean up the partially grazed fields by using them as night paddocks. During November and December the few young stock that are carried on dairy farms are of little use to clean up the pastures when the grass is growing very vigorously. If a field gets away and the growth is quite uneven the field should be mown.

CROPPING OPERATIONS.

Roots ridged in October and November will require thinning during the coming month. A proper horse-hoeing preparatory to thinning is very important. Cultivators having three tines should be used—an A-shaped tine to work the middle of the drill and two L-shaped ones to cultivate near the rows. It is not advisable to use long, curved tines near the plants at the early hoeing, as they frequently knock too much earth away from the sides of the drills and leave the roots of the seedlings exposed.

The later sowings of swedes, soft turnips, rape, and other green crops will be made towards the end of December, and care should be taken that the final cultivation of the land does not dry the seed-bed too much. Care should also be taken not to apply too

much soluble manure with the seed for the later sowing of swedes and turnips, or the germination of the seed is likely to be erratic. Superphosphate and lime, or a mixture of super and slag or super and rock phosphate, usually give better results than when the whole of the phosphates applied are in the form of super.

On Canterbury and North Otago mixed farms the skim-ploughing of grassland for wheat can usually be commenced in December. Old short-rotation pastures usually throw little summer feed after November, and early skimming will not interfere to any extent with the carrying-capacity of the farm. Moreover, early skimming reduces the pressure of team work during the autumn months, and allows the wheat land to get the benefit of a partial summer fallow.

—*P. W. Smallfield, B.Ag., Fields Superintendent, Auckland.*

PREVENTION AND TREATMENT OF MAMMITIS IN DAIRY COWS.

The following practical points are commended to the attention of dairy-farmers :—

Prevention.—(1) Practice rigid cleanliness in all things. Pay particular attention to milking-machines and teat-cups.

(2) See that the machines are (*a*) running at the proper pressure and not too high, and (*b*) that they are not left on too long.

(3) All cows known or suspected to have anything wrong with the udder must be milked last by hand.

(4) Never strip an affected quarter on to the ground — always into a receptacle containing disinfectant.

(5) The early detection of mammitis cases is of the utmost importance, both from the preventive and curative points of view. This is best done by taking a strip or two of the fore milk from each quarter before putting the machines on. Take these strips into a bucket the top of which is covered with fine wire gauze. Any small clots in the fore milk are then immediately detected, and a cow whose milk contains them must be regarded as a case of mammitis and treated accordingly.

Treatment.—(1) Stripping : The most important feature of treatment is *frequent stripping*. This reduces the invading army of germs, and also removes the tissure-damaging substances which they produce ; moreover, by keeping the affected quarter as empty of milk as possible, the germs will be deprived of much of their food-supply. Stripping should be done at frequent intervals—the oftener the better. Even if it could be done every two hours it would not be too often—in fact, it would be very advantageous.

(2) Massage : This should be done thoroughly but gently, from above downwards towards the teat. Do it after stripping. Olive-oil or some simple, harmless lubricant must be used to prevent chafing the skin when massaging. When this is done, again strip out the milk that massaging has brought into the milk-cistern.

(3) Fomentation : This is particularly helpful in acute cases in the early stages. It is best done by applying a flannel wrung out in hot water, keeping the water hot throughout. Not less than half an hour should be spent in doing this. Afterwards rub in some olive-oil to ward off the effects of cold after fomentation. Avoid turning the cow out if the weather is bad or there is no sheltered place to put her in. Foment thrice daily while the quarter is hot and swollen.

—*Live-stock Division.*

THE ORCHARD.

SPRAYING WORK.

BLACK-SPOT may have put in an appearance in some localities, and it may be necessary on this account to continue spraying with lime-sulphur on certain apple and pear varieties. It may also be advisable to continue with bordeaux on such pear varieties as Winter Nelis, Louise Bonne de Jersey, and Williams. Otherwise one of the other forms of sulphur should be used on apples for mildew. When bordeaux is being used, particularly in the growing-period, care should be taken to secure a neutral or slightly alkaline mixture; it should never contain an excess of copper sulphate. If bordeaux is made correctly it should give no reaction to litmus paper. Free copper is quickly detected if a little of the mixture is placed in a saucer and a drop of ferro-cyanide of potassium is poured in, when it becomes muddy-brown in appearance. These precautions are very important, as many instances of scorching have been traced to the use of an acid bordeaux. The methods of testing are simple, and cost practically nothing.

Of the insect pests, codlin-moth, red mite, leaf-hopper, and pear-slug are the most troublesome, and should be watched for closely. Arsenate of lead must be renewed on pip-fruit every fourteen to seventeen days, to guard against codlin-moth and leaf-roller. Fruit infected with codlin-moth should be gathered and destroyed. Where lime-sulphur is used throughout the season red mite is kept in fair control. However, where sulphur in one of the other forms has been used in lieu of lime-sulphur it is frequently found that red mite increases to such an extent that special treatment has to be resorted to. The use of spraying-oils in the summer is becoming popular, and proving very effective in dealing with certain pests such as red mite. If red mite and leaf-hopper are both troublesome at the same time, spraying-oil 1–200, plus Black Leaf 40, 1–800, may be used. To get the best results this spray should be repeated ten days later. Oil up to a strength of 1–100 may be used with safety unless foliage is very weakened. However, the lighter oil gives less spotting of fruit, which sometimes occurs through the collecting of spray into drops at the base of fruits. A good deal of such spotting may be avoided if spraying is not left till late in the day, but done when drying may be quickly effected.

Cherries and plums will require perhaps two applications of arsenate of lead for control of the slug. The first application should be made as soon as the slug appears on the foliage, repeating it in about seventeen days. Stone-fruit may still require attention for brown-rot, according to weather conditions. Spraying measures as previously recommended should be supplemented by the removal and destruction of diseased fruit.

PACKING AND HANDLING OF THE STONE-FRUIT CROP.

Preparation should already be in hand for dealing with the new season's crop. By the end of November some of the earlier stone-fruit will be ready, and growers should look well ahead, particularly in the matter of case-supply. Good clean new cases should be used for stone-fruit particularly. Second-hand cases are often the means of brown-rot infection during transit. Clean packages, neatly labelled or stencilled, or branded with rubber stamps, and carefully packed, attract attention from buyers.

Often insufficient attention is given to the grading of stone-fruit. Blemished and misshapen fruits should be discarded, and, to allow of proper packing and to get uniformity in the case, fruit should be sized. Most sizes of peaches and nectarines and of the larger varieties of plums should be packed on the diagonal pocket pack system. Too often one sees fruit of all sizes tipped into a case, and the fruit bumped down to allow of nailing on the lid. The result is much bruising and many stem punctures. Such injuries should be strictly avoided. It may even pay to pack large-sized peaches of certain dessert varieties in trays, and to wrap each fruit.

Picking should be done carefully, and fruit handled as little as possible. Picking-boxes should not be overfilled, and picked fruit should not be left standing out in the sun. Picking should be done at the correct stage of maturity, avoiding under-maturity and over-ripeness. The correct stage for apricots, peaches, nectarines, and plums is what is described as hard ripe—that is, a degree of maturity which will allow the fruit after picking to develop good flavour and to ripen. In apricots it is indicated by a yellow tinge over the fruit; in peaches and nectarines by the changing of the deep green; yellow-fleshed varieties should show up golden on the sunny side. Cherries are harvested nearly ripe. Fruit fully ripe or almost so should be graded out and disposed of near at hand. Several pickings should be made to secure uniformity in maturity and to avoid over-ripeness.

THINNING.

The importance of thinning may be again emphasized. The careful thinning of apples will help materially in the work of grading for export. What some may consider an expensive operation really helps to lighten the work later on when time is more precious. Diseased fruits should be got rid of now. To secure the greatest uniformity in size, one must be able to judge the capacity of the branch or lateral and thin accordingly. Weaker trees require heavier thinning than trees in robust growth. Fruit should be removed from near the tops of leaders, and it is advisable to remove all fruit from young trees in order to secure their maximum growth.

EXPORT OF APPLES AND PEARS.

One cannot look too far ahead in connection with these matters. Prospective shippers should soon be able to estimate the crop and the probable amount of fruit for export, basing the percentage on previous seasons' experience. Cases should be made up in readiness, and provision made for a supply of all necessary materials in good time. Dry cases are absolutely essential. Cases made up from green timber dry best if stacked in the open. The grading-machine and other shed equipment may require some overhauling. One should not wait till the season actually begins to attend to such necessary details.

CULTIVATION AND MANURING.

Cultivation should be continued right through December. Early in the New Year green cover-crops may be sown, and those contemplating their sowing will be well advised to inquire for seed in good time. Nitrate of soda or sulphate of ammonia, 1 lb. to 1½ lb. per tree, may be applied to weakly trees or those showing signs of having received a set-back through previous heavy cropping or drought.

FIREBLIGHT.

Vigilance in connection with any possible fireblight outbreak should be exercised, and suspicious symptoms as described in last month's notes reported to the nearest Orchard Instructor without delay.

—*N. J. Adamson, Orchard Instructor, Hastings.*

Citrus Culture.

Lemons should be sprayed with bordeaux, 4–4–40, as the petals fall from the main flowering. This is very necessary to prevent verrucosis and grey scab, which otherwise distort many young fruits. Owing to the prolonged flowering-period, three sprays may be necessary to ensure the protection of all young fruits. A summer insecticide of oil, 1–60, Volck, 1–50, or Black Leaf, 40–1–800, is advisable to control insect pests such as young scales, aphis, and mealy bug. Black Leaf 40 may be added to the bordeaux and both applied together.

Every effort should be made to reduce the surface soil to a good tilth while the land is still in easy workable condition. Aim at providing at least 6 in. of very finely worked loose soil on the surface.

With the heavy spring growth on the trees will be found many strong growths of a very soft woody nature. These are rarely very fruitful, and, though they may serve a very useful purpose in the formation of young trees, with fruiting-trees they should be well cut back to send out side shoots, or cut out to the base if undesirably placed.

—*W. H. Rice, Orchard Instructor, Auckland.*

POULTRY-KEEPING.

PRIMING THE COCKERELS.

