1927.

NEW ZEALAND.

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT FOR 1926–27.

Presented to both Houses of the General Assembly by Command of His Excellency.

SIR,— Department of Agriculture, Wellington, 15th July, 1927.

I have the honour to forward herewith, for your Excellency's information, the report of the Department of Agriculture of the Dominion for the financial year ended 31st March last.

It is satisfactory to record that the past agricultural year has been marked by an increased volume of production in most of the country's primary staples. On the other hand, the world market prices for several of these leading products have declined in varying degree, thus counterbalancing the financial increment which would otherwise have accrued to the producers. Statistics for the twelve months ended 30th June this year show the aggregate value of exported agricultural produce to be on a par with the total recorded for the preceding yearly period. In order to correctly assess the position, however, comparison must be made with the year 1924–25, from which level (allowing for certain movements in the domestic market for produce) value has fallen by some ten millions sterling.

Weather conditions during the year, though not uniformly good at all periods, have been favourable on the whole, as evidenced by the great output from the land.

The group of products derived from the sheep—wool, mutton and lamb, skins, and other by-products—took first place in aggregate value. A further substantial increase in the flocks was registered, the total number of sheep now being again over the twenty-five million mark, with a very strong proportion of breeding-ewes. Combined with a good average lambing this resulted in a very big crop of lambs. An excellent clip was secured generally, as regards both weight and quality. The local wool-sales were characterized by steadiness throughout the season, at a range of values appreciably higher than those of the preceding year. Prices for fat sheep and lambs ruled lower than in the 1925–26 season, but there were increased slaughterings in both classes at the meat-export works—lamb killings constituting a new high-level record. Average dressed weights of mutton and lamb were somewhat higher than in the preceding season.

Cattle other than dairy cows registered a further decrease in the annual enumeration, and beef exports (apart from the boned article) showed another marked drop in quantity. Needless to say, the shrinkage in cattle is a serious matter in relation to pasture-management, especially on the rougher country, and all reasonable steps should be taken to encourage the raising of this class of stock, even though, unfortunately, the values for frozen ox-beef on the British market so far continue at a depressed level. The existence of a very fair and growing domestic market for beef must not be lost sight of, however. It is reassuring to note of late indications that the position may largely right itself in the near future. A strong demand for young cattle is reported from several important grazing districts, where feed conditions require their use.

The dairy industry season of 1926–27 has been notable in several directions. Although operating with a slightly reduced number of cows, the industry has put

up a clear high-level record in production. The official grading figures for export butter and cheese indicate an increase in butterfat-production of 10½ per cent. as compared with the preceding year, and of 4¾ per cent. above the previous peak year of 1924–25. Having regard to the steadily increasing population of the Dominion, it is safe to say that domestic consumption absorbed a correspondingly larger amount of dairy-produce during the year, and this must also be taken into the calculation of total output. Grading statistics also demonstrate that quality accompanied quantity, both butter and cheese sharing in this feature. During the year consolidated and extended regulations under the Dairy Industry Act, dealing mainly with the manufacture and export of dairy-produce, were issued and brought into operation. Perhaps the most far-reaching provision of the regulations was that instituting compulsory grading of cream, together with differential payments according to quality. The introduction of a "finest" grade of butter and cheese, and of a national brand, were also noteworthy features. Owing to several adverse factors affecting the British market, prices for both butter and cheese averaged lower than those of the preceding year.

Touching on arable farming, all cereals showed increases in area cropped compared with the season of 1925–26, especially as regards wheat. The feature of this section was the bountiful wheat harvest, the average per-acre yield constituting a new record for the Dominion. It is satisfactory to note in consequence that very little, if any, importation of this essential grain will be necessary before next harvest. At current prices this year's wheat crop adds over two and a quarter millions sterling to the gross revenue of our primary producers, or about one million more than the wheat returns for 1925–26. Wheat-production forms one of the major items of agricultural income pertaining almost entirely to our internal trade, and as such not appearing in statistics of exportation. The season's oats and barley yields showed increases, and maize advanced in total production. Potatoes remained practically stationary in area, but the yield was somewhat reduced. Turnips and mangolds both showed some shrinkage in area. Linseed fell away heavily in area, but a much higher per-acre yield almost made up this deficiency. A decreased total yield of rye-grass and an increase in cocksfoot were recorded.

Commercial fruitgrowing in the Dominion has received a great stimulus this year owing to the very successful export trade in apples and pears; and, although the apple crop did not equal that of 1926 in quantity, the monetary returns were very much higher. The Government guarantee was renewed for the past season's shipments in a somewhat modified form, designed to give the growers and shippers an incentive to keep packing, transport, and marketing costs down to the lowest possible level. During the year further progress was made in fruit cool storage methods and system, this resulting in the local market being better supplied, with apples in particular, during a longer period of the year.

Poultry-keeping, beekeeping, and market-gardening (including in the latter the growing of such lines as tomatoes and small-fruits) were carried on steadily, with reasonable profit to the increasing number of those engaged in these lesser branches of rural production. The aggregate value of the output of these industries is much greater than is often realized, and their importance to the community warrants every encouragement.

The hemp industry may be described as being in a fairly healthy condition generally, although some shrinkage in the year's output occurred, due to heavy floods in certain of the milling areas last spring. The grading statistics show an appreciable improvement in quality compared with the figures for 1925–26. Considerable development took place during the year in regard to the growing of phormium as a regular cultivated crop, several new companies having been formed for that purpose. There can be no doubt that the potentialities are very great—given, of course, proper conditions of land, situation, and management—and every wish for success must be accorded to all such sound enterprises.

Much interest centred round the artificial fertilizer trade during the year. Importations of raw phosphate and phosphatic manures increased heavily, and the local manufacture of superphosphate was also greatly expanded. Considerable upheaval took place in the latter branch of the industry, certain industrial

movements and disagreement as to selling terms resulting in severe cutting of prices between the North Island manufacturers concerned. This state of affairs still exists in the industry to a great extent. Farmers have taken the opportunity of low prices to purchase heavily, especially for pasture top-dressing, and the beneficial effect of this is already being evidenced. The important principle connected with the right of co-operative dairy companies to buy manufactured fertilizers at wholesale rates was largely at the root of this trade war, and the final outcome will be watched with interest.

The year has been a notable one in connection with agricultural education. Following legislation in the session of 1926, the site for a State agricultural college at Palmerston North was purchased, a governing Council brought into being, and much preliminary organization effected. During the parliamentary recess questions regarding the relation of Canterbury Agricultural College (Lincoln) to the whole scheme were examined, and satisfactory arrangements have now been concluded in that respect. Briefly, the Palmerston North institution (to be named the Massey Agricultural College), although also covering the ordinary field, will specialize more particularly in dairying, while the Canterbury establishment will give special attention to arable farming and plant-breeding. Both institutions will be of full status and university rank, and the Canterbury College is to receive adequate State financial assistance for its development on these lines. The ground is now cleared for a definite advance, and far-reaching benefit to agriculture and the Dominion in general cannot fail to result.

Agricultural education is closely bound up with scientific research, and much important investigational work awaits attention. In this connection the Department of Agriculture, the two agricultural colleges, and the recently formed Council of Scientific and Industrial Research are co-ordinating so far as possible. Mention may be also made here of special investigations initiated with the financial assistance of the Empire Marketing Board (London), including those of the mineral content of pastures and insect control of noxious weeds.

Owing to the shortness of the 1926 session of Parliament it was not possible to then accomplish much in regard to agricultural legislation. An important measure, the Veterinary Surgeons Act, was passed, however. A number of Bills have been prepared for the current session, dealing with stock, fertilizers, noxious weeds, &c. A measure will also be submitted dealing with the New Zealand Institute of Horticulture, enabling the latter, *inter alia*, to grant educational diplomas in full legality.

New Zealand, in common with other countries, is beset with many difficult economic problems pertaining to rural settlement, production, and finance. Our primary producers, so largely dependent on world markets, are peculiarly situated in relation to costs of production, on the one hand, and the selling prices of their produce, on the other. One problem of prime importance is that of rural credit, and the Government is making every endeavour to promote a system of long-term loans on the amortization principle, in lieu of the present short-term mortgage, with its attendant waste and worry. The bonds to be issued under last session's legislation may be commended to our small investors. This year it is proposed to extend the legislation by initiating a system of intermediate rural credit, largely with the object of providing the working or liquid capital, which is often so essential to successful farming.

Turning to the outlook, the present economic position, in my opinion, does not justify the pessimistic attitude taken up by many people. On the contrary, the prospects for our agricultural industries appear to warrant a reasonable confidence. With "better farming," hard work, and economy New Zealand agriculture may be trusted to win through its existing difficulties.

The reports of the Director-General and those of divisional heads record a very fine volume of work in many fields. Practical service has been given to the various agricultural industries, and much accomplished on the scientific side.

I have, &c.,

O. J. Hawken,

Minister of Agriculture.

His Excellency the Governor-General.

REPORT OF THE DIRECTOR-GENERAL.

THE HON. THE MINISTER OF AGRICULTURE. Wellington, 30th June, 1927.

I have the honour to report as follows upon the work of the Department during the past official year :—

All administrative work has been carried out well by the responsible officers entrusted with its various branches, and side by side with this the instructional services, and the experimental and investigation work associated with them, have been further extended. Of late years the development of the Department's work has been largely upon the instructional side, in an endeavour to meet the always-increasing desire on the part of producers for further knowledge regarding the principles of all branches of agricultural science applicable to their practical farming operations for the purpose of obtaining the best results from them. The practice adopted is, broadly speaking, carried out on three lines—firstly, by lectures and demonstrations at farmers' gatherings, this including the winter "farm schools," organized by the Fields Division, which extend over periods varying from one to six days at each centre, at which officers skilled in various subjects impart information; secondly, by experimental and demonstration work on selected land in various districts, and on Government farms or farm areas; and, thirdly, by officers carrying their knowledge and their instruction service direct to the producer himself on his own farm, station, orchard, poultry-run, garden, apiary, &c., or to dairy factories.