DECEMBER is one of the busiest months of the year on the poultry plant, for with the hatching operations over and little culling yet carried out the quarters will be taxed to their utmost capacity. It is indeed a time which calls for special care and management in every branch of the business. As the young stock develop the greater is the demand on the housing accommodation, and the possible risk of the birds becoming overcrowded.

To lessen the risk of overcrowding and its evil effect, particularly on the growing birds, the necessity of priming off all forward cockerels for the Christmas market cannot be overemphasized. Even when food is cheap it is poor economy to keep a cockerel after about five months old. If not marketed at about this age it will commence to produce its second feathers, and it may be months before it can be brought to a prime condition again. Another important point is that the flesh of a prime five-months-old bird is distinctly superior to that of one double the age, and will therefore command a much higher price, also a better return over the cost of production. The great benefit, however, in marketing cockerels at an

early age is that accommodation and runs are saved, which is distinctly to the advantage of the remaining stock, while more time is available to attend to the main working of the plant. Care should also be taken that the birds themselves as well as the quarters are free from vermin, as, however good the food may be, the birds will fail to rapidly put on weight if insect pests are present. The poultry-keeper, after going to the trouble of priming his cockerels, should endeavour to sell them by weight, and get away from the weak but common system of disposing of them by the pair. Many of the poulterers are prepared to buy by the pound, but of course they want something better than mere stores.

It is useless trying to prime cockerels when they are running with the pullets. The males should be separated from the females before commencing to crow. When the priming process begins, at about three and a half months, exercise must be curtailed. It is not necessary to coop the birds, as they are apt to fret and lose instead of gaining weight. The best plan is to confine them to small runs with little scope for exercise. Do not try to prime cockerels on inferior or damaged food. If they are to rapidly lay on flesh the food should be sound, and fed with a free hand. Only soft food should be given, and fed sparingly for the first two days. Hard grains are apt to bring on digestive troubles when the birds are confined to a limited space. A suitable mash may be made from two parts of bran and one part each of finely ground wheat-meal and maize-meal, the whole being moistened with milk or soup and mixed into a crumbly mass. Feed three times a day as much as the birds will eat up clean. Succulent green food can be fed in abundance, but separately, and when skim-milk is available it may be given in large quantities to drink.

MORTALITY THROUGH GIZZARD-COMPACTION.

Many cases have been reported to me lately of birds dropping dead at feeding-time from no apparent cause—birds which in most cases were in a heavy-producing condition and gave evidence of being healthy and thriving. I have made many post-mortem examinations in investigating this mortality. Usually the heart was found to be in a badly ruptured condition, and the gizzard packed with fibrous materials such as long pieces of grass, &c. No doubt the ruptured heart was the actual cause of death, but the question arises, "What caused the heart to rupture?" It appears safe to assume that this was due first to compaction of the gizzard with fibrous material causing derangement of the digestive system, then excessive blood-pressure resulting from excitement at feeding-time, followed by a ruptured heart. In several cases where my advice has been sought the cause of the gizzard-compaction was traced to the birds being freely supplied with long lawn-clippings. Lawn-clippings make an ideal green food for fowls when they are short and in a succulent condition. On the other hand, if they are on the long side and in a fibrous condition they form a tangled mass, and will not leave the gizzard. In other cases the mortality was due to the birds eating grass-hay which was used as litter, and this had a similar effect in packing the gizzard.

Once trouble makes its appearance in a flock from this latter cause the only safe course it to withhold from the ration as far as possible any grass, lucerne, green oats, &c., which is not in a succulent form and finely chopped. Indeed, the birds will be given a better opportunity of freeing themselves from any fibrous matter that may be contained in the gizzard if the green material provided consists solely of silver-beet, cabbage, rape, or similar tender plants. Above all it should be seen that plenty of sharp gravel grit is within reach of the birds at all times. Remember that fowls have no teeth, and require this grit to assist digestion.

BROODY HENS.

With the present high cost of foodstuffs as compared with the low market value of fresh eggs the poultry-keeper cannot afford to have any drain on his profits through weak or indifferent management. For example, there is nothing to be gained but much to be lost by allowing broody hens to sit on the nest for days on end. This not only means a loss in eggs, but the development of vermin is encouraged. It is a mistake to conclude that by allowing the hens to take a rest now they will make up for any loss in eggs during the dearer-egg season. If a bird is properly fed and maintained in good condition she needs no rest for the comparatively short laying-life demanded of her in these days of forced egg-production. Especially is it poor economy to now allow to rest hens which are intended to be disposed of at the end of the present laying season. As soon as a bird is found on the nest by night showing signs of a desire to sit she should be removed to a broody-coop. Do not make the common mistake, however, of starving broody hens or ill-treating them in any way as a short-cut to breaking the desire to sit. They should be given all the food they will eat, and encouraged by careful management to resume laying in the shortest time possible.

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

THE APIARY.

ARTIFICIAL INCREASE.

MANY methods are in vogue relative to what is commonly termed "increase." The word "increase" in this case means adding to the number of colonies. Strong stocks are built up by early feeding, and then are divided, the portion containing the old queen being removed to a new location. As nearly as possible an equal part of brood and stores is given to each, and the remaining space is filled with frames of foundation. Early queens must be reared and introduced to the half that is queenless, or, failing this, a ripe cell should be inserted. For rapid increase this method is perhaps the best known in bee-culture, and is highly recommended. Always remember a good spring is necessary to ensure the young queens mating in time. If a large number of colonies are required those already divided may be further fed with sugar syrup or sealed stores, until

sufficient strength has been gained for a second division. Just here judgment is required as to whether some stocks are too weak for a second division, for only the very strong should be so broken down.

QUEEN-REARING.

During the summer months every attention should be paid to raising a stock of young queens to replace old and failing ones. Buying new queens each successive season is too expensive, and with a little attention and care good queens can be raised by the beekeeper in his own yard. An apiary should be requeened each year, and queens should not be tolerated for more than two seasons at the most. In the long-run it is the queens that tell in the production of big crops, and unless the beekeeper takes the trouble to requeen in the summer only a small percentage of the stocks will yield a surplus. Perhaps no branch of apiculture receives less attention than the production of young queens; and yet if the beekeepers who get the big crops of honey are asked what counts most in their production the reply is invariably "young queens." In New Zealand it has been proved over and over again that the best period for raising queens is from November to February. During these months everything is favourable for the operation, as the hives are at their highest state of prosperity, and under normal conditions the workers and drones are at their best.

It is best to breed only from pure Italian queens whose correct mating has been assured. Novices can judge the mating by noting the uniformity of the hatching brood as regards colour. Should the young worker bees show diversity of colour—some being yellow-banded and others quite black—the mating has not been correct. The question of mating is always a difficult one, as queens mate on the wing, and therefore it is impossible for the apiarist to select the sires. But as purebred queens, even though mismated, throw pure drones, it only takes a comparatively short time to eliminate crossbred drones from an apiary. There is, however, still the chance of contamination from other drones in the neighbourhood.

To sum up the matter: By persistently breeding from the best it is possible to achieve wonderful results, while under careless management, or, as is often the case, no management at all, bees are sure to deteriorate.

Methods of queen-rearing are legion, but may be roughly divided into two classes—namely, those which use the naturally built queen-cells, and those which necessitate the provision of artificial queen-cups into which young larvæ are transferred. The former method is most suitable for beginners, or for use early in the season, as it minimizes the risk of chill to young larvæ; while the second method is used largely by beekeepers who want to rear queens in greater numbers.

The Alley System.—A simple, efficient, and easy method for raising queen-cells may be found in the Alley plan. It must be understood, however, that when raising queen-cells they require to be large and well-shaped, and that any cells not up to size should be cut out. Procure a frame of young larvæ from the breeding-hive, and with a sharp knife proceed to cut every second row of cells down to the midrib of the foundation. Next kill two out of

every three larvæ, and cut the comb into strips about 1 in. wide the full length of the frame. These strips are fastened with melted wax to cell-bars that hang about midway in a standard frame. The cells are pared down to about ⅜ in. in height, which gives the bees room to construct a solid base for the queen-cell. The frame or frames containing these bars, with the strips attached, may now be put into the hive previously prepared for their reception.

The Miller Method.—The Miller method of raising queen-cells will be especially useful to the novice or to the beekeeper wishing a few cells at one time. It is simple, easy, and under normal conditions never fails. No extra appliances are needed as described in the systems previously mentioned. Perhaps no better outline of the Miller system can be given than the original one which appeared in the *American Bee Journal* for August, 1912, as follows: "Into an empty brood-frame, at a distance of 2 in. to 3 in. from each end, fasten a starter of foundation about 2 in. wide at the top, and coming down to a point within an inch or two of the bottom bar. Put in the hive containing your best queen. To avoid having it filled with drone-comb, take out of the hive, either for a few days or permanently, all but two frames of brood, and put your empty frame between these two. In a week or so you will find this frame half-filled with beautiful virgin comb, such as bees delight to use for queen-cells. It will contain young brood with an outer margin of eggs. Trim away with a sharp knife all the outer margin of comb containing eggs, perhaps a few eggs next to the youngest brood. This you will see is very simple. Any beekeeper can do it the first time of trying, and it is all that is necessary to take the place of preparing artificial cells. Now put this 'queen-cell stuff,' if I may so call the prepared frame, into the middle of a very strong colony from which the queen has been removed. The bees will do the rest, and you will have as good cells as you can possibly have with any kind of artificial cells. You may think that the bees will start 'wild cells' on their own comb. They won't. At least, they never do to amount to anything, and, of course, you needn't use those. The soft, new comb, with abundant room at the edge for cells, is so much more to their taste that it has a practical monopoly of all cells started. In about ten days the sealed cells are ready to be cut out and used wherever desired."

NUCLEUS HIVES.

In order to facilitate the work of queen-rearing a few nucleus colonies should be run in conjunction with every apiary. In these small colonies queens can be raised and cared for until they are mated and laying. It is an easy matter, once the queens are laying, to transfer them to the larger hives in the apiary.

The best style of nucleus hive to adopt is the four-frame one. This size will give the young queen a chance to lay once she is mated, and will, besides, hold sufficient bees to care for relays of queen-cells throughout the season. To form a nucleus colony take one frame of well-capped brood with adhering bees, and one frame containing honey and pollen, the remaining space being filled with an empty comb and feeder. If the number of bees on the comb is not sufficient to form a good cluster, one or two frames of young bees may be shaken into the nucleus, this being done to replace the field-bees which return to the

old hive. Place the frame of brood in the middle of the hive and close the entrance until the following day, when the bees may be released. In the course of a day or two the small colony will settle down, and will then be ready to receive the first queen-cell.

Nuclei thus formed should be placed in a shady position until the bees are released. It is a good plan to set them a fair distance apart from each other and away from the main part of the apiary.

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

HORTICULTURE.

SMALL-FRUITS.

GROWERS of berry fruits will now be busy harvesting their crops. The gooseberry and strawberry picking will be well under way, and the current and raspberry harvest about to commence. These facts might well be given more publicity by growers' associations. Very few people are aware of the brief period during which these popular berries are available. Were the people acquainted with the facts and a fresh supply made readily available, the consumption would increase greatly. To enable the berries to be supplied in the best condition picking must commence early in the day and the fruit be consigned that afternoon. A reasonably even sample should be maintained, both as to maturity and size.

Cape gooseberries and passion-vines should receive regular cultivation at a moderate depth only, in order to maintain a soil mulch, destroy weeds, and encourage growth.

TOMATOES UNDER GLASS.

Tomato-plants growing under glass will now be ripening their lower bunches. The leaves may be trimmed from below the ripening bunch. Make applications of liquid manure at frequent intervals, and now the houses are well filled with plant-growth see that ample ventilation is given in fine weather. The outside crop will now be well established. Suckering and tying should be done as soon as necessary and in fine weather shallow cultivation given between the rows.

VEGETABLE-GROWING.

In the vegetable section the harvesting of the early crops of potatoes, peas, cabbages, and salads will be taking place. A handy second growth may often be taken from this cabbage crop with a little management. When the growth is well established give the land a dressing of nitrate of soda. As the ground becomes available prepare it for winter crops of celery, leeks, broccoli, brussels sprouts, and savoy cabbage, and autumn crops of peas and beans.

Those cabbage-plants now in seed-beds are often troubled with insect pests during dry weather. This trouble is best combated by sturdy growth and ample watering. In difficult cases apply a spray consisting of two teaspoonsful of Black Leaf 40, 2 oz. arsenate-of-lead paste, and 4 gallons rain-water. Dilute the ingredients in a small quantity of water, and dissolve well before pouring them into the bulk.

Mix well, and apply the spray in dull weather when the plants are dry, covering well the under-side of the foliage, where most insects feed.

Celery is a waterside plant delighting in a rich soil. For this reason it is usually grown in trenches of rich soil, where it may be readily given abundant irrigation. Trenches for this purpose should now be prepared; usually they are made about 2 ft. wide to accommodate a double row of plants. Open the trench out 18 in. or so in depth, place a good layer of well-decayed manure in the bottom, mixing it well with about an equal quantity of soil, and topping off with 3 in. or 4 in. of soil alone. This should then form a shallow trench of the stated width. Water the plants well before setting them out. Lift them with plenty of soil, disturbing the roots as little as possible, and put out plants of an even grade. After planting, water the trench, and do not let it dry out while the crop is growing.

The useful, mild, and hardy leek is in general esteem during winter. It should be planted out now, as soon as the plants are ready, into a good rich soil. It is customary to drop the plants into holes made 5 in. or 6 in. deep with a dibber, the tops of the leaves just showing above the top. Afterwards fill the holes with water, which will wash down sufficient soil to establish the plants.

TOBACCO.

In the tobacco-fields, as soon as the ground crusts or shows a growth of seedling weeds, put the horse-hoes through the crop on a fine day, working the land to only a shallow depth. This treatment should maintain the necessary sturdy growth that is required. When the majority of the plants show flower-buds at the terminal the crop should be topped—that is, the terminal bud removed by pinching it out. This act maintains that growth and vigour in the leaves which would otherwise be absorbed by the blossoms.

Preparations for the harvest and curing the crop should now be made. A supply of 4 ft. curing-sticks will be needed, and materials for rafters on which to hang them. Arrangements should be made to clear right out the sheds that are to be used, so that the most may be made of the usually limited space available. The ample but controlled ventilation required to properly carry out this operation is usually satisfactory as far as the lower portion of the building is concerned, but the upper portion under the roof is often far too close. To enable a free draught to be obtained there when necessary, ample ventilation should be put in the roof or gable-ends.

—W. C. Hyde, Horticulturist, Wellington.

Survey of Weed Flora.—The last annual report of the Fields Division states that it is intended to make a survey of the weed flora of the seed-producing areas in New Zealand in relation to the occurrence of the weed-seeds in seed-samples, both undressed and machine-dressed. Work has been commenced on white clover, and arrangements have been made for the collection of samples of white clover from the principal seed-producing areas throughout New Zealand. Surveys of this type are in progress in many other countries, and prove of value in accurately ascertaining the place of origin of lines of seed.

TESTING OF PUREBRED DAIRY COWS.

C.O.R. LIST FOR JULY TO OCTOBER.

Dairy Division.

THE appended list, comprising particulars of 155 records, includes a number of very good performances. It will be noted that almost every class is headed by an outstanding yield, while some of the classes contain several records considerably above the average.

In the Jersey section the performance of Mr. J. J. Goodwin's three-year-old Rexcourt Lady Magnet attracts attention. Her yield of 880·19 lb. butterfat places her high among the leading producers of this class for the breed; in fact, the record is only some 25 lb. below that of Mr. P. J. Petersen's Ivondale Golden Lass, the present leader of the Jersey three-year-old.

NEW FRIESIAN SENIOR TWO-YEAR-OLD CLASS-LEADER.

The special feature of the current list is the record of Mr. T. Sheriff's Pareora Echo Blossom. Her C.O.R. for 819·81 lb. butterfat entitles her to the leadership of the senior two-year-old Friesians, a position which Mr. John Donald's well-known Netherland Princess IV has held since the 1913–14 season, the second year of certificate-of-record testing in New Zealand.

Pareora Echo Blossom was bred by Mr. A. S. Elworthy, of Holme Station, Timaru, one of our oldest C.O.R. testing breeders, and gained her certificate in the ownership of Mr. T. Sheriff, Clandeboye. The greater proportion of the pedigree of Pareora Echo Blossom is comprised of imported stock. Her sire is Rosevale Echo Burkeyje, and her dam Pareora Cherry Blossom, who gained a C.O.R. for 491 lb. butterfat at the age of 2 years 324 days. The paternal grandsire of Pareora Echo Blossom is Echo Sylvia Sir Griselda (imp.), who has to his credit ten C.O.R. daughters, eight with first-class and two with second-class certificates. The paternal grandam of Pareora Echo Blossom is North and Sons' Rosevale Burkeyje Sylvia, one of the many fine cows bred by these well-known breeders. Rosevale Burkeyje Sylvia has gained seven certificates of record, two on productions over 700 lb. butterfat, three on productions over 600 lb., and the remaining two on productions over 500 lb. This cow is a daughter of Burkeyje Sylvia Posch, and therefore a grandaughter of Inka Sylvia Beets Posch one of the outstanding sires of the breed. The maternal grandsire of Pareora Echo Blossom is Marquis Segis Colantha, sire of nine first-class and two second-class C.O.R. daughters, many good records being represented. The maternal grandam, Pareora Glommen, has a C.O.R. for 376·97 lb. butterfat on a record commenced at 2 years 318 days. Marquis Segis Colantha was sired by King Segis Wild Rose Homestead, and Pareora Glommen by Cliffside Butter Laddie, who in turn is by Cliffside Laddie.

Pareora Echo Blossom is thus a concentration of many well known and proven strains, and represents a combination of Canadian, American, and Dutch blood lines. She is still a young cow, and should be capable of still further outstanding performance.

LIST OF RECORDS: JULY TO OCTOBER, 1928.