In this work field officers of all Divisions take part, and while those of the Fields Division give their time wholly to experimental, instructional, and investigational work, the Veterinarians and Inspectors of the Live-stock Division, the Dairy Instructors and Farm Dairy Instructors of the Dairy Division, together with the Orchard Instructors and Apiary Instructors of the Horticulture Division, largely combine administrative with instructional work, and this combination has proved most valuable in both directions, these officers, as a result of their willingness to give advice and assistance, being now looked upon usually as friends whose presence is welcomed. There are perhaps occasions in rabbit or noxious-weed infested districts where the conscientious performance of necessary official inspection duty creates temporary irritation, but even this is yearly becoming less apparent.

Closely linked up with the farm, factory, and orchard instruction services are the departmental laboratories, that at Wallaceville dealing with animal-disease and dairying matters, while the Chemical and Biological Laboratories in Wellington get through a large volume of work connected with their respective branches of scientific activities. The bulk of the work of these laboratories is done in direct association with the field or factory officers, who refer to the laboratory concerned all questions which they are unable themselves to deal with directly from their own knowledge, thus enabling the necessary examinations to be made of material sent, or investigations to be carried out for the advice and guidance of the field officer requiring the information. This intimate combination of field and laboratory services is carried out in the best spirit of team-work, and it constitutes the keystone, so to speak, of whatever degree of merit the advisory and research work of the Department may be considered to have attained.

The year has been a busy one for all branches of the Department, as will be gathered from the reports following, which cover the activities of each Division, &c. It has been necessary to make staff increases, principally in the Fields Division, in the endeavour particularly to meet the demands upon the instructional and investigational services; but in the present stage of development of our rural industries increased services of the right type are necessary, and there is still room for further expansion as men of the right stamp for the work become available.

LIVE-STOCK.

The field officers of the Live-stock Division, both Veterinarians and Inspectors of Stock, have maintained a close supervision over the health of farm-stock in their respective districts, and no outbreaks of contagious disease of a serious character have occurred during the year, the general health of live-stock having been good. Drought conditions over a portion of the Hawke's Bay Province were responsible for a good deal of loss during the 1925–26 season, but at the time of writing the feed conditions are much better than was the case twelve months previously. In some other North Island areas attention has had to be given to the improvement of pasture conditions where soil-deficiencies exist, in order to ensure sound health and proper development in cattle and sheep,

especially young animals. Top-dressing has proved of great assistance in this where it is practicable to carry it out, and for this purpose phosphatic manures are most generally useful, though cases have occurred where lime has been needed.

In connection with dairy cattle, a carefully planned experiment has been conducted in the feeding of concentrates in conjunction with pasture grazing, and this is being carried on into another season in order that results may be as certain as possible. Dairy-farmers now adopt much better feeding-methods than was the case a few years back, winter feed in the form of roots, hay, or ensilage being more generally provided, with good effect as regards the health of cows, and their productivity when they come into profit. At the same time, there is room for an extension of the Department's activities in the direction of animal husbandry as applied to dairy cattle as well as other farm stock, and proposals for this are under consideration.

The further increase in the number of sheep in the Dominion is satisfactory, and breeders and large flockowners are fully alive to the necessity for maintaining a high standard of quality in their sheep and improving it. The amount of land-subdivision which has taken place of late years has brought into being a number of owners of small flocks, many with insufficient experience of sheep-farming, and in connection with these there is considerable room for improvement, particularly in the methods of breeding and management adopted. Too many inferior rams are used and the fat-lamb trade, combined with the poor market at present for fat ewes, tends to induce the keeping of old ewes longer than is desirable.

Considerable stimulus has been given to pig-keeping by the efforts made to develop an export trade in pork. The natural line of extension is among the dairying community, who have dairy-factory by-products available for pig-feeding. But the conditions existing as regards supplementary foods create difficulties, seeing that the South Island is the principal grain-producing district, while the greater bulk of the Dominion's dairying is carried out in the North Island; and the costs involved by carriage and handling during transit from the South Island farm to the North Island dairy farm are sufficiently heavy to hamper the development of pig-keeping on up-to-date and profitable lines in the large dairying districts. How this difficulty can be overcome constitutes a distinct problem.

Animal-disease.

Cattle.

The Dominion's freedom from really serious animal-disease has been fully maintained; moreover, those diseases which do exist have been distinctly less troublesome, though still demanding the closest attention from all points of view.

Stringent precautions against the risk of the introduction of foot-and-mouth disease have been continued—in fact, they have been strengthened—and the manner in which farmers and the commercial community have supported these restrictions is highly appreciated.

The gradual decline noted in last year's report in the number of cases of tuberculosis found in cattle and pigs has been continued, a further small decrease being recorded.

A group of dairy-cow diseases—contagious abortion, failure of conception, and contagious mammitis—have been given special attention by the Department. These cause much loss to dairy-farmers, who naturally feel badly lacking in specific and reliable remedies for them. All are troublesome to combat, and here, as in all other countries, much has yet to be learned regarding the best methods for overcoming them. As regards contagious abortion, vaccine treatment has been tried to some extent in New Zealand, though to a much greater extent in the United Kingdom and other countries, but it cannot be said to have proved sufficiently satisfactory to warrant its adoption as a reliable form of treatment. In the 1926 annual report of the Royal Agricultural Society of England Sir J. McFadyean, who may be regarded as the highest veterinary authority there, states that "it must be confessed that more evidence is required regarding the practical value of inoculation, and that in many cases conclusions in its favour have not been justified by the facts."

The Department, in addition to its other investigational work, is now testing a form of vaccine treatment different from any hitherto tried in the United Kingdom, which is reputed to have given promising results in Rhodesia. Other control methods advised in Great Britain are already in use by the Department in New Zealand. They are valuable up to a point, but they do not provide what is really needed. Information regarding these will be found in the Veterinary Laboratory section of the Live-stock Division's report.

As regards failure of conception, a considerable volume of investigation work has been done, and consequent upon the fact that in many cases an inflammatory condition of the cervix (the opening

from the womb), accompanied by a mucoid discharge, was noted, special attention has been given to this and direct experimental treatment carried out. This work is still in progress, and in addition every effort is being made to increase our knowledge of the cause or causes of failure to hold to the bull, and the methods for overcoming it.

Mammitis is reported as having been less prevalent during the year, but plenty of cases still occur and much loss is caused. In order to combat mammitis there is no doubt that careful management of the herd and constant care in watching for and detecting cases in their early stage are necessary. The udder of the cow is a most delicately constructed organ, highly susceptible to any influences which will cause irritation or disturbance of its normal functions, and this is especially the case when the animal is in full milk. The very general use of milking-machines accentuates the necessity for the exercise of the greatest care. Owing to the conditions existing here milking-machines have become a practical necessity, and they are undoubtedly a valuable adjunct to the dairy farm, but if carelessly handled, or if kept in an uncleanly condition, they may do much harm, and the necessity for the exercise of every care in regard to them cannot be too strongly emphasized. With hand milking the presence of any inflammatory condition of the udder can be quickly noted while the trouble is in its early stages, but with the machine it may easily be overlooked until it has become severe, by which time contagion, if it be present, may have spread to other cows in the herd. Again, driving a machine at too high pressure is calculated to produce udder trouble, as also is omission to remove the machine-cups immediately the udder has been milked out. Dirt is also bad, whether in the machine parts or in the shed or its immediate surroundings. Apart from trouble arising from this cause, however, contagious mammitis not infrequently occurs among hand-milked cows, and it needs to be consistently guarded against.

The departmental field officers are always willing to advise dairy-farmers both as to preventive and remedial treatment, and their services are largely called upon.

At the Wallaceville Laboratory steady research work is going on, and some interesting experiments have been carried out, these including the use in herds of a vaccine (known as an autogenous vaccine) prepared from the milk of a cow in the herd suffering from contagious mammitis. A range of results sufficiently wide to enable any reasonably definite conclusion to be arrived at has not yet been reached, but the work is going on, and it may open up a line of effort towards a method involving less time and trouble in application.

Reports have been received from Stock Inspectors throughout the Dominion regarding the results of the use of proprietary preventive vaccines for mammitis. These embody varying opinions from farmers on whose herds the vaccines have been tried; but the balance of opinion is against their efficacy.

Sheep.

Serious contagious disease in sheep continues to be non-existent. Special attention has been drawn to the condition known as lympho-adenitis, which causes an inflammatory condition accompanied by pus-formation in some of the body-glands. This, however, is not very prevalent in the Dominion. In the case of some other countries the British Government authorities have had to impose special requirements in the case of imported mutton carcasses. Every attention is being given here to detect and prevent the export of affected carcasses, and in addition research into the methods of infection and the means of prevention is being undertaken.

Further systematic investigation into the condition known as renal congestion in lambs was undertaken in Otago last spring, and a considerable volume of information was obtained. This will be continued when the next lambing season comes round. An informative article describing the work done last season was written by Mr. D. A. Gill, M.R.C.V.S., and published in the Department's *Journal* of April of this year. The assistance given in connection with this investigation by the Medical School authorities at Otago University, in providing facilities for the examination of specimens, &c., was much appreciated.

A troublesome mortality among sheep, principally ewes, in a portion of Hawke's Bay has been the subject of a close and painstaking investigation by Mr. C. S. M. Hopkirk, B.V.Sc., officer in charge of the Wallaceville Laboratory. This bears a close resemblance to the braxy-like disease which was prevalent in Otago several years ago, though it occurs on pastures mostly of high carrying-capacity and is not confined mostly to turnip-paddocks as was the case in the South. There can be but little doubt that the reprehensible practice of leaving the carcasses of dead animals to decay on the surface of the ground over a long period of years is primarily responsible for the trouble, and it is significant that it is principally confined to the area subject to periodic droughts with resultant mortality. Fluke infestation is present in the swamps and

watercourses in this area, and it has been suggested that these parasites may be responsible for acting as mechanical carriers of infection into the liver. This is the subject of careful investigation, as the liver-fluke is a widespread parasite (not so in New Zealand, fortunately), while mortality of the nature now under investigation is not commonly met with in fluke-infested areas in other countries.

Little was heard of trouble arising from extrusion of the vagina in pregnant ewes, the seasonal conditions as regards food conditions not being favourable to its development. Some cases of ante-partum paralysis in ewes occurred, but sheep-farmers generally are alive to the necessary preventive measures and no serious trouble occurred.

Generally, the year may be regarded as one in which our flocks were maintained in good health and good condition.

Other Farm-stock.

No serious trouble occurred among swine, and it is satisfactory to note that a further reduction in tubercular infection among these animals has taken place. No other form of contagious disease has called for investigation, and what trouble has occurred in the shape of sickness or mortality has been largely due to management conditions.

A somewhat serious epidemic of distemper has been responsible for a great deal of sickness and many deaths among dogs on farms and elsewhere, but it seems now to have largely subsided. Field officers have done their best to advise as to prevention and treatment.

Wool-production.

The wool-clip showed an improvement upon that of the preceding year, and details regarding it are given in the divisional report. A great deal of attention has been given to the question of quality in wool, particularly the tendency to produce a hair-like fibre. A considerable amount of investigation and instructional work has been carried out with a view to assisting farmers to deal with this difficulty. Mr. A. H. Cockayne, Biologist, and Director of the Fields Division, has carried out a great deal of valuable work in this direction. In addition, Mr. W. Perry, of Masterton, whose skill and experience as a breeder are well known, has most generously co-operated and assisted in lectures and demonstrations at farm schools and at other meetings throughout the country. His valuable assistance is most highly appreciated.

The Wool Instructor of the Live-stock Division has himself carried out a great deal of work in the same direction, as will be gathered from the divisional report, one of the useful features being the examining of wool staples from rams, and reporting thereon to owners, thus enabling farmers to become aware of the good or bad qualities, as the case may be, of their rams from a wool-production standpoint. More care and more knowledge in selection and breeding are essential for overcoming wool-deterioration. The Board of Agriculture has taken a deep interest in this question, and the general effort now being made should do much good. It is necessary to strengthen our specialist staff for this particular work.

Poultry.

The poultry industry is going ahead, and a good year has been experienced. The Department's functions in connection with the industry are largely of an instructional nature, and the Chief Instructor and his staff have done very good work.

The new poultry-station which has been established at Wallaceville should prove of value in assisting the progress of this industry, and it is proposed to carry out investigational and experimental work aimed at the various difficulties which poultry-farmers have to meet. The Live-stock Division report affords detailed information regarding the year's work of the poultry branch.

Export of Stud Stock.

The Dominion is progressing in its export trade in breeding-stock, and with careful handling this should gradually develop into a valuable business. So far as sheep entered in our flock-books are concerned, the breed societies undertake inspection as to quality and type. A suggestion has been made that Departmental officers should also take part in this inspection, and that it should be extended to all live-stock exported.

The Department is desirous of doing all it can to assist in improving this growing trade, but it is open to question whether the actual inspection of purebred stock cannot be best carried out by the skilled persons appointed from the breed societies. The Department could, however, aid in other ways. As regards the point of setting a standard of quality for ordinary flock sheep exported,

there are evidently marked differences of opinion among sheepowners as to the advisableness of this. There is a good deal to be said on both sides, but, whatever is done regarding animals of this class, there can be no two opinions as to the necessity for maintaining a high standard in purebred stock intended for export.

Inspection of Meat.

The meat-inspection service of the Live-stock Division has been carried out efficiently. Details of the stock inspected both at meat-export slaughterhouses and local abattoirs will be found in the divisional report.

Inspection of Milk-supplies.

The Live-stock Division undertakes the inspection of milk-supplies to cities and boroughs, so far as the dairy farm is concerned, and the efficiency of this service has been well maintained. Special measures are taken to maintain freedom from tubercular contamination of milk, and numerous samples of the mixed milk of dairy herds are examined at the Department's and other laboratories for the purpose of determining whether this is present. Throughout the year only five affected samples were found, and in each case the herd was taken in hand by the field officers of the Department and the source or sources of infection removed.

Apart from these special measures, general sanitation has, generally speaking, been well observed, and dairy-farmers co-operate well with the inspecting officers.

Live-stock Inspection.

The stock-inspection service has functioned well, and the general control of disease has been maintained on good lines, this being rendered easier consequent upon the willingness of farmers to meet the requirements of the departmental officers, who in turn are able to give a great deal of advice and assistance in connection with disease prevention, control, and treatment, together with stock-management, all of which is valuable towards maintaining farm animals in good health and profitable condition.

The Rabbit Pest.

A great improvement has taken place in the position throughout the Dominion as regards rabbits, these being less in number and better under control than has been the case for many years past. Rabbit Boards, where established, have done very good work, and, so far as their districts are concerned, are to be congratulated upon the results attained. Those officers of the Department responsible for carrying out the provisions of the Rabbit Nuisance Act may also be commended, as the present good position must be held to be largely due to their efforts over a period of years of onerous and often unpleasant work. A much greater spirit of united effort between farmers and Inspectors is noticeable, and this is very satisfactory from all points of view.

Noxious Weeds.

The Noxious Weeds Act, always difficult of administration, has given cause for much thought as to the best lines to adopt in dealing with weeds on abandoned properties. In some cases, in order to reasonably protect adjoining occupiers, the Department itself has taken steps to clear the weeds, and a good deal of similar work has been done on Crown and Native lands. The question of amending the Act in order to place more responsibility upon mortgagees and others in the case of abandoned or unoccupied farms requires careful consideration, especially as regards mortgagees, as bringing them under its provisions might constitute undue hardship. It is hoped, however, that an amending Bill may be brought down during the current session.

The Empire Marketing Board has made a special grant of money to aid in the control of certain noxious weeds, including blackberry and ragwort, by means of insects. The work in connection with this is being carried out under the direction of Dr. R. J. Tillyard, Entomologist to the Cawthron Institute, with whom the Department's Entomologist, Mr. D. Miller, is co-operating so far as circumstances render it necessary. The result of this undertaking is being awaited with much interest, but efforts at control by present known methods are being continued as vigorously as is possible under the conditions existing.

The Department has carried out a series of experiments in the control of blackberry by chemical sprays, and the result of these is being embodied in a report about to be published.

Dairying Services.

The Director of the Dairy Division, Mr. W. M. Singleton, and his staff have carried through a year's work involving special responsibility, one of the salient features being the putting into force of a comprehensive set of regulations dealing with dairy-produce manufacture, including the important matter of cream-grading. These regulations were accepted by the industry without adverse comment, and in the short period during which they have operated appear to be working well. The establishment of compulsory cream-grading, with differential payment according to grade, marks an important step in the progress of commercial dairying in the Dominion, and its beneficial influence is already observable in the distinctly higher standard of quality of the year's output, an improvement (upon an already high standard) for which such grading can justifiably be held to have been to a considerable measure responsible. Together with cream-grading, the system adopted by the Dairy Board in making differential advances to factories according to the grade of their output proved a factor in the improved quality of butter and cheese; but the efficient work of the Dairy Instructors must be recognized as being of great importance.

The testing for water content of butter has been continued. No complaints regarding excess water content have been received during the year from either the United Kingdom or America.

Instruction to Factory-managers.

The dairy-factory instruction officers of the Dairy Division have carried out a large volume of valuable work in assisting factory-managers to overcome difficultles arising in connection with their manufacturing processes, and the active co-operation existing between the Instructors and the factory-managers constitutes an important factor in maintaining the high standard of quality which characterizes our dairy-produce.

Farm Dairy Instruction.

Another branch of the activities of the Dairy Division is that of farm dairy instruction, this being carried out in direct co-operation with individual dairy factories or groups of factories, who share the cost with the Department. The system is working well. The Farm Dairy Instructors keep in close touch with the factory-managers, and follow up to the farm any faulty milk or cream delivered to the factory, ascertain the cause of the trouble, and give the farmer advice and assistance in remedying it.

Herd-testing.

Final figures relative to herd-testing in New Zealand during the past season are not yet available, but interim statistics would appear to evidence that the movement has approximately maintained the numerical strength of the previous year.

Under the herd-testing "Association" system the member takes the samples and milk-weights each month, and arranges for delivery of the samples to a testing-depot, usually the dairy factory to which he is a supplier, where they are tested either by a member of the factory staff or an independent testing-officer. The returns are then figured on the basis of the milk-weights recorded by the member and the results of the samples. The figuring of returns involves a good deal of clerical work, all stationery being supplied free of cost by the Dairy Division. The cost of this form of testing to the farmer is approximately 2s. per cow per season.

A slight variation of this form of herd-testing is known as "Dairy Company" herd-testing. Under this scheme the farmer takes the weights and samples, while the company arranges for the testing of the samples and the figuring of the returns. In a number of instances the company makes no direct charge for this service, the cost being made a general charge against working-expenses, while in some cases each member is debited with the actual cost of conducting the work.

The Dairy Division officers' direct share of the work is carried out on two distinct lines—namely, the certificate-of-record test applied to purebred dairy cows, and the association herd-test applied to ordinary herds. As regards the association herd-test, much of the Division's work has been that of organization and establishment, the testing being continued by local organization and local effort. During the past season 8,600 cows have been tested by Dairy Division officers themselves, the compilation of monthly and annual returns for these cows also having been carried out by the Division. Some 700 individual purebred animals were under the C.O.R. test during the year, a number of very high yields having been authenticated.

Another method, known as the "Group" system, has come largely into use of late. It is conducted by local organizations, and is more elaborate than the association method in that the samples and milk-weights are taken by officers engaged and paid by the controlling organization, and the tested cows are distinctly marked by tattooing. A further development, in some groups, is that of marking the heifer calves from tested cows of proven merit, which is a good idea. The cost of conducting this system is necessarily greater, amounting to about 5s. per cow per season.

Herd-testing is doing much good, and it deserves support.

Arable Farming.