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

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS.						
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Rydal Gipsy ..	T. M. Remington, Westmere	1 343	240·5	365	8,979·5	610·60
Oaklands Belle ..	F. Parsons, Whenuakura ..	2 23	242·8	365	7,709·3	533·34
Middlewood Gold Leaf	Kilgour Sisters, Kiwitea ..	1 337	240·5	365	8,707·9	525·49
Earlston Iris ..	Chisholm Bros., Hunterville	1 344	240·5	365	8,781·2	522·51
Middlewood Clematis	Kilgour Sisters, Kiwitea ..	1 296	240·5	365	8,949·0	518·04
Gowanlea Trinket ..	John Robb, Westmere ..	1 331	240·5	365	9,731·1	502·04
Greendale Waihine ..	Mrs. G. M. Harris, Hikutaia	1 338	240·5	314	7,665·5	501·41
Hurden Lady Flora ..	H. Allen, Kihikihi ..	1 342	240·5	365	8,319·9	499·22
Earlston Charm ..	Chisholm Bros., Hunterville	1 346	240·5	365	7,790·1	493·66
Oaklands Lily ..	F. Parsons, Whenuakura ..	2 43	244·8	356	7,569·5	485·35
Awapuni Belle ..	W. Devine, Palmerston North	2 38	244·3	365	8,198·3	483·57
Noble's Maire ..	J. Hanaray, Woodville ..	2 19	242·4	365	8,851·2	457·66
Jersey Meadows Pennon	R. E. Robertstein, Rukuhia	2 52	245·7	361	7,859·9	451·34
Awapuni Lena ..	W. Devine, Palmerston North	1 353	240·5	365	7,338·1	448·64
Braithwaite Gold Dust	H. Allen, Kihikihi ..	1 303	240·5	365	8,119·2	447·56
Sunhill Topsy ..	J. G. Holmes, Te Awamutu	2 7	241·2	365	9,951·2	447·08
Flat Park Golden Mary	W. J. Hall and Son, Matatoki	1 314	240·5	365	8,087·9	438·56
Gowanbrae Lady Jean	R. E. Robertstein, Rukuhia	1 352	240·5	365	6,784·4	437·19
Ratavale Ideal ..	Mrs. I. W. Speirs, Levin ..	2 16	242·1	365	8,553·6	436·96
Otterburn Trinket ..	H. Allen, Kihikihi ..	2 29	243·4	363	6,945·0	430·16
Woodlands Mercedes Lass	L. Sampson, New Plymouth	1 288	240·5	365	6,806·4	429·21
Vernon Golden Eileen	G. R. and H. Hutchinson, Auckland	1 270	240·5	365	7,756·3	428·43
Glenview Melva ..	R. A. Paddon, Pukeatua ..	1 352	240·5	365	7,255·6	428·24
Ferns Marie ..	B. N. and W. A. Sandilands, Feilding	1 302	240·5	365	6,840·4	426·31
Ferns Freda ..	B. N. and W. A. Sandilands, Feilding	1 337	240·5	344	7,749·4	418·20
Princess Gay Girl ..	A. E. Sly, Whakaronga ..	1 360	240·5	348	6,935·3	403·74
Vernon Xenia's Star	G. R. and H. Hutchinson, Auckland	1 339	240·5	365	6,562·9	400·57
Falconite Daisy ..	E. W. Jacobs, Horotiu ..	2 26	243·1	336	6,617·5	397·26
Maggie's Madeline ..	D. Marra, Dargaville ..	1 335	240·5	362	6,535·9	383·56
Kelvin Melba ..	G. Buchanan, Paeroa ..	1 356	240·5	365	7,212·0	376·60
Wee Waa Princess ..	Mrs. G. M. Harris, Hikutaia	1 347	240·5	334	6,180·4	368·30
Poplarvale Bell Bird	G. R. and H. Hutchinson, Auckland	2 10	241·5	336	5,920·7	355·26
Kia Ora May ..	R. E. Clements, Dargaville	1 340	240·5	365	6,575·8	354·41
Tranby Corsica ..	H. Robson, Koromatua ..	1 319	240·5	310	6,685·2	351·12
Wareham Leonette ..	B. W. Seymour, Paterangi..	1 295	240·5	365	5,980·0	337·42
Rosebury Waione ..	H. Allen, Kihikihi ..	1 344	240·5	350	6,224·2	337·10
Golden Daylight of O.K.	G. R. and H. Hutchinson, Auckland	2 31	243·6	317	5,621·0	331·92
Brookley Model ..	E. W. Jacobs, Horotiu ..	1 314	240·5	326	5,983·8	331·10
Keepsake of Ivry ..	H. W. Le Bailly, Buckland	1 308	240·5	365	6,330·5	330·02
Ratavale Silver Bell..	Mrs. I. W. Speirs, Levin ..	2 35	244·0	352	6,359·8	329·74
Brentwood Fawn Bess	C. A. Willis, Pukekohe ..	2 31	243·6	350	5,550·9	324·03
Amelita	H. W. Le Bailly, Buckland	1 332	240·5	365	6,124·7	323·68
Titoki Foxie ..	H. Garlick, Makomako ..	2 33	243·8	333	7,132·7	321·59
Tyntesfield Snowflake	R. K. Garland, Okauia ..	1 344	240·5	355	5,302·4	320·78
Maxina of O.K. ..	Mrs. A. Jagger, Whitford ..	1 295	240·5	304	5,437·8	319·89
Bankton Nancy ..	F. P. King, Hautapu ..	1 358	240·5	343	5,549·3	316·67
Meadowvale Sweet Memory	W. Archer, Waikiwi ..	1 344	240·5	347	5,121·6	312·61

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		JERSEYS—*continued.*				
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Mission's Princess ..	Mrs. M. A. Wright, Hilton Downs	2 35	244·0	324	5,775·5	312·31
Heatherlea Neat Girl	D. A. Sinclair, Koputaroa ..	2 23	242·8	285	6,194·5	311·51
Jersey Meadows Dew-drop	R. A. Paddon, Pukeatua ..	2 8	241·3	316	5,663·4	300·86
Velebit Fox's Freda*	G. E. Yelchich, Waiuku ..	2 21	242·6	238	4,869·6	298·04
Jersey Farm Decoration	H. R. Benbow, Ormondville	1 280	240·5	251	5,400·2	284·23
Otterburn Marigold ..	R. K. Garland, Okauia ..	2 0	240·5	334	5,103·9	278·90
Ratavale Miranda ..	Mrs. I. W. Speirs, Levin ..	2 31	243·6	302	4,958·4	272·45
Alfalfa Serenade ..	R. A. Paddon, Pukeatua ..	1 323	240·5	282	5,011·2	258·18
Kelvin Patty ..	G. Buchanan, Paeroa ..	2 19	242·4	337	4,948·1	258·15
Tyntesfield Clarionette	R. K. Garland, Okauia ..	1 349	240·5	331	4,229·1	249·71
Brentwood Joyce ..	C. A. Willis, Pukekohe ..	1 352	240·5	289	3,765·3	248·35
Senior Two-year-old.						
Lisbury Zenith's Sultana	M. A. Jennings, Mauriceville	2 138	254·3	365	12,184·6	734·87
Palmdale Fleurette ..	D. Kennedy, Morven ..	2 210	261·5	365	9,900·3	592·21
Northland Merriment	E. W. Jacobs, Horotiu ..	2 113	251·8	365	11,011·0	536·17
Someview Belle ..	A. Clarke, Whareora ..	2,347	275·2	365	8,438·3	509·40
Lily of Stonycroft ..	S. Unwin, Winchester ..	2 300	270·5	365	9,018·8	468·85
Coniston Bilberry ..	R. Waterhouse, Ardmore ..	2 191	259·6	365	7,086·0	453·54
Orange Dale Rowers Peach	W. J. Hall and Son, Matatoki	2 315	272·0	324	7,034·8	448·23
Viola's Beatrice ..	R. E. Clements, Dargaville	2 269	267·4	365	8,489·2	439·78
Kitty of Bulls ..	Dr. F. J. Watson, Bulls ..	2 202	260·7	365	6,891·1	407·82
Llangollen Ladybird ..	J. T. Entwisle, Cambridge ..	2 243	264·8	365	6,483·0	389·11
Fairy Meadows Zealandia	F. S. Veale, Tamahere ..	2 239	264·4	358	7,225·9	364·22
Iron Lass	H. W. Le Bailly, Buckland ..	2 362	276·7	326	5,020·1	324·22
Tauwhare Lenora ..	Dr. C. G. Aickin, Auckland	2 321	272·6	365	5,670·4	310·43
Clifton Some Eileen ..	Mrs. A. Jagger, Whitford ..	2 103	250·8	264	4,865·2	286·21
Three-year-old.						
Rexcourt Lady Magnet	J. J. Goodwin, Morrinsville	3 342	311·2	365	15,065·7	880·19
Holly Oak Signorella	F. Phillips, Otorohanga ..	3 264	303·4	365	9,937·8	562·14
Rydal Blue Bell ..	T. M. Remington, Westmere	3 284	305·4	299	9,704·3	552·93
Elcho Faith ..	C. J. Masters, Hunterville ..	3 134	290·4	365	9,480·4	514·06
Linden Grove Bride	A. E. Sly, Whakaronga ..	3 359	312·9	365	9,359·5	510·29
Penrose Juliet ..	Clemow Bros., Stratford ..	3 293	306·3	332	8,929·7	507·93
Holly Oak Pansy ..	F. Phillips, Otorohanga ..	3 169	293·9	315	8,873·2	497·31
Silverleys Daisy ..	J. S. Jones, Bell Block ..	3 352	312·2	296	8,559·0	491·11
Neat Eileen ..	A. Clarke, Whareora ..	3 289	305·9	364	8,952·8	482·48
Mait's Lilac ..	F. P. King, Hautapu ..	3 19	278·9	337	9,160·1	477·87
Rosemont Melva ..	F. P. King, Hautapu ..	3 15	278·5	353	7,982·7	459·69
Ohape Eminent ..	H. W. Birch, Roxburgh ..	3 20	279·0	365	7,043·6	438·34
Meadowland Princess	B. W. Seymour, Paterangi	3 88	285·8	354	7·094·5	428·14
Ferndale May Star ..	J. J. Springgay, Gisborne ..	3 55	282·5	289	7,934·7	415·66
Baby Trix	J. Paul, Toatoa	3 239	300·9	277	7,955·4	397·63
Coniston Bluebell ..	R. Waterhouse, Ardmore ..	3 75	284·5	322	6,228·5	395·14
Ferndale Queen Beauty	J. J. Springgay, Gisborne ..	3 21	279·1	296	7,255·4	385·42
Penzance Dainty ..	F. P. King, Hautapu ..	3 14	278·4	365	6,246·5	374·69
Alfalfa Flower ..	Mrs. M. North, Ohaupo ..	3 44	281·4	282	7,596·3	359·45
Jersey Oak's Queen Bess	Mrs. I. W. Spiers, Levin ..	3 337	310·7	313	7,302·5	344·85
Clifton Some Rioter	Mrs. A. Jagger, Whitford ..	3 4	277·4	313	5,760·3	318·43
Rydal Jersey ..	W. C. Morgan, Marybank ..	3 26	279·6	250	4,384·7	289·35