As will be gathered from the appended report of the Director of the Fields Division, the grain harvest proved a good one. The yield per acre of wheat for the whole of the year's crop is not yet known, but those threshing returns available at the time of writing show a return of 38 bushels per acre. The yield for the previous year was 30·44 bushels per acre. As regards oats, returns to date show a yield averaging 43·25 bushels per acre, which is 3 bushels per acre over the total yield of the previous season. The yield from the potato crop cannot yet be stated. In 1925–26 it was 6·09 tons per acre. Potato-growers are unfortunate this year in being unable to export to Australia, consequent upon an embargo imposed by the Commonwealth authorities.

Plant-diseases.

The scientific officers of the Fields Division have been actively engaged in research into some troublesome and costly diseases affecting farm crops, these including smut in wheat, oats, and barley; take-all in wheat; wheat-scab; dry-rot of swedes; and corticium disease of potatoes. Good work has been done, and the latest results in connection with dry-rot and smut especially are very satisfactory. A special attack is being organized upon potato-diseases. With all this, combined with routine work, the Biological Laboratory staff has been more than fully occupied, and the keen and enthusiastic work done is appreciated. Full details of the work of this Laboratory will be found in the divisional report.

Seed-testing.

The seed-testing establishment of the Fields Division handled 8,627 seed-samples during the year, this being 481 in excess of the previous year. The bulk of these were connected with seed production and export, and one would have liked to see more samples of seed intended to be sown in the Dominion submitted for testing. Certainly some merchants do their own testing, and the great bulk of the seed supplied for use in the Dominion is of good quality, but there is reason to believe that some poor-class seed still goes into use. Any farmer who wishes to do so can send a sample of seed for testing by the Seed-analyst, this service being free to farmers.

Fields Instruction.

The Instructors in Agriculture and Fields Instructors of the Fields Division have been kept busy in giving advice and assistance to farmers in matters connected with their pastures and crops. More officers were added to the staff, but there is still room for expansion of this service, which is undoubtedly doing good work not only in giving direct advice on the farm, but also in carrying out experimental and demonstration work on various areas throughout the Dominion. The carrying of practical advice direct to the farmer on his own farm has proved in practice to be most useful, and, while it naturally entails a great amount of travelling, the results in the form of increased production must be of concrete value to the Dominion. That the service is appreciated by the farmers themselves is shown by the extent of the demand for the Instructors' services, this being well in excess of the capacity of the existing staff to fully meet.

A further feature of the work of the Fields Division lies in the local experimental work undertaken on areas of varying size, local farmers co-operating by allowing portions of their land to be used for the purpose and assisting in carrying out the necessary work. These local experiments, by helping to elucidate local farming difficulties, or by demonstrating methods of overcoming them, constitute a useful feature of the Division's work.

Pasture-improvement.

That portion of the report of the Fields Division dealing with agrostology goes fairly fully into the work which is being done in connection with pastures, especially the systematic classification of grassland types in the Dominion. As this proceeds it will involve the co-operation of both the Live-stock and the Chemistry staff, so as to enable our knowledge to be advanced and applied to practical farming operations.

The practice of top-dressing pastures with artificial fertilizers has continued to expand to such an extent (aided by much lower prices for phosphatic manures) that fertilizer-manufacturers have found difficulty in keeping pace with the demand for their products. The value of top-dressing has been proved up to the hilt, and it has now become a regular feature of the season's operations on dairy farms. It will be important to keep an eye to results as years go on, and to watch for any possible developments arising from the continued applications of phosphatic fertilizers accompanied by heavy grazing.

The Hemp Industry.

This industry continues in a generally satisfactory condition. The growing of phormium under cultivation has taken quite a step forward during the year, this being largely brought about by the formation of new companies for the purpose. A considerable increase in the amount of hemp-fibre and its allied by-products may therefore be expected during the next few years.

The hemp-grading staff, under the supervision of the Director of the Fields Division, has had a busy year, with satisfactory results.

Farm Economics.

The work of the farm economics branch of the Fields Division, in the hands of Mr. E. J. Fawcett, is making excellent headway considering the volume of detailed work necessary in respect of any particular section of farming before any reliable conclusions can be arrived at. The objective of the Department in this connection has become more fully realized by the farming community, and it is being found that most settlers now have no objection to supplying any data for which they are asked. The assistance of farmers in this economic work is vital to its success, and it is desired to place on record the Department's thanks to all those who have readily complied with its requests for information.

Orchard Instruction.

The instruction staff of the Horticulture Division, under the leadership of Mr. J. A. Campbell, Director, has had a busy and a useful year in assisting fruitgrowers to improve the quality of their product, increase their production, and cope with the various troubles affecting their orchards, and also in the inspection of fruit for export. Full details of the work of the Horticulture Division will be found in the divisional report appended.

Those diseases which are controllable, with our present knowledge, have been vigorously dealt with. Others, concerning which more has yet to be learned, have been dealt with to the best advantage in the circumstances, aided by the information supplied by the Biological Laboratory staff as a result of the study and investigation of these diseases which is in progress. The volume of experimental work done in orchards has been very considerable.

Fireblight has been troublesome, the disease having made its appearance in the Hawke's Bay, Wairarapa, and Manawatu districts. It has been energetically handled, and every effort made to control and eradicate it. A difficult feature of control and eradication methods lies in the fact that hawthorn is a host plant, and some farmers who possess hawthorn hedges naturally resent being asked to destroy them. It is a case of one section of the rural community being asked to make a sacrifice for the benefit of another section, and the extent to which farmers here meet fruitgrowers in this matter is most satisfactory. There has been some friction and some trouble, but the divisional officers have generally shown tact and discretion, and have done their best to deal satisfactorily with a very difficult matter.

Fruit-export.

Particulars of the fruit-export trade for the year will be found in the divisional report. The financial results of the current season have been in marked contrast to those of the previous year, when the guarantee given by the Government as to net return to the grower had to be heavily called upon. This season's prices have been good, and it is anticipated that at the end of the selling season the export trade will be found to have been quite self-supporting.

The divisional officers carried out a large volume of work in supervising the grading of export fruit and in inspecting it, and they were able to do this with the cordial co-operation both of fruitgrowers and the Fruit-export Board.

Cool Storage of Fruit.

Very little trouble has been experienced during the year from flesh-collapse or other cool-storage troubles in the stores in the Dominion, and the investigations which have been going on for some time past have evidently given good results. The fruit exported also carried well at sea generally, and the shipping companies concerned must be congratulated upon the care and skill exercised by their officers in bringing this about.

The Institute of Horticulture.

The Institute has become definitely established, and it should prove an organization of great value in bringing about a continued advance in New Zealand horticulture. Legislation designed to give the Institute a definite status has been drafted, and it is hoped that it may be brought down during the coming session.

Tobacco-culture.

Tobacco-culture has geen stimulated by the giving of a guarantee on the export of tobacco-leaf of a sufficiently high standard of quality. An Instructor has been appointed, and a considerably increased area planted in the Nelson District. The prospects of this becoming a useful and productive industry are good, and very recent developments suggest that there is no likelihood of any call being made upon the guarantee by growers.

Importation of Fruit.

The necessity for taking all possible precautions for preventing the introduction of further disease into the Dominion renders it necessary to keep a careful watch and maintain an efficient inspection of all fruit introduced from overseas. This is, perhaps, especially necessary in the case of citrus fruits, the growing of which has extended considerably of late in the northern districts of the Dominion. Inspectors at the ports are doing good work, and, if found necessary, recommendations will be made for increasing their powers.

Beekeeping.

This very useful industry continues to expand, but it is a matter for regret that unfavourable weather conditions last spring caused some trouble.

The members of the instructional staff were kept fully occupied in carrying out their duties, and the requests for their services are increasing, both as regards direct advice and the giving of lectures and demonstrations. The quantity of honey exported was considerably less than in the previous year, but well up to that of preceding years, the value being £34,695.

It is satisfactory to note that New Zealand honey has attained a high reputation in the Home market, the prices secured being well in advance of those for honey imported into the United Kingdom from other countries. An important factor in this connection, no doubt, is the care exercised in maintaining a high standard of quality, while judicious and extensive advertising has also been of marked assistance.

No less than 7,500 apiaries are now established in the Dominion.

Investigation into Bush Sickness and into the Mineral Content of Pastures generally.

This important research work, under the direction of Mr. B. C. Aston, F.I.C., F.N.Z.Inst., Chemist to the Department, has made steady progress during the year, and expansion in the volume of work already in hand will be enabled as a result of the generous grant lately made by the Empire Marketing Board for the purpose of furthering this research.

Mr. Aston, in his report, gives details of the work done. A good deal of misconception appears to exist regarding what has already been accomplished and what is already known regarding bush sickness. The cause, well designated "iron-starvation," has been established, and accepted as correct by the scientific authorities in the United Kingdom. "Sick" animals can be brought back to normal health, while still upon affected country, by being medicinally treated with an iron compound, either citrate of iron and ammonia, or syrup of phosphate of iron. In like manner they can be kept healthy by periodic medicinal treatment by the same preparations.

On the Department's farm at Mamaku by good farming methods, including the laying down of good pastures, suitable top-dressings, frequent changes of stock from paddock to paddock, and the growing of root crops and saving of hay for winter feed, also a certain amount of molasses feeding, dairy cattle are kept healthy over long periods and are milking well. Last season twenty cows were milked, and they did well throughout the season. Admittedly, it has taken some years to bring the pastures into this condition, but it does demonstrate that the trouble is capable of being overcome. A further point worth mentioning is that cows fattened on the Mamaku farm on more than one occasion last year topped the fat-stock market at Westfield, and these cows had no medicinal treatment. There are cows being milked on the farm which were bred there and which have never been off it.

A further expansion of the investigation work is in hand. Some experiments on a small scale made last year gave promising results from the use of iron compounds as a top-dressing for pastures on affected country. The results were not uniformly good, but quite good enough to warrant further experimental work on a larger scale. This is now being planned.

In addition a systematic soil-survey of the affected area is in progress, and, together with this, a large number of chemical analyses of grasses and other pasture-plants have been and are still being made.

Ruakura State Farm.

This farm has experienced, on the whole, a good year, and the Manager is to be complimented on the progress made. Extensive improvements have been carried out, adding substantially to the value of the property. These include new farm buildings, new fencing, further water-supply, and pasture-improvement.

For the twelve months ended the 30th June, 1926, the milking-herd, with fourteen additional cows, yielded butterfat to the value of £1,483, as compared with £638 for the preceding twelve months. For the current year the return will be less, as trouble occurred through an outbreak of abortion, and the rate paid out for butterfat was less. A good deal of culling of the least profitable cows is being done.

New accommodation for feeding and housing calves has been provided, and ninety-four calves were reared, all in excellent health and condition. Increased accommodation for swine is being provided. The demand for pigs of the Large White breed has been far in excess of the available supply. The poultry premises have been entirely remodelled, the old plant having been demolished and replaced by a modern structure. At the apiary eight cadets (four men and four women) went through a six-months course of training. The horticulture section has been completely remodelled.

The payments for the year, including permanent salaries, were £12,971, this also including the cost of staffing and maintaining the Farm Training College. The total receipts amounted to £8,690. The receipts would have been increased by approximately £900 but for the fact that the year's output of fat lambs were frozen and shipped to England on the Department's own account, and that none of the returns from these had come to hand before the end of the financial year.

The Ruakura Farm Training College.

A substantial increase in the number of applications for places which has been experienced during the year would appear to indicate that the excellent facilities which Ruakura can offer for the training of youths in farming pursuits are becoming better known and appreciated. Besides having fifty-two students in residence, which represents the limit of the accommodation, there are also a number of applicants on the waiting-list. Twelve of the students now in residence are from Britain, being holders of Fellowship of the British Empire scholarships, which, among other privileges, entitles them to twelve months' training at this farm. Improvements at the students' quarters during the year include wardrobes in the bedrooms and the provision of a comfortable and commodious sitting-room.

As from January next a course covering one year will be substituted for the present course, which covers two years. Provision is to be made, however, for enabling a few approved students to continue into a second year on a special course.

Weraroa State Farm.

Unfavourable weather conditions in early spring prevented this farm having a good season. In October the rainfall was 9·25 in., and this greatly retarded sowing operations.

The Friesian and the Red Poll herds have been kept at a high standard, but it is regretted that at the annual sale the demand for purebred stock from the Friesian herd was poor and unsatisfactory—an experience, however, not confined to this herd alone last year. The Red Polls sold well. The farm had a successful season so far as its exhibits at agricultural and pastoral shows were concerned, the total prize-money received amounting to £35 17s. for Friesian cattle, £57 12s. for Red Polls, and £13 10s. for pigs. At the Royal Show, in Auckland, the Friesians gained one first, one third, and a special prize, while the Red Polls gained six firsts, one championship, and one reserve championship.

As regards pigs, there has been a good and steady demand for both the Berkshires and Large Blacks, and the results of the pig section can be regarded as satisfactory. The Ryeland sheep have done well, and the stud flock now contains some 160 ewes.

The payments for the year (including permanent salaries) were £7,456, while the total receipts amounted to £5,420. The preceding year's receipts amounted to £7,758. The falling-off last year affords a good indication of what happens on a large farm when the seasonal conditions are adverse. The future of this farm demands consideration. It has served its purpose as an experimental farm, and there is little to be gained by the Department continuing to conduct it simply as a commercial farm. It contains a large area of first-class dairying-land upon which a number of families could be supported. It is considered that it would now be of greater value to the district and to the State if it were converted into an up-to-date dairy-farm settlement.

Nauru and Ocean Islands Phosphates.

Phosphate operations at Nauru and Ocean Islands are proceeding very satisfactorily, and shipments for the seventh financial year, which ended on the 30th June, are approximately 593,300 tons, as compared with the previous highest output, in 1924–25, of 470,700 tons, or an increase of about 122,600 tons. This satisfactory result for the year has been possible owing mainly to unusually favourable weather throughout and satisfactory labour and health conditions, combined, no doubt, with increased efficiency. For the previous year (1925–26), when adverse weather and labour conditions were experienced, phosphate shipments were approximately 200,000 tons less—namely, 391,700 tons.

Deliveries of Nauru-Ocean phosphate to New Zealand for 1926–27 are approximately 135,200 tons, as compared with 77,400 tons for the previous corresponding period, or an increase of about 57,800 tons. These quantities have been insufficient to meet the rapidly increasing demands for this high-grade material, and the Phosphate Commissioners have purchased on behalf of the fertilizer-manufacturers considerable quantities of phosphate from outside sources at the lowest prices obtainable, though at a considerable increase on Nauru-Ocean rates. This outside phosphate is of lower quality, but by judiciously mixing it with the relatively large supply of high grade the manufacturers have been able to maintain the high standard of phosphatic fertilizers obtaining in this market, and which is a factor of great economic importance to the country.

With the view of increasing the output from Nauru and Ocean Islands an extensive programme of development has been decided on, starting with an improvement of the shipping facilities. Contracts were signed in March last with Messrs. Henry Simon, Ltd., of Manchester, for the construction of a loading-cantilever at Nauru and an improved steel jetty at Ocean Island. This work will probably extend over two years, entailing an expenditure of about £250,000, which will be financed by the Commission.

The cantilever for Nauru embodies some unique features suited for the special conditions pertaining there. It will project about 180 ft. beyond the edge of the reef, and will permit of discharging the phosphate direct into the vessel's fore and after holds simultaneously, thus dispensing with the present system of loading by means of small lighters. The material will be transferred from the 12,000-ton shore storage bin to the discharging-points of the cantilever by rubber-belt conveyers with a total capacity of 600 tons per hour, thus enabling the loading of a 6,000-ton vessel in a day. The outer arms of the cantilever will operate on the principle of a wharf-crane, permitting them to swing in on the reef when not in use. The whole plant will be operated electrically. It is hoped that on completion of the cantilever installation the output capacity will be increased to 700,000–770,000 tons.

Other improvements facilitating production and transport are also to be put in hand at both islands, with a view to getting the best possible service from the improved shipping arrangements.

Freight and marketing arrangements have been satisfactorily dealt with by the Commission during the year.

Staff Matters.

I very much regret to record the loss, through death, of Mr. H. L. Marsack, Veterinarian, Mr. G. H. Sargeant, Apiary Instructor, and Mr. E. P. Huddleston, Inspector of Stock, all highly respected officers of the Department.

In conclusion, I must express my appreciation of the valuable assistance rendered by Mr. F. S. Pope, Assistant Director-General, and Messrs. Singleton, Campbell, Cockayne, and Lyons, Divisional Directors, all of whom have devoted themselves whole-heartedly to the continued improvement of the work of the Department, and in doing so have exhibited both energy and enterprise on sound lines.

C. J. Reakes, D.V.Sc., M.R.C.V.S.,
Director-General.

LIVE-STOCK DIVISION.

REPORT OF J. LYONS, M.R.C.V.S., DIRECTOR.

Stock Conditions generally.

Weather conditions experienced during the year were good, and following on a mild winter an excellent and early spring brought the stock on in good condition. A too-rapid growth of feed in some districts was not advantageous from the point of view of maintaining sheep in the best condition of health, but, on the other hand, a good supply of winter feed is assured, and stockowners should be able to do their stock well through the coming winter. Stock have remained in good health, and no serious mortality has taken place, although in some instances trouble has been experienced of parasitic gastritis in young cattle, as mentioned later in the report. In the maintenance of the stock of the Dominion in good health it cannot be too strongly emphasized that weakness of constitution must be avoided by selecting only strong-constitutioned animals for retention as the future producers of the Dominion, and doing them well during their growing and also producing period. It is altogether wrong that a producing animal should be turned out at the end of the season to winter as best it may, and be hardly given another thought until brought in again for the next season's milking, low in condition and unable to produce its maximum owing to lowered vitality. Such treatment—it is fortunately becoming less common—is bad in every way, as after a season of production the cow needs good treatment during her period of recuperation if she is to give her best return.

The principal diseases and troubles affecting stock in New Zealand are dealt with under their respective headings as follows:—

Blackleg.—Owing to the steady campaign carried out by officers of the Department against blackleg in parts of the Taranaki and Auckland Provinces the position in recent years has become less acute, and the mortality amongst young stock has been reduced to such an extent that it was possible during recent years to relax the regulations in the Auckland District, so that calves were only inoculated on farms where an outbreak of the disease took place. As a result of the experience gained in the Auckland District the same methods were during the past season introduced into the Taranaki District and were found to work satisfactorily. Our present system, while safeguarding the health of stock, has been an enormous saving in labour both to officers of the Department and stockowners in the district. The regulations with regard to removing stock from the district is still in force.

Tuberculosis.—An examination of the whole position as regards tuberculosis in animals in New Zealand indicates that the incidence of tubercular disease in cattle and pigs in New Zealand would appear to be decreasing, although there are still some districts possessing low, wet, and swampy areas where the disease is prevalent to a greater extent than elsewhere, and until better conditions can be brought about by means of drainage, &c., improvement will be difficult in these districts. The condemnations of cattle on clinical examination and as a result of the tuberculin test numbered 4,750, as against 4,692 last year. This constant weeding-out of clinically affected animals must be an important factor in controlling the disease and in gradually reducing its incidence. Wellington District, embracing all the North Island outside Auckland Province and including Nelson and Marlborough, shows a decrease of 198, and Canterbury - West Coast District shows a decrease of sixty-six compared with the previous year, while Auckland and Otago Districts show increases of 280 and forty-two respectively. The increase in the Auckland District can be traced as having taken place in low-lying swampy areas already referred to, and Otago's increase is attributable to reactions as a result of the tuberculin test and confined to a few herds. The number of cattle (including calves) examined at freezing-works and abattoirs on slaughter was 321,039, of which 16,333, or 5·08 per cent., were found to be affected in varying degrees, a considerable number only very slightly. These figures show a decrease of 0·08 per cent. on last year's figures, and, although small, it is nevertheless satisfactory, following as it does on the somewhat larger decrease which was shown for the preceding year. In the case of swine a decrease of 0·35 per cent. is disclosed, which is also a satisfactory feature. The number of swine examined was 418,316, of which 34,405, or 8·22 per cent., were found to be affected in varying degrees, and, as in the case of cattle, a considerable number only very slightly.