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS—*continued.*						
Four-year-old.		Yrs. dys.	lb.		lb.	lb.
Otterburn Aster ..	A. C. Smith, Otorohanga ..	4 363	349·8	365	10,779·0	668·76
Ashleys Gem ..	W. T. Dazeley, Pukekohe ..	4 24	315·9	365	10,057·3	617·60
Ebors Susie ..	B. W. Seymour, Paterangi	4 4	313·9	351	9,496·1	505·97
Beaulah Pet ..	Mrs. A. Jagger, Whitford ..	4 314	344·9	309	7,644·1	462·29
Silverleys Teresa ..	J. S. Jones, Bell Rock ..	4 7	314·2	300	7,304·5	431·95
Kowhai Pearl ..	H. Garlick, Makomako ..	4 30	316·5	312	6,757·5	412·38
Holly Oak Pearl ..	A. V. Hornig, Manakau ..	4 288	342·3	285	8,657·9	378·75
Otterburn Silver Queen	A. C. Smith, Otorohanga ..	4 304	343·9	334	6,187·4	370·31
Holly Oak Queenie ..	L. A. McDonald, Levin ..	4 48	318·3	211	6,207·6	319·20
Mature.						
Jersey Park Fancy ..	D. Kennedy, Morven ..	7 11	350·0	361	12,137·6	728·48
Florrie's Hope ..	A. E. Sly, Whakaronga ..	8 284	350·0	365	12,909·1	639·50
Lively Prue ..	H. Lewis, Waharoa ..	5 342	350·0	346	10,773·3	632·42
Rioter's Gavotte's Pet	W. A. Guy, Matapu ..	7 6	350·0	360	8,417·5	574·10
Engdale's Grace ..	H. Allen, Kihikihi ..	8 346	350·0	365	10,465·8	573·78
Fair View Gift ..	E. Oakenfull, Tikokino ..	8 323	350·0	307	8,423·4	557·84
Brentwood's Snowdrop	C. A. Willis, Pukekohe ..	7 240	350·0	365	9,536·9	538·50
Mystery's Secret ..	R. J. Wilson, Putaruru ..	5 337	350·0	305	8,151·4	532·50
Mova's Una ..	R. K. Garland, Okauia ..	5 324	350·0	365	8,551·6	519·30
Ardmore Ada ..	W. T. Dazeley, Pukekohe ..	6 26	350·0	327	8,052·1	504·83
Clydesdale's Quicksilver	Mrs. I. W. Speirs, Levin ..	9 1	350·0	365	9,767·6	502·83
Hua Brook Dulcet ..	H. Salway, Bell Block ..	5 311	350·0	359	9,569·9	473·89
Clifton Rona ..	Mrs. A. Jagger, Whitford ..	5 58	350·0	311	9,005·1	459·69
Yellow Velvet ..	C. G. Wardell, Opaheke ..	9 332	350·0	294	8,072·2	444·69
Otterburn Dot ..	A. C. Smith, Otorohanga ..	5 338	350·0	326	7,777·7	431·93
Roslyn Sweet Love ..	Mrs. A. Jagger, Whitford ..	7 356	350·0	309	6,810·5	431·87
Rioter's Chase ..	Mrs. A. Jagger, Whitford ..	12 92	350·0	320	7,923·7	409·77
Raleigh's Success ..	A. E. Peppercorn, Cambridge	5 5	350·0	341	7,659·5	409·71
Silverleys Veronica ..	H. W. Birch, Roxburgh ..	6 3	350·0	345	5,875·6	396·89
Ribbonswood Primrose	E. Oakenfull, Tikokino ..	6 34	350·0	342	7,359·6	396·56
Waipiko Sprite ..	W. A. Guy, Matapu ..	10 355	350·0	331	7,958·9	372·47
Dainty's Surprise ..	D. and J. Gibson, Riverlea ..	5 314	350·0	288	7,960·4	359·27
Winter Beauty ..	E. Oakenfull, Tikokino ..	5 16	350·0	307	6,062·5	352·12
FRIESIANS.						
Junior Two-year-old.						
Fairmont No. 16* ..	Halligan Bros., Te Aroha ..	1 356	240·5	365	17,898·6	643·00
Totara Sylvia Lulu* ..	Piri Land Co., Auckland ..	2 69	247·4	365	13,874·7	570·16
Fairmont No. 19* ..	Halligan Bros., Te Aroha ..	1 329	240·5	365	13,829·3	485·12
Fairmont No. 37* ..	J. L. Udy, Waihou ..	1 280	240·5	333	11,789·9	479·09
Melrose Sylvia Colantha Keyes*	T. Sheriff, Clandboye ..	2 12	241·7	248	12,493·7	451·50
Na Riwi Van Domino†	H. W. Reeve, Waitoa ..	2 43	244·8	269	10,843·6	353·96
Senior Two-year-old.						
Pareora Echo Blossom*	T. Sheriff, Clandeboye ..	2 223	262·8	365	22,671·9	819·81
Pareora Burke Maid*	A. S. Elworthy, Timaru ..	2 268	267·3	365	16,446·0	563·60
Pareora Segis Lass Posch*	A. S. Elworthy, Timaru ..	2 307	271·2	365	13,844·0	551·83
Junior Three-year-old.						
Mahoe Netherland Astelia	R. A. Wilson, Bulls ..	3 8	277·8	340	10,301·2	393·49
Carlowrie Duchess Sylvia†	R. K. Macdonald, Edendale	3 37	280·7	227	9,739·1	349·94

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	FRIESIANS—*continued.*					
Senior Three-year-old.		Yrs. dys.	lb.		lb.	lb.
Bainfield Sylvia Princess 2nd*	Piri Land Co., Auckland ..	3 291	306·1	365	19,621·7	736·87
Livingstone Lady Wakalona*	W. J. Eames, Hunterville ..	3 191	296·1	365	18,302·3	734·60
Junior Four-year-old.						
Ivy Netherland Pieterje	Hodgson Estate, Tamahere	4 8	314·3	365	16,934·1	564·10
Senior Four-year-old.						
Waipipi Princess* ..	W. T. Gleeson, Waipipi ..	4 257	338·2	364	15,479·8	679·38
Mahoe Adiantum ..	R. A. Wilson, Bulls ..	4 358	349·3	350	14,827·7	515·92
Mature.						
Nepean Isolda Johanna Pietje*	T. H. Richards, Cardiff ..	5 358	350·0	365	23,001·3	828·16
Matamata 156* ..	Piri Land Co., Auckland ..	6 317	350·0	305	19,427·0	716·28
Springfield No. 17* ..	J. I. Royds, Christchurch ..	7 106	350·0	365	20,564·8	711·56
Waipipi Desert Gold*	W. T. Gleeson, Waipipi ..	9 267	350·0	365	15,142·5	689·22
Carlowrie Beauty† ..	R. K. Macdonald, Edendale	7 92	350·0	200	12,767·2	410·85
	MILKING SHORTHORNS.					
Mature.						
Hauruia Esther ..	A. L. Souter and Son, Waerenga	Mature	350·0	294	12,744·6	589·04
Pukerimu Lucy 4th ..	Estate of Hon. John Fisher, Pukerimu	8 24	350·0	282	10,229·9	380·46
	AYRSHIRES.					
Mature.						
Elim's Pæony ..	A. R. Claridge, Toko ..	7 259	350·0	365	12,603·6	528·29
Prudence of Braeside	A. R. Claridge, Toko ..	6 343	350·0	365	12,554·3	509·97
Elim's Marvel ..	A. R. Claridge, Toko ..	5 341	350·0	308	9,738·0	405·91

Second-class Certificates.

Jerseys.

Three-year-old.						
Holly Oak Excelsior ..	F. Phillips, Otorohanga ..	3 168	293·8	348	6,908·0	407·52
Mature.						
Holly Oak Sister Sue*	R. Weinberg, Nihoniho ..	5 273	350·0	365	13,388·8	810·30

Friesians.

Senior Two-year-old.						
Waipipi Daisy Gold*	W. T. Gleeson, Waipipi ..	2 223	262·8	365	12,528·7	492·58

Cider Manufacture.—The quantity of cider manufactured in the Dominion last season is estimated at 50,000 gallons, with an approximate value of £12,500.

EXPORT OF APPLES AND PEARS, 1929 SEASON.

I. CONDITIONS OF GOVERNMENT GUARANTEE.

CONDITIONS for the Government guarantee on shipments of apples and pears made from New Zealand during the 1929 export season are as follows:—

1. The guarantee shall be limited to approved varieties and classes of apples and pears packed in compliance with the requirements of "Extra Fancy," "Fancy," and "Good" grades.

2. The Government guarantees to the grower a gross market price of eleven shillings (11s.) per case for "Extra Fancy" and "Fancy" grades, and seven shillings (7s.) for "Good" grade on all cases of such apples and pears exported by him in accordance with the conditions set out herein. (With respect to South American markets the gross price shall be considered to be the c.i.f. price, plus 1s. 6d. per case selling-charges.)

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

4. Any grower who exports any portion of his fruit crop outside the guarantee shall be deemed to have forfeited his right to participate in the guarantee with respect to all fruit exported during the season by him or on his behalf, save that any grower, if he so desires, may ship the whole of his pears outside the guarantee without prejudice to his apple shipments under the guarantee, and *vice versa*.

5. All apples and pears to qualify for the guarantee must be passed by an Inspector of the Department, and must be packed in accordance with the Export Regulations, subject to the modifications and directions set out in the appended statement entitled "Export Regulations."

6. Payment of claims under the guarantee shall be calculated on the basis of the average gross price per case received by the claimant for the whole of the apples and pears approved under the guarantee and exported on his account during the season to all markets, and only the deficiency between the average gross price realized for such fruit and 11s. or 7s., as the case may be, shall be payable under the guarantee.

7. Where, however, apples or pears of more than one variety and supplied by more than one grower are exported by a joint packing company or group in its own name, the guarantee shall be calculated separately in respect of the whole of the fruit supplied for export by each grower, on the basis of the pool price received for each variety supplied by him; provided that the joint packing company or group shall have, not later than seven days after the fruit has been shipped from New Zealand, notified to the Director of the Horticulture Division full particulars of each grower's fruit included in each shipment.

8. The Government reserves to itself the right (*a*) to withhold the guarantee from any grower who, in the opinion of the Director of the Horticulture Division, is not satisfactorily grading out, and exporting separately, his "Extra Fancy" and "Fancy" grade fruit; (*b*) to withhold from any grower the guarantee with respect to any variety of "Fancy" grade or "Good" grade fruit in the event of the Director of the Horticulture Division being satisfied that such grower is not shipping a reasonable proportion of his higher grades of fruit of that variety; (*c*) to withhold the guarantee from any grower who sells, except for consumption within New Zealand, any portion of his fruit crop without the approval of the Director of the Horticulture Division; (*d*) to limit the quantity of fruit shipped to any particular port should freight rates or market conditions, &c., be deemed unsatisfactory; (*e*) to insist on fruit being precooled prior to shipment if deemed necessary; (*f*) to withhold the privileges of the guarantee from all fruit shipped in vessels the storage facilities of which are held by the Department to be unsatisfactory; (*g*) to withhold the privileges of the guarantee with respect to any market in connection with which the New Zealand Fruit-export Control Board is of the opinion that satisfactory f.o.b. or c.i.f. trade is or can be established; (*h*) to withhold the guarantee with respect to any fruit packed contrary to such instructions as may be issued by the Department of Agriculture, after discussion

with the accredited representative of the Fruit Control Board and the shipping agents of the fruitgrowers concerned, calling for a cessation of packing during any specified period, owing to the lack of shipping facilities or other causes; (*i*) to withhold the guarantee from any grower who resubmits fruit for export that has been previously rejected without having reconditioned such fruit as directed by an Inspector, or who resubmits such fruit other than as one complete line.