Actinomycosis.—The number of cases of this disease dealt with throughout the Dominion was 689, being a decrease of sixty-five on the previous year. They were distributed as follows: Otago-Southland, 77; Canterbury - West Coast, 57; Wellington, 208; Auckland, 347. All districts, with the exception of Otago-Southland, which shows an increase of twenty-four, shared in the decrease. Medicinal treatment is advised for this disease when detected in the early stages, and as a result many animals have been saved from condemnation.

Mammitis.—This disease, although not so prevalent as in former years, is still a serious menace to the dairy-farmer, and the field officers of the Division are using every effort to assist farmers in combating it, while the Wallaceville Laboratory staff are investigating and exploring new and better methods of treatment. Experiments carried out in some cases showed good results, but these were far from being constant, and more investigation work has to be done both in New Zealand and in other countries. Proprietary vaccines for preventive treatment are still in use in dairying districts. Officers of the Department have been keenly interested in their use, with the view to finding if they were successful as a preventive agent. While in some cases owners claim satisfactory results, the

consensus of opinion is that the vaccines have not come up to expectations. In summing up the position with reference to their use the fact remains that although they have been in use for many years their application has not become universal, as would have been the case had they been successful preventive agents. So far the Department is unable to advocate their use either as preventive or curative agents.

Congenital Diseases.—(*a*) Contagious abortion: This disease, although in existence in most of the dairying districts throughout the Dominion, is not the dreaded scourge it was a number of years ago. A few herds may suffer severely, but in the majority of cases they get through the season with comparatively slight losses. This is no doubt due to the fact that the majority of our herds have acquired immunity, for the time being, at any rate.

(*b*) Temporary sterility: In this complaint, although the majority of the cows may prove in calf before the end of the season, yet the fact that they keep continually returning to the bull for a period and do not get in calf until late in the season is a source of loss and annoyance to the dairy-farmer, as such animals do not come to profit at a time when they afford the greatest source of income to their owners. The condition is one that is fully occupying the resources of the Laboratory and field officers of this Department in order that a remedy may be found. The experience so far has been, however, that an agent which has given satisfactory results when tried on one herd may prove an utter failure in the next. Hence research work has to be continued. The common practice of letting the bull run with the cows cannot be too strongly condemned when this trouble is present in the herd, as not only does it wear out the bull, but it lessens the chance of the cows conceiving.

Malignant Growths.—During the year 415 head of cattle were condemned by Inspectors for malignant growths, an increase of seventy-three over last year's figures. In the majority of cases the diagnosis was confirmed by laboratory examination.

Parasitic Diseases (Sheep and Calves).—Although a number of cases have been reported, principally from the North Island, with the exception of fifty yearling heifers that died on one property no serious mortality has been attributed to this. The worst-affected centres are the King-country and Hawke's Bay. In a portion of the latter district fluke is also prevalent, and control measures are in operation under the direction of the officers at the Wallaceville Laboratory in conjunction with the district Veterinarian.

Ante-partum Paralysis and Extrusion of the Vagina.—The only cases reported were from the Amberley and Lincoln districts, in both of which a number of cases were seen. This is the second season in which little has been heard with regard to this condition. The trouble is no doubt due to the good condition of the pastures on which flocks were kept. Sheep that are well fed and allowed to become too fat before lambing are the usual victims of this trouble. Good management can prevent it.

Ophthalmia (Temporary Blindness in Sheep).—This complaint was reported rather common in the Wairarapa, Stratford, and Marlborough districts. Investigations under way at the Laboratory suggest that the disease is contagious.

Lice in Sheep.

The remarks made in my last annual report still apply—viz., that sheep affected with lice are still too numerous, and far too many prosecutions for exposing lice-infested sheep at saleyards have had to be taken. Notwithstanding the numerous prosecutions the position has not improved, and it would seem that if the position is to be remedied more drastic action is required. It was also pointed out in the last report that the Inspector has the power to order the withdrawal of lice-infested sheep from sale, and with the view to stopping the practice it is proposed that all Inspectors be instructed to see that such sheep are withdrawn from sale. It does not follow that when this action is taken it will relieve the owner of the sheep from prosecution.

Renal Congestion affecting Lambs.

Odd cases have been reported from most sheep-farming districts in the Dominion. In the Central Otago, Southland, and Oamaru districts the disease during the early spring months was more or less prevalent and a considerable amount of mortality ensued. Officers of this Department, aided by the hearty co-operation of the farmers, are carrying on an exhaustive investigation, with a view to determining from an exact scientific standpoint the cause of the trouble. From the practical point of view it can be well described as a result of overnutrition, or of an unbalanced highly nutritive ration. Such an investigation must of necessity occupy an extended period. This investigational work will, if necessary, be extended to other districts. It is hoped that the knowledge gained will be of benefit to the sheep-farming community throughout the Dominion. Meanwhile practical precautionary measures need always to be observed.

Cattle-tick.

The infestation of stock with cattle-tick within area A, with the exception of the Tauranga and Coromandel districts, has been much lighter than for some years past. The cold season experienced may account for this to some extent. There are, however, other factors at work, such as picking and spraying. It is also realized that better farming methods, such as top-dressing, keeping the roughage eaten out, ploughing, and burning, are all factors which assist in reducing the ticks to a minimum. The hearty co-operation of the settlers is asked for in this respect. If owners will individually see that their stock is kept free from ticks, and that their pastures are kept free from roughage, which affords a breeding-ground for the tick, it will go a long way towards the eradication of the pest. Where dairying is carried on, the method of control is comparatively simple. It is on the grazing-runs, where stock are seen only at irregular intervals, that difficulty is experienced.

However, much may be done in the latter case by occasional dippings, and also in destroying all roughage on the farm. In area B the position is better than it has been for several years. Very few fresh farms were infested, and in the majority of farms where ticks were found on stock in previous years none was found. The position at Waitara has improved; only a few ticks were found this season, and those all on properties previously affected. A constant inspection of all cattle within the area has been maintained, and all cattle within the area have been dipped or sprayed before removal. It is to be regretted that during the season a further development took place regarding cattle-tick in Poverty Bay. Ticks were reported on several properties in an area adjacent to Tolaga Bay. Every endeavour was made to locate and eradicate the parasites in this district. Regular inspection of all neighbouring stock was carried out, and spraying and burning of cover were resorted to, and it is to be hoped that by these means the ticks will be eradicated.

"Bush Sickness," or Soil-deficiency.

That a considerable improvement has been effected on many of the farms within the bush-sick area is apparent to any one familiar with the district during the past decade. On many of the farms dairying is being carried on with reasonable hope of ultimate success, where a few years ago it was impossible to carry stock of any description successfully. A good example of this is to be seen in our own experimental farm at Mamaku. During the past few seasons dairying has been carried on with increasing success. Out of a herd of some twenty-odd cows milked during the past season the returns were good, and the animals maintained their health throughout the season. In fact, their yield and condition were in excess of that hoped for by those knowing the district a few years ago. The altered conditions have been brought about simply by better farming methods—viz., laying down good pastures, suitable top-dressing, frequent changes, and growing roots and hay for winter feed. Notwithstanding the knowledge we have acquired, this is a difficult country for the average settler to bring into a satisfactory state of cultivation. The success of the venture depends to a great extent on the amount of capital at his disposal. A larger amount is required than for outside country, and the average settler going on the land has not the necessary finance. The result is a continued struggle, with the not infrequent result in the past that the settler has had to abandon his land.

The value of citrate of ammonia and iron as a curative agent in this trouble has been demonstrated during the past season. Large quantities have been sold at cost price, and there is still a high demand for it by settlers in the affected areas.

Live-stock Statistics.

Sheep.—A further increase has again to be recorded in the number of sheep as shown by the returns collected on the 30th April, 1926. The increase shown is 357,038, and it is also satisfactory to note that the number of breeding-ewes shows an increase of 233,029. As was mentioned last year, the increase in the number of breeding-ewes is a reflection of the rapidly changing condition in regard to our mutton and lamb export industry. The number of lambs slaughtered at freezing establishments for the year under review reached a total of 5,343,766, an increase of 288,521 on the previous year. The number of sheep as at the 30th April, 1926, is shown in the table hereunder, together with those for the previous four years :—

Year.	Stud and Flock Rams (Two-tooth and over).	Breeding-ewes.	Other Sheep.	Lambs.	Total.
1922	322,072	12,496,054	3,687,672	5,716,461	22,222,259
1923	330,055	13,063,003	3,369,559	6,318,822	23,081,439
1924	332,814	13,076,097	3,853,482	6,513,386	23,775,776
1925	355,579	13,715,223	3,947,429	6,529,724	24,547,955
1926	370,535	13,948,252	4,292,056	6,294,036	24,904,993

Cattle.—A decrease in the total number of cattle is again recorded, and, contrary to previous years, the number of dairy cows shows a slight decrease. The following table shows the position under the respective classes, together with the previous four years :—

Year.	Bulls.	Dairy Cows.	Other Cattle.	Total.
1922	59,086	1,137,055	2,127,082	3,323,223
1923	60,154	1,248,643	2,171,897	3,480,694
1924	58,934	1,312,589	2,192,074	3,563,497
1925	59,820	1,323,432	2,120,492	3,503,744
1926	58,853	1,303,836	2,089,777	3,452,486

Swine.—An increase of 32,409 in swine has taken place, the total number as at January, 1926, being 472,534.

Horses.—Horses again show a decrease, the 1926 figures being 314,867, a decrease of 11,963.

Slaughter of Stock.

The lambing season was a good one, and, the conditions continuing favourable for fattening, the slaughtering season opened early. While prices showed some tendency to fluctuate, they have nevertheless been maintained at a payable basis for the producer, but as by-products have not maintained the values of previous years it is doubtful if the returns on the whole will be sufficient to satisfy exporters. Sheep and lamb slaughterings have been heavier than last year, as have also calves and swine, all of which show substantial increases. Cattle-slaughterings have again decreased, owing to the low prices offering in the overseas market.