9. The Government reserves the right to re-examine and to withdraw any fruit from export in the event of such re-examination indicating that by reason of over-maturity or other cause inimical to the keeping-qualities of the fruit it would be inadvisable to allow such fruit to be exported. All fruit so withdrawn may be disposed of in New Zealand by the owner without reference to the guarantee, or by the Government on behalf of the owner. In the latter event the proceeds will be credited to the owner, and the transaction dealt with generally as though the fruit had been actually exported under the guarantee. But should such re-examination reveal the fact that any line of fruit, through careless or faulty packing, is decidedly below the standard required, it will be deemed not to be covered by the guarantee, and the owner of such fruit may, at the option of the Minister, be held to have forfeited all right to participate in the guarantee for the remainder of the season.

(NOTE.—No apples or pears carrying more than one-hundredth part of a grain of arsenic per pound shall be approved for export under the guarantee or otherwise.)

II. EXPORT REGULATIONS.

The regulations which follow shall apply to all apples and/or pears intended for export.

APPLE GRADES AND VARIETIES.

The standard grades shall be as under:—

"Extra Fancy," "Fancy," and "Good" grades: Apples of these grades shall be mature, sound, smooth, clean, well formed, hand-picked, true to name, and free from disease, visible bitter-pit, skin-puncture, or skin broken at stem, and other defects. Individual apples of either grade shall carry not less than the percentage of colour, and not more than the percentage of blemish and unnatural russet indicated in the appended general list with respect to each variety in the respective grades.

Hail blemish allowance to be set by the Inspector in accordance with the nature of the hail damage in the locality.

Healed-over moth stings, with respect to export fruit, shall be limited as follows: "Extra Fancy," one sting; "Fancy" and "Good" grades, two stings.

Table 1.

XF = Extra Fancy; F = Fancy; G = Good; HCC = High characteristic colour; GCC = Good characteristic colour; CC = Characteristic colour.

Varieties.	Sizes.			Colour.			Blemish.			Russet.		
	Max.	Min.	Min.									
	XF, F, G.	XF, F.	G.	XF. %	F. %	G. %	XF. %	F. %	G. %	XF. %	F. %	G. %
Solid Red.												
Hoover	100	234	252	65	30	10	3	3	5	5	10	20
McIntosh Red ..	113	234	252	65	30	10	3	3	5	5	10	20
Rokewood	113	234	252	65	30	10	3	3	5	5	10	20
Tasma	100	234	252	65	30	10	3	3	5	5	10	20
Partial Red.												
Brighton	113	234	252	40	15	5	3	3	5	5	10	20
Delicious	113	234	252	40	15	5	3	3	5	5	10	20
Dougherty	113	234	252	40	15	5	3	3	5	5	10	20
Edward Lippiatt ..	113	234	252	40	15	5	3	3	5	5	10	20
Frimley Beauty ..	113	234	252	40	15	5	3	3	5	5	10	20

Table 1—continued.

Varieties.	Sizes.			Colour.			Blemish.			Russet.		
	Max.	Min.	Min.									
Partial Red.—contd.	XF, F, G.	XF, F.	G.	XF. %	F. %	G. %	XF. %	F. %	G. %	XF. %	F %	G. %
Jonathan	113	234	252	40	15	5	3	3	5	5	10	20
King David ..	113	234	252	40	15	5	3	3	5	5	10	20
Salome	113	234	252	40	15	5	3	3	5	5	10	20
Scarlet Nonpareil ..	113	234	252	40	15	5	3	3	5	5	10	20
Scarlet Pearmain ..	113	234	252	40	15	5	3	3	5	5	10	20
Shepherd's Perfection	113	234	252	40	15	5	3	3	5	5	10	20
Shorland Queen ..	113	234	252	40	15	5	3	3	5	5	10	20
Spitzenberg	100	234	252	40	15	5	3	3	5	5	10	20
Stark	113	234	252	40	15	5	3	3	5	5	10	20
Worcester Pearmain ..	125	234	252	40	15	5	3	3	5	5	10	20
Yate's	113	234	252	40	15	5	3	3	5	5	10	20
Striped.												
Adam's Pearmain ..	113	234	252	25	10	*	3	3	5	5	10	20
Cox's Orange ..	125	252	252	20	5	*	3	3	5	5	15	50
Premier	100	234	234	25	10	*	3	3	5	5	10	20
Ribston Pippin ..	125	234	252	20	5	*	3	3	5	5	10	20
Rome Beauty ..	113	234	252	25	10	*	3	3	5	5	10	20
Senator	113	234	252	25	10	*	3	3	5	5	10	20
Simmond's Winter ..	113	234	252	25	10	*	3	3	5	5	10	20
Statesman	113	234	252	20	5	*	3	3	5	5	10	20
Stayman's Winesap ..	113	234	252	25	10	*	3	3	5	5	10	20
Yellow or Green.												
Alfriston	88	198	198	HCC	GCC	CC	3	3	5	2	10	15
Ballarat	88	198	198	HCC	GCC	CC	3	3	5	2	10	15
Boston Russet ..	100	234	252	HCC	GCC	CC	3	3	5	2	10	15
Brownlee's Russet ..	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
Cleopatra	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
Celo	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
Dunn's	96	216	234	HCC	GCC	CC	3	3	5	2	10	15
Golden Pippin ..	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
Granny Smith ..	96	234	252	HCC	GCC	CC	3	3	5	2	10	15
Gravenstein ..	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
London Pippin ..	100	216	234	HCC	GCC	CC	3	3	5	2	10	15
Lord Wolseley ..	100	198	216	HCC	GCC	CC	3	3	5	2	10	15
McMahon's White ..	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
Newtown Pippin ..	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
Parlin's Beauty ..	96	198	216	HCC	GCC	CC	3	3	5	2	10	15
Pioneer	113	234	252	HCC	GCC	CC	3	3	5	2	10	15
Stone Pippin ..	113	234	234	HCC	GCC	CC	3	3	5	2	10	15
Sturmer Pippin ..	100	234	252	HCC	GCC	CC	3	3	5	15	50	75
Willie Sharp ..	100	216	234	HCC	GCC	CC	3	3	5	2	10	15

* Colour showing.

APPROVED FOR EXPORT TO CONTINENT OF EUROPE.

Table 2.

Variety.	Max. Size.	Min. Size.	Variety.	Max. Size.	Min. Size.
Cleopatra	100	198	Sturmer	100	198
Dunn's	100	198	London Pippin ..	100	198
Jonathan	100	198			

APPROVED FOR EXPORT TO SOUTH AMERICA.

"Extra Fancy" grade apples only shall be approved for South American markets as follows:—

Table 3.

Variety.	Max. Size.	Min. Size.	Variety.	Max. Size.	Min. Size.
Solid Red Varieties.					
Rokewood	96	138	Tasma	72	138
Partial Red Varieties.					
Delicious	72	138	King David	96	138
Dougherty	80	138	Salome	88	138
Frimley Beauty ..	72	138	Scarlet Nonpareil ..	88	138
Jonathan	96	138			
Striped Varieties.					
Premier	80	138	Statesman	96	138
Rome Beauty	72	138	Stayman's Winesap ..	80	138

REGISTERED EXPORT NUMBER.

The registered number issued to all growers under the Local-market Regulations will be declared to be the grower's registered export number also. The registered number of each grower must be branded on each case of fruit exported by him, provided that in the event of any group of growers pooling their fruit for export such group may designate its fruit by using any pool number allotted by the New Zealand Fruit-export Control Board. Likewise any packing organization to which a registered number has been allotted may use such registered number only provided that in either instance each individual grower's fruit is shown separately on the advice-note for examination, and stacked in separate lots, so that the Inspector may have no difficulty in identifying the particular lot under examination.

Should unavoidable circumstances prevent the adoption of this procedure resulting in a line comprising a large number of cases being submitted as one line, it must be definitely understood that the examination of same will be solely at the grower's risk, and in the event of any fruit forming a portion of the line being found to be unsatisfactory the whole line will be liable to rejection.

PACKING.

Plain or corrugated strawboard or wood-wool shall be used on top and bottom of cases.

WRAPPING PAPER.

Apples of the various sizes as set out below shall be wrapped in paper of the size indicated opposite each respectively:—

Sizes 64's to 80's (both inclusive), paper 11 in. by 11 in.
Sizes 88's to 113's (both inclusive), paper 10 in. by 10 in.
Sizes 125's to 198's (both inclusive), paper 9 in. by 9 in.
Sizes 216's to 234's (both inclusive), paper 8 in. by 8 in.

In the event of the size of the paper used being smaller than that specified above for any respective size of apples, such apples shall be double-wrapped by overlapping two papers.

SPECIFICATIONS OF APPLE EXPORT CASE.

Inside measurements: 10½ in. by 11½ in. by 18 in.

Ends: 10½ in. by 11½ in. by ¾ in.—two pieces (each planed on the outer side).

Sides: 10½ in. by 19½ in. by $\frac{5}{16}$ in.—two pieces (one board for each side).

Tops and bottoms: 5½ in. by 19½ in. by $\frac{3}{16}$ in.—four pieces (two each for top and bottom).

Cleats: 11½ in. by ¾ in. by 5/16 in.—four pieces (one across each end both top and bottom).

Cases made of two-piece sides and two-piece ends will be accepted provided the side boards are of equal width, and are cut or planed to an equal thickness, and that the grain of the end boards is across the end corresponding with the greatest measurement, and that the two pieces are properly secured by means of corrugated fasteners, one close to each edge on the one side, and one midway between on the reverse side.

Local timber recommended for the construction of export cases is white-pine of good quality; but *Pinus insignis*, rimu, and beech timber, if well and evenly cut and used with flexible tops and bottoms not exceeding 3/16 in. will be accepted.