The following table shows the stock slaughtered at freezing establishments alone during the year, with the previous year's figures shown also :—

Stock.	Year ended 31st March, 1927.	Year ended 31st March, 1926.	Increase, 31st March, 1927.	Decrease, 31st March, 1927.
Cattle	163,268	206,904	..	43,636
Sheep	2,409,396	2,292,257	117,139	..
Lambs	5,343,766	5,055,245	288,521	..
Calves	57,791	31,358	26,433	..
Swine	201,766	159,852	41,914	..

For purposes of comparison the following table shows the killing of sheep and lambs over four periods—1st October to 31st March in each year—as indicative of the slaughterings from the beginning of each season to 31st March, the end of the year under review, but not the end of the season :—

Stock.	1923-24.	1924-25.	1925-26.	1926-27.
Sheep	1,462,128	1,821,901	1,654,489	1,729,963
Lambs	3,492,004	3,360,761	3,574,508	3,806,498

These figures show an increase of 75,474 sheep and 231,990 lambs for the period 1st October, 1926, to 31st March, 1927, compared with the same period of 1925–26.

The following are the numbers of each class of animal slaughtered under direct inspection during the year ended 31st March, 1927 :—

Cattle	321,039
Calves	100,486
Sheep	3,018,977
Lambs	5,470,710
Swine	379,577

The following table indicates the respective class of premises at which these animals were slaughtered :—

Stock.	Abattoirs.	Meat-export Slaughterhouses.	Bacon-factories.
Cattle	157,771	163,268	..
Calves	42,695	57,791	..
Sheep	609,581	2,409,396	..
Lambs	126,944	5,343,766	..
Swine	136,544	201,766	41,267

At ordinary slaughterhouses for the year ended 31st March, 1927, the stock slaughtered was as follows :—

Cattle	83,946
Calves	2,472
Sheep	238,409
Lambs	23,701
Swine	23,143

In addition, 38,739 carcasses of pork killed and dressed by farmers and sent into butchers' shops were examined by departmental officers.

In connection with the animals shown in the table as slaughtered at meat-export slaughterhouses, the following numbers of the respective classes are returned as having gone into consumption within the Dominion :—

Cattle	38,740
Calves	7,713
Sheep	152,343
Lambs	60,348
Swine	15,312

Compensation paid for Stock and Meat condemned.

Compensation to the amount of £15,715 was paid out during the year for 5,199 animals condemned in the field for diseases under the Stock Act, and £13,963 for carcasses or parts of carcasses condemned for disease on examination at time of slaughter at abattoirs and meat-export slaughterhouses, &c., under the provisions of the Slaughtering and Inspection Act. The aggregate of these amounts shows a decrease on the previous year's figures of £1,205.

Importation of Stud Stock from Abroad.

It is to be regretted that owing to the continued prevalence of foot-and-mouth disease in England breeders of stud stock have not been permitted to make fresh importations of stud cattle, sheep, and swine from the United Kingdom for some years past. It is recognized that the necessity to impose strict prohibition has greatly inconvenienced breeders in their breeding operations, but the necessity to prevent by every precautionary measure the introduction of this disease into the Dominion left no alternative. The position in regard to the disease has improved, but it is not considered advisable to be too hasty in the matter of withdrawing our restrictions. Breeders may, however, rest assured that whenever it is deemed quite safe to do so the question of lifting the prohibition will be recommended, with such additional precautions in regard thereto as may be considered advisable in the circumstances.

A few dairy cattle have been imported from Canada, swine from Australia, and also some sheep (principally merinos) from Australia.

The following is a summary of the various classes of animals which have entered into quarantine during the year: Horses, 4; cattle, 13; swine, 51; dogs, 120.

Exportation of Stud Stock.

The exportation of stud stock (principally sheep) from New Zealand has again shown a promising advance. The following are the numbers of stock exported for stud purposes during the year: Sheep, 5,327; cattle, 57; horses, 16; swine, 5.

Destruction of the Kea.

The subsidy of 5s. per beak paid for the destruction of the kea totalled £766 15s., being equal to 3,067 birds, or a decrease of 830 on the previous year. The payment of this subsidy for some years past has accounted for a considerable number of keas being destroyed, and the damage which they have been credited with in the destruction of sheep should as a result be minimized.

Inspection of Dairy Premises supplying Milk for Direct Consumption.

The work connected with the inspection and registration of dairy premises supplying milk for direct consumption entails constant and careful supervision on the part of the Inspectors employed in the work, in order that the desired standard may be achieved and maintained. The work throughout the year has been carried out successfully, and I am pleased to report that, on the whole, the dairy premises are being maintained in a satisfactory condition. Some difficulty (financial and otherwise) naturally exists in a number of cases in getting all done that is required to bring the premises up to the required standard, and in these cases we have had to be satisfied with such improvements as could be effected.

The amendment to the Dairy Industry Act which was passed and came into force during the year will enable the difficulty which has previously existed in regard to farms held on short tenancy to be overcome, in that the landlord is required to bear a share of the cost of improvements in proportion to the unexpired term of the lease.

In addition to the inspection of dairy premises, where special attention is given to cleanliness, methods of handling, and cooling of the milk, &c., a careful clinical examination of the cows is carried out, and any showing evidence of disease are destroyed; also suspicious cases are subjected to the tuberculin test, and if a reaction is shown they, too, are destroyed. Numbers of composite samples of milk are also collected and subjected to biological examination at the Veterinary Laboratory at Wallaceville and elsewhere, with an exceedingly small number of positive results.

Greater use has been made during the year of the N.Z. patent sediment-tester, further testers having been supplied to officers for use in addition to those previously supplied for the large centres. These testers are of value in affording direct ocular evidence of the condition of the milk in regard to dirt content, and I propose to further extend the supply of them to other districts.

The Veterinary Laboratory.

During the year additional assistance was provided for the Wallaceville Veterinary Laboratory. Mr. D. A. Gill, M.R.C.V.S., D.V.S.M., on account of his aptitude for the work, was transferred from his duties in the field to assist at the Laboratory, and with this assistance the volume of research work carried out has been considerably increased. Some of the diseases on which investigation is in progress, such as renal congestion in lambs, braxy-like disease of sheep, &c., are seasonal, and the time at the disposal of the research officers for field observations in combination with laboratory work is limited in some instances to a few weeks in the year, which of necessity prolongs the work.

The following is a summary of the year's operations prepared by the Officer in Charge, Mr. C. S. M. Hopkirk, B.V.Sc. (Melbourne) :—

During the year a total of 3,292 specimens of various sorts have been examined, 291 less than last year. The slight reduction in the number of specimens has been largely due to the decline of the farmers' interest in mammitis which has resulted from the smaller number who are going in for the use of proprietary vaccines. Actually the specimens have been of wider range and interest than in the preceding year.

Mammitis.—Of 1,704 samples of milk received for examination in connection with this disease 48 per cent. were found affected. A large amount of work was undertaken in the further examination of these milks, and it was found that streptococci were causative in all but five of the cases examined. In these five a bacillus was found which was capable of causing intense mammitis experimentally. This latter form of mammitis is more destructive to the quarter than the streptococcic form, but, fortunately, is not commonly met with. Experimental work on this type of the disease suggests very strongly that it is a secondary infection occurring in a quarter already affected with the streptococcic form. Experimental work on the prevention and cure of streptococcic mammitis has been carried out throughout the year. Curative measures tried included the injection of antiseptics into the udder through the teat in liquid and gaseous form, injection of antiseptic into the circulating blood, and the giving of drugs by the mouth. No good results were obtained. Preventive measures took the form of a vaccine made from streptococci isolated from cases of mammitis in the herd on which the vaccine was to be used (so-called autogenous vaccine). The field-work was carried out by Mr. Webster, Government Veterinarian, Masterton, and the results, while not yet conclusive, distinctly indicate further experiments on these lines. It must, however, be admitted that this form of vaccination has been tried here and elsewhere in the past and has not been successful as a general rule. Mr. Webster also vaccinated some affected cows in an endeavour to obtain a curative effect, but this was quite unsuccessful. In addition to this aspect of the question, we have endeavoured to discover if there is some other way by which the cow may become infected in addition to entrance of infecting germs into the teat duct. Large doses of the germ were given to the cow by drenching, by inoculating the mucous membrane of the mouth, by injecting into the blood-circulation, and also by injecting into the womb after calving, but in no case was there any degree of mammitis resulting from these experiments.

Genital Diseases of Cattle.

Contagious Abortion.—837 blood-samples were received for testing in connection with this disease. This season there is in Wairarapa, southern Hawke's Bay, and Manawatu a total of seventy heifers carrying their first calf which are receiving repeated doses of a specially prepared vaccine against this disease. Results will not be available till August or September, but, should the method prove sufficiently efficaceous to warrant it, it is hoped to extend the treatment to embrace a considerably larger number of animals next season. On the Laboratory farm we are endeavouring to raise a clean herd from the calves of our adults which are badly infected with contagious abortion. The clean animals—eight heifers carrying their first calf, and a bull—are kept in separate paddocks and never come in contact with the old herd. So far the experiment has been entirely successful. Work has also gone forward throughout the year in the way of hastening the agglution test in the hope of giving an even more rapid service to the farmer seeking help in this connection, and in other more technical matters.

Failure of Cows to conceive.—Following on observations made last season, which seemed to indicate a connection between this state and an inflammatory condition affecting the mouth of the womb, field officers have been making special observations throughout the spring and summer. Mr. Webster, together with other officers here, has given a great deal of time and attention to this work. This officer tried the effect of swabbing the inflamed areas with various preparations, but was not able to say that definite benefit had been derived. The cases treated, however, were, in the majority, complicated by the presence of discharge, &c., in the vaginal passage, which vitiated the effect of the dressings applied. A number of swabs were taken from the vagina and the mouth of the womb in such cases, but the most careful bacteriological work at the Laboratory failed to demonstrate any organism present which could be considered as causative. It appears from the results of a large number of blood-tests that there is no connection between this condition and contagious abortion.