Nailing: Nails used to be not less than 1½ in. long, 14 gauge. Nails to be spaced not more than 3 in. to 3½ in. apart, and the outer nails of each board to be not more than 1 in. from the edge of board.

Strapping: All cases to be strapped with a wire or steel band, such strapping to be tightly applied, and to be not more than 1 in. from end of case.

LABELLING AND MARKING.

Each end of each case of fruit intended for export must bear a label of one or other of the designs adopted by the New Zealand Fruit-export Control Board for the purpose of designating "Extra Fancy," "Fancy," and "Good" grades.

The marking of cases shall be in accordance with the previous season's requirements.

APPLES PACKED IN TRAYS.

Apples may be packed in trays in a manner similar to that prescribed for the packing of pears, provided that apples ranging in size from 100 to 163 per case of "Extra Fancy" grade only shall be so packed.

PEARS.

The following varieties of pears are approved for export to Europe:—

Table 4.

Variety.	Max. Size.	Min. Size.	Variety.	Max. Size.	Min. Size.
	In.	In.		In.	In.
Elizabeth Cole ..	2¾	2¼	P. Barry	2¾	2¼
Glou Morceau ..	2¾	2¼	Packman's Triumph ..	2¾	2¼
Josephine de Malines ..	2¾	2¼	Winter Cole	2¾	2¼
Keiffer	2¾	2¼	Winter Nelis	2¾	2¼
L'Inconnue	2¾	2¼	Vicar of Winkfield ..	2¾	2¼

PEAR PACKAGES.

Pears for export shall be packed in half-cases or trays of the following dimensions:—

Half Case.

Inside measurement, 11½ in. by 4½ in. by 18 in.
Two half-cases to be wired together, forming one package.

Specifications of Half Case.

Ends, 11½ in. by 4½ in. by ¾ in.—two pieces.
Sides, 19½ in. by 4½ in. by 5/16 in.—two pieces.
Tops and bottoms, 19½ in. by 5½ in. by 3/16 in.—four pieces.
Cleats, 11½ in. by ¾ in. by 5/16 in.—eight pieces.

Trays.

Inside measurement of 11½ in. by 18 in., with depth from 2¾ in. to 3 in. Each tray to be complete with lid and label. Three trays to be securely

wired together, forming one package. Binding-wires to be placed within 1 in. of each end of the package.

It is essential to the safe carriage of pears that the tray in all cases should be at least $\frac{1}{4}$ in. to $\frac{1}{2}$ in. deeper than the greatest width of the fruit. Abundance of soft wood-wool should be used above and below the fruit. A cleat may be placed under the lid at each end when it is found necessary to increase the depth of a pear-tray.

Specifications of Trays in Sets of Three.

Ends: $11\frac{1}{2}$ in. by 3 in. (or $2\frac{3}{4}$ in.) by $\frac{3}{4}$ in.—six pieces.
Sides: $19\frac{1}{2}$ in. by $2\frac{3}{4}$ in. by $\frac{5}{16}$ in.—six pieces.
Tops and bottoms: $19\frac{1}{2}$ in. by $5\frac{1}{2}$ in. by $\frac{5}{16}$ in.—four pieces.
Tops and bottoms: $19\frac{1}{2}$ in. by $5\frac{1}{2}$ in. by $\frac{3}{16}$ in.—eight pieces (if desired, may be $\frac{5}{16}$ in., instead of $\frac{3}{16}$ in.).
Cleats: $11\frac{1}{2}$ in. by $\frac{3}{4}$ in. by $\frac{5}{16}$ in.—four pieces.

In the construction of trays on the basis of sets of three to the package the following is recommended: Bottom of bottom tray and top of top tray to be of two pieces, each $5\frac{1}{2}$ in. by $\frac{5}{16}$ in. Tops and bottoms in all other instances to be of two pieces, each $5\frac{1}{2}$ in. by $\frac{3}{16}$ in. Middle tray to have cleats across each end both top and bottom, thus requiring four cleats $\frac{3}{4}$ in. by $\frac{5}{16}$ in. by $11\frac{1}{2}$ in. Constructed in this way any bulge that takes place is inward, owing to the timber being lighter than the outer tops and bottoms. At the same time any such bulge is protected by the cleats, which also keep the trays apart, thus allowing for free ventilation.

N.B.—No pear of a smaller size than 33 to the tray shall be packed in trays.

LABELLING PEAR-TRAYS.

The same type of label will be used as was used last season (1928), but one end only of each tray will be required to bear a label, the other end to have the shipping number stencilled thereon.

After being packed and labelled, three trays will be wired together as one package of three trays, the centre tray to be turned the reverse end to the other two, thereby ensuring that the shipping number and other details will be shown on both ends of the package.

After the set of three trays has been wired the wire should be prized forward and stapled to the end board of the middle tray on both sides of each end of the package to prevent the trays from becoming displaced.

MINIMUM CONSIGNMENT.

Twenty cases of any one variety of either apples or pears shall be the minimum consignment accepted for export.

AGRICULTURAL SHOWS, SEASON 1928-29.

THE following show-dates have been notified by agricultural and pastoral associations:—

Wyndham A. and P. Society: Wyndham, 7th December.
Feilding A. and P. Association: Feilding, 5th and 6th February.
Tauranga A. and P. Association: Tauranga, 5th and 6th February.
Dannevirke A. and P. Association: Dannevirke, 12th and 13th February.
Te Puke, A. and P. Association: Te Puke, 13th February.
Masterton A. and P. Association: Solway, 19th and 20th February.
Whakatane A. and P. Association: Whakatane, 20th February.
Opotiki A. and P. Association: Opotiki, 23rd February.
Te Awamutu A., P., and H. Association: Te Awamutu, 20th February.
Taranaki Metropolitan Agricultural Society: New Plymouth, 6th and 7th March.
Morrinsville A. and P. Society: Morrinsville, 13th March.
Mayfield A. and P. Association: Mayfield, 23rd March.
Methven A. and P. Association: Methven, 27th March.
Flaxbourne A. and P. Association: Ward, 18th April.

ANSWERS TO INQUIRIES.

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

DEATH OF LAMBS FROM SUSPECTED DOCKING INFECTION.

C. S. S., Ruataniwha :—

I have lost several lambs this season from a complaint which attacks the largest lambs. They become paralysed in the hind legs, and at times throw back their heads and become quite stiff. The lamb will drink if held up under the ewe, and the bowels seem to be functioning all right. The ewes have been on young grass and oats, with occasional changes on to old pasture. There have been no recoveries from these attacks. The lamb dies about the third or fourth day. Any advice as to treatment will be much appreciated.

The Live-stock Division :—

The description of the symptoms shown by your lambs is suggestive of infection occurring at docking. Such cases are very often of tetanic nature without actual locking of the jaws. Another cause giving rise to rather similar symptoms is the formation of an abscess in the spine, which can be very often located on post-mortem. Both those conditions are the result of infection through docking-wounds. Treatment is usually of no avail, and prevention must be aimed at by observing strict cleanliness in everything connected with marking. A clean site should be chosen for the operation; the use of an antiseptic is very advisable; and strict attention should be paid to cleanliness of knives, &c.

OCCURRENCE OF WING-THISTLE.

"SUBSCRIBER," Featherston :—

Can you tell me the best way of dealing with wing-thistle? It is getting thicker every year in this part of the country. Is it likely to get serious, or will it die out in time? The seed has been blown from the rough hills at the back of my place.

The Fields Division :—

If in small quantities wing-thistle can be controlled by chipping, but there are no economic means of controlling large areas. When the thistle becomes thickly distributed on a farm it is a nuisance for a year or two, after which it gets very much thinner and ceases to do any harm. On large areas in the South Island wing-thistle provides a great deal of sheep-feed. It is not likely to cause you any serious trouble.

DEHORNING OF YOUNG CATTLE.

"DEHORNER," Nelson :—

Kindly advise me on the following points: (1) Where circumstances make it impossible to prevent the growth of horns in calves, at what age should young cattle be dehorned? (2) At what distance from the head should the horn be severed? (3) Which is the best season of the year for the operation?

The Live-stock Division :—

(1) Where the caustic method is not adopted on calves, it is preferable not to dehorn until two years old, as after that age there is less probability of horn-growth occurring. (2) The horn should be sawn off close to the head, taking a ring of hair about $\frac{1}{4}$ in. wide with the horn. This is preferable to leaving $\frac{1}{2}$ in. of horn, which frequently results in growth continuing and a malformed stub. (3) Dehorning should be performed in cool weather when flies are not plentiful.

ENSILAGE FOR CALVES.

"SUBSCRIBER," Fordell :—

Please inform me if weaner calves will thrive if fed on ensilage through the winter. Will they feed on it readily, and is there any danger of giving them too much at a time ?

The Live-stock Division :—

There should be no danger in feeding ensilage, provided it is fed with care and the calves gradually brought on to it. Precaution should be taken to see that the ensilage is not spoiled, or mouldy, and only as much should be given as will be cleaned up at each feeding. As ensilage is a succulent food the calves will eat it readily, but it is advisable that some hay be fed in conjunction.

CLUB-ROOT AND FERTILIZERS.

O.W.G., Marton :—

I am putting about 14 acres into turnips in land subject to club-root. I am told ½ cwt. of nitrate of soda to the acre will counteract this tendency. Please let me know if this is so, or advise me what manure would be effective.

The Fields Division :—

The use of nitrate of soda will not in any way counteract the tendency to club-root ; at present there is no known fertilizer which will prevent this disease. In your case the best fertilizer to use with the crop would be one-third super and two-thirds Ephos or Nauru phosphate ; basic super ; or half super half basic slag. The last-mentioned mixture is probably the best, but it must be mixed immediately before being put into the drill, and sown at once. If allowed to stand any time it gets hot and will not run through the drill.

TREATMENT OF BLOWN COWS.

"ANXIOUS," Havelock North :—

I have had a number of cows blown lately, and lost a valuable one yesterday through it eating burr-clover, which appears to be throughout the paddocks just now. Will you kindly advise what to do for the animals when blown, and in the event of having to stab them what sized knife should be used ?

The Live-stock Division :—

In the prevention of "bloating" of cows the following points should be remembered : (1) Do not turn cows in the morning on pasture containing much clover, until the dew is off the grass. (2) The feeding of some hay previous to turning cows on the pasture has a marked preventive effect. (3) Keep a close watch on the cows when first turned on pasture liable to cause bloating, as the condition is rapidly developed. (4) It is a good plan to allow cows on such pasture only for a very short period to begin with, extending the time daily. In this way they become gradually accustomed to the feed. Regarding treatment when blown, a useful drench consists of two to three tablespoonfuls of turpentine in a pint of raw linseed-oil. In extreme cases tapping of the paunch is necessary to save the animal's life. The puncture is made on the left side, at the point of greatest distension, between the last rib and the haunch-bone. The instrument for this purpose is known as a trocar and cannula, but if this is not available a long narrow-bladed knife can be used. After inserting the knife it should be turned in the wound to allow the gas to escape.

Paralysis in Pigs.—In recent experiments at the Wallaceville Veterinary Laboratory pigs suffering from paralysis made a good recovery when given a moderate quantity of cod-liver oil in their food.

WEATHER RECORDS: OCTOBER, 1928.

Dominion Meteorological Office.

GENERAL NOTES.

OCTOBER was characterized by rains in excess of the average in all parts of the Dominion, and in most districts the excess was considerable. The heavy falls, towards the end of the month especially, were of great value to the east coast districts, where a dry spell had previously been experienced. In parts of the South Island the absence of sunshine, following on the cold and dry conditions in September, prevented any rapid growth of vegetation, but in most districts feed is abundant and in excellent condition.

Although the rainfall was, on the average, above normal in all districts, there were isolated stations on both east and west coasts where slight deficiencies were reported. The greatest excesses occurred in the high country of the South Island and in Central Otago, where some stations had more than double the average. Hanmer Springs recorded 11·58 in. compared with an average of 3·31 in. Of the North Island provinces, Wellington had the greatest excess, while among individual stations Tauranga was outstanding with double its average fall.

Temperatures on the whole were mild, and the few cold spells of too short a duration to have a serious effect on vegetation. A few inland frosts occurred about the middle of the month, one on the 15th doing some damage to early-sown crops.

For the greater part of the month unsettled and frequently stormy weather prevailed. Depressions were numerous, and mainly of the westerly type. During the first ten days the westerly weather was particularly strongly developed, and gales from between north and west were of almost daily occurrence. The most violent were on the 5th, 6th, and 8th, and on the first two days much damage was done to buildings, fences, and trees in South Canterbury, the wind on the evening of the 6th being considered the severest experienced for many years in that district. Heavy rains fell on the ranges of the South Island. High levels were reached by the southern lakes, especially Lake Wakatipu, while many of the rivers were in flood. An unusual number of thunderstorms was reported. In the east coast districts warm and dry conditions predominated during this period.

A most interesting phenomenon associated with the strong winds between the 6th and 8th was that they transported enormous quantities of dust from Australia. Deposits of varying thickness were reported from almost all districts south from New Plymouth and Napier. In Otago and Southland the deposition occurred mainly on the 6th, and was particularly heavy. Snow on the mountains was tinted to a pale chocolate colour. The time of arrival of the dust-clouds became later and later as the distance from the southern extremity increased. Dust transported from Australia has been noted previously in New Zealand, but on this occasion the phenomenon was on a far greater scale, and a special investigation of it is being undertaken.

First northerly and then southerly gales were associated with an intense depression which crossed the Dominion on the 13th. Hail fell in places, and the ranges of the South Island received falls of snow.

From the 21st to the 26th and during the last three days of the month the weather was controlled by intense cyclonic disturbances. Except on the 28th, conditions were extremely unsettled, with general rains. South to south-east gales and very cold weather occurred at many places on the 30th and 31st. Heavy rains fell in the east coast districts, and there was some flooding in the North Island and in North Canterbury and Marlborough. In the Manawatu and Wairarapa districts the floods assumed serious proportions, and much of the low-lying country was under water. The cold temperatures were responsible for some losses of shorn sheep.

—Edward Kidson, Director of Meteorological Services.

RAINFALL FOR OCTOBER, 1928, AT REPRESENTATIVE STATIONS.

No.	Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
	North Island.				
		Inches.		Inches.	Inches.
1	Kaitaia	4·90	16	0·66	4·48
2	Russell	4·08	13	0·77	4·64
3	Whangarei	6·91	16	2·17	4·96
4	Auckland	5·24	23	0·97	3·64
5	Hamilton	5·56	15	2·05	4·79
6	Kawhia	6·37	16	1·72	5·48
7	New Plymouth	5·97	21	0·98	5·61
8	Riversdale, Inglewood ..	10·78	23	1·74	10·37
9	Whangamomona	8·68	16	1·25	9·01
10	Eltham	5·24	15	1·26	4·11
11	Tairua	8·10	15	1·70	6·46
12	Tauranga	10·61	14	2·85	5·25
13	Maraehako Station, Opotiki	6·06	10	2·12	5·45
14	Gisborne	2·30	10	0·57	2·80
15	Taupo	8·09	16	1·88	4·48
16	Napier	3·04	13	0·75	2·30
17	Maraekakaho Station, Hastings	4·87	15	1·79	3·09
18	Taihape	5·70	22	0·94	3·99
19	Masterton	5·87	18	1·96	3·32
20	Patea	4·69	18	1·14	4·33
21	Wanganui	3·59	12	1·10	3·67
22	Foxton	4·81	13	1·13	2·92
23	Wellington (Karori Reservoir)	6·05	17	1·71	3·83
	South Island.				
24	Westport	11·13	25	3·27	6·97
25	Greymouth	8·75	23	1·40	10·03
26	Hokitika	15·21	23	2·22	11·84
27	Ross	20·31	21	3·41	15·16
28	Arthur's Pass	45.45	23	12.49	19·78
29	Okuru, Westland	18·75	18	2·50	15·37
30	Collingwood	14·01	25	3·16	11·03
31	Nelson	4·56	17	0·88	3·59
32	Spring Creek, Blenheim ..	4·45	14	1·90	2·72
33	Tophouse	8·44	21	1·00	5·90
34	Hanmer Springs	11·58	17	3·31	3·31
35	Highfield, Waiau	4·76	9	2·10	2·60
36	Gore Bay	2·98	10	1·08	2·25
37	Christchurch	2·27	12	0·78	1·68
38	Timaru	1·70	16	0·40	1·95
39	Lambrook Station, Timaru	4·68	12	1·06	2·01
40	Benmore Station, Clearburn	4·90	19	0·80	2·13
41	Oamaru	2·90	16	1·06	1·68
42	Queenstown	6·80	17	1·27	3·48
43	Clyde	3·71	14	0·72	1·58
44	Dunedin	5·80	20	1·32	3·09
45	Wendon	6·02	19	0·83	2·66
46	Gore	6·00	22	0·94	3·26
47	Invercargill	6·18	23	0·93	4·44
48	Puysegur Point	11·15	24	1·49	8·16
49	Half-moon Bay	8·98	22	1·52	4·94

THE SEASON'S LAMBING: NORTH ISLAND ESTIMATE.

FROM information furnished by Inspectors of Stock in the various districts the average lambing for the current season in the North Island is estimated at 84·61 per cent., compared with 87·28 per cent. last year. With 8,211,878 breeding-ewes in the North Island, as shown in the 1928 sheep returns, the number of lambs this season is estimated at 6,948,380. South Island and Dominion estimates will appear in next month's issue of the *Journal*.

ESTIMATED AREAS UNDER CEREALS AND POTATOES.

THE following estimates of the areas under wheat, oats, and barley in the Dominion for the current season were issued by the Government Statistician at date 3rd November, the figures being based on a card census: Wheat, 255,000 acres; oats, 303,000 acres; barley, 22,000 acres. The corresponding final totals for the preceding season (1927–28) were 262,799 acres of wheat, 303,708 acres of oats, and 21,752 acres of barley. Wheat, therefore, has an estimated decrease in area this season of 7,799 acres, oats a decrease of 708 acres, and barley an increase of 248 acres.

Also from a card census and at date 3rd November the Statistician estimates this season's area under potatoes as 21,100 acres. The corresponding final figures for the 1927–28 season were 21,693 acres. Only holdings of 1 acre and over outside borough boundaries are covered by these figures; a fair aggregate area of potatoes is also grown on smaller holdings and within boroughs. Reckoned on the average of the last five seasons—5·34 tons per acre—the total yield from this season's area would be 112,674 tons, as compared with a total actual yield of 121,402 tons for 1927–28.

KILLINGS AT MEAT-EXPORT WORKS.

THE following table, compiled from Meat Producers Board statistics, gives particulars of aggregate killings and/or equivalent output at meat-export works in New Zealand for the past five seasons:—

Season.	Beef Quarters.	Mutton Carcasses.	Lamb Carcasses.	Pork Carcasses.	Boned Beef =Freight Carcasses.	Frozen Sundries =Freight Carcasses.	Total Equivalent in 60lb. Freight Carcasses.
1923–24	322,829	1,939,324	4,769,583	4,943	266,154	81,997	5,705,608
1924–25	458,549	2,224,263	4,750,164	35,753	263,738	54,961	6,438,056
1925–26	215,594	2,001,340	5,000,590	60,757	223,415	111,229	5,610,730
1926–27	184,331	2,094,354	5,381,121	74,633	242,044	69,534	5,956,708
1927–28	394,821	2,005,333	5,947,197	147,601	283,749	125,200	6,992,516

Examination of Basic Slag.—Referring, in his annual report for 1927–28, to the system of examination by the Imperial Institute in London of all shipments of basic slag exported from England and the Continent of Europe to New Zealand, the Chief Chemist, Department of Agriculture, states that during the last four months of the year samples of fifty-six consignments of slag were analyzed at the Institute, with the following results: Slag with minimum guarantee 17 per cent. phosphoric acid—Complied with guarantee, 42; below guarantee, 4: slag with minimum guarantee, 20 per cent. phosphoric acid—Complied with guarantee, 3; below guarantee 7. In only two instances, however, was the deficiency greater than 1 per cent. The importers of slag found to be below guarantee were notified of the Imperial Institute's results before arrival of the shipments. The citric-solubility of the basic slag was in all cases satisfactory. In one instance the fineness of grinding was slightly below the minimum guarantee of 80 per cent.