Tuberculosis in City Milk-supplies.—Biological tests (guinea-pig inoculations) were carried out on 202 composite milk-samples, and in only five instances was it found that tubercle bacilli were present. More samples would have been tested but that sickness broke out among the guinea-pigs, and this reduced the number available for inoculation purposes.

B.C.G. Vaccine against Tuberculosis. — This is a vaccine prepared in France, and said to prevent tuberculosis in animals and man under certain conditions. Cultures have recently been obtained from France, and calves will be tested during the coming year. It must be realized that a considerable period will elapse before anything can be said as to its efficacy.

Tumours from Stock.—145 specimens of malignant growths were received for examination during the year; 118 of those were growths known as epitheliomata, affecting the eye, vulva, or brand-mark on cattle. The remaining 27 comprised 13 varieties.

Actinomycosis.—A new iodine combination for the treatment of this disease having been found highly efficaceous in human medicine, the same method was tried out on affected cows. One such cow was kept at the Laboratory and given a thorough course of the treatment, but the disease progressed without check in spite of it. Cases tried by field veterinarians gave similar results. The usual treatment, however, is quite effective except in cases too far advanced.

Disinfectants.—Seventeen disinfectants were tested as to their efficiency compared with carbolic acid as a standard on behalf of the Stores Control Board.

Investigational Work in Sheep-diseases.

Contagious Ophthalmia in Sheep.—This was mentioned in the last annual report. During the season outbreaks occurred in Wairarapa and Taranaki, and further investigational work was carried out. It was possible to show definitely that the condition is contagious, but although several different organisms were grown from affected eyes none was itself capable of causing the condition. Neither were we able to demonstrate the presence of a filterable virus, but further work is necessary in this direction. The disease only exists for a brief period in late summer, and, since it attacks young sheep preferably, it would appear that some immunity is gained.

Mortality among Fat Lambs.—An investigation into this condition was carried out in Central Otago in October and November. The results have been reported in full in the April number of the Department's *Journal*.

Abortion in Ewes.—Several reports of this were received last lambing season from the Wairarapa, and work was put in hand forthwith to discover the cause. A germ was eventually isolated from an aborted lamb which it is thought may be connected with the condition, and this suspicion will be tried out during the next lambing season. The organism in question has been inoculated into three pregnant ewes to find whether abortion is actually caused.

Arthritis in Lambs.—An investigation into the cause of this condition was undertaken this season, and specimens were received from four meat-works. An organism has been isolated from these with such frequency and uniformity as to strongly suggest that it is the cause of the arthritis, and this is further borne out by the fact that arthritis can be caused in lambs by injecting this organism into the circulation. It now remains to discover how the organism gains entrance to the body before means can be taken to prevent its occurrence, and this will involve field observations rather than laboratory work.

Braxy-like Mortality among Sheep.—Further work has been done in this connection, and much evidence has been obtained suggesting that the condition may be intimately related to invasion of the sheep's liver by young liver-flukes (*Fasciola hepatica*). It appears that the young flukes, when burrowing into the liver, cause the death of small portions

of the liver-substance, in which a germ closely resembling that of braxy takes up its abode and produces toxins (poisons) which result in the animal's death. Whether this is correct or not requires patient investigation, but, in any case, fluke infestation is a bad thing, and in order to get rid of it three courses are being followed—(1) Drainage of swamp areas; (2) dressing such areas with copper sulphate (both these procedures being aimed at destroying the small water-snails in one of which, probably *Potamopyrgus antipodum* var. *zelandiæ*, the liver-fluke passes a part of its life-cycle—hence destruction of the snails automatically eliminates the fluke); (3) drenching of sheep with carbon tetrachloride or a reliable extract of male fern, both of these drugs being very destructive, though not 100 per cent. efficient, to the flukes present in the liver of the sheep. It is anticipated that the coming season will see a considerable advance in this investigation.

Paralytic Condition in Sheep.—This is a condition that has only recently come under notice, and there has been no opportunity as yet for proper investigation, but the condition is somewhat suggestive of certain plant poisonings which occur in Australia.

Work carried out for other Divisions.

Dairy Division.—Numerous bacteriological examinations have been made of factory water-supplies to determine their suitability or otherwise from a buttermaking point of view. Butter-samples have been examined for moulds and off flavours. A special vacuum process for sealing milk bottles, &c., was tested bacteriologically, but was considered unsafe. Work was also carried out on "gas-holes" in cheese, and so-called "non-acid starters."

Horticulture Division.—Several samples of honey supposed to be poisonous have been tested by feeding to rats. In certain of these there appears to be some irritating substance causing marked inflammation of the stomach a few minutes after being eaten.

Chemistry Section.—Barium carbonate being suggested as possibly suitable for poisoning rabbits, we undertook experiments to discover the dose required, &c. It was found that 7½ grains was the smallest quantity which would cause death of an adult rabbit. With this dose, although the animal was soon unable to move, death might not occur for twenty-four hours.

Poultry Branch.—For this branch we have done considerably more work than usual, probably resulting from the establishment of the poultry-station at the Laboratory farm. Two items are of special interest.

(1) Tuberculin testing of poultry: This has proved very reliable in our hands, using specially prepared tuberculin (avian). The importance of this disease among poultry is not confined to the birds themselves; the fact that pigs may fairly frequently, and cattle occasionally, become infected with tuberculosis of avian origin is now generally recognized, and is a point worth careful consideration, hence the importance of being able to diagnose the disease with certainty among poultry.

(2) Sudden deaths: It has been found that as a result of many post-mortem examinations of such cases that sudden deaths very frequently are due to the presence of minute tapeworms which are found buried in the lining of the intestine. Their small size and the fact that they are embedded in the membrane accounts for their not having been discovered in past cases. Experiments have shown that a drug known as Kamala can be used efficaceously in combating this parasite.

Importation of Animal-manures.

The supervision of the sterilization of animal-manures from Australia and India has been continued during the year. The quantity of animal-manures imported into the Dominion has for some years been declining, but the importations from Calcutta during the past year show an advance, 1,650 tons having been imported. The importations from Australia amounted to only 215 tons. Higher cost of production in Australia is said to be largely responsible for the falling-off in imports from there.

Poultry Industry.

The poultry industry is in a healthier position to-day than for some years past in spite of the reduction shown in the number of fowls kept. This reduction probably represents the elimination of the unprofitable birds, and, as the statistics reveal an increase in the number of holders of large flocks, a greater confidence in the industry is indicated. The improved position in regard to the supply of essential foodstuffs at a reasonable price is undoubtedly responsible for the optimism which no doubt prevails, and it is hoped that nothing will occur to prevent a continuous supply of foodstuffs, particularly wheat, as without this there cannot be success in the industry.

The poultry-breeding and experimental station which is being established at Wallaceville is now nearing completion, and it is intended to hatch out a full complement of chickens during the coming season in order that it may be fully equipped with birds for next season's requirements. Sittings of eggs will also be available for sale; also stock for breeding purposes, particularly male birds for mating.

I append hereunder the report of the Chief Poultry Instructor, who has always manifested a keen and practical interest in everything that pertains to the good of the industry:—

A matter for chief concern relative to the poultry industry is conveyed in the census returns taken during April last (1926). These show that there were, including fowls, ducks, geese, and turkeys, 3,781,145 head in the Dominion, as against 3,991,009 in 1921, indicating a decrease of 209,864 birds. Fowls decreased numerically from 3,491,567 in 1921 to 3,308,384, a decrease of 183,183; ducks declined from 379,988 to 352,030, and geese from 46,234 to 43,879. Turkeys, on the contrary, increased in number from 73,220 in 1921 to 76,852 in 1926. The heavy culling of stock and the curtailment of hatching operations which took place during 1924 and 1925 owing to the food-shortage and the high prices charged for it were almost solely responsible for the reduction of stock during the census period.

During the year high prices have generally ruled for fresh eggs and table poultry, whilst food-prices have been somewhat easier. Consequently the average producer has had a good year. By this, together with the prospects of a greater and cheaper food-supply, producers have generally been encouraged to increase their flocks during the recent hatching season. As a result, it is safe to assume that the reduction of stock which took place during the census period has been caught up, possibly exceeded. Whilst the census returns show a decrease in stock, it is pleasing to note that the householders keeping fowls, irrespective of other poultry, increased by 11,102.

The most gratifying feature conveyed in the returns is the increased number of people keeping large flocks, or, in other words, sufficient to provide the whole or greater part of a livelihood. In 1921 ninety-six people kept flocks ranging from 500 to 900 and forty-one kept 1,000 and over, whilst in 1926 there were 148 and sixty-six respectively. With the advanced knowledge now available relative to the breeding and management of large flocks, an extension of large plants may be looked forward to with confidence. Notwithstanding the severe test with which the industry has been faced, it is gratifying to be able to report that 3,293 cases of eggs containing thirty dozen each were exported to the London market during the year. These were sold at a f.o.b. price, and consequently no official report has been received regarding them. Cabled reports, however, go to show that the line realized 10s. a case more than Australian or South African eggs. Favourable comment has also been cabled relative to the quality of the eggs and the methods

of packing, &c., the credit of which is due in a large measure to the Poultry Instructors, who supervised the work of testing, grading, and packing. It is unfortunate that owing to food-shortages the industry receives a periodical set-back, as the New Zealand poultry-producer is in a unique favoured position so far as markets are concerned. The price obtainable for his products on the local market are all that could be desired, whilst, owing to having opposite seasons, any summer surplus of eggs can be exported to London at payable prices to the producer.

The erection of the new poultry-station at Wallaceville is now nearing completion. Already there are over five hundred birds on the plant. It is expected after the forthcoming breeding season that the farm will be fully stocked and equipped. The chief functions of the plant will be to demonstrate up-to-date methods in the management of poultry, to supply sittings of eggs, and birds for breeding purposes from tested stock, at moderate prices; and also to conduct experiments by way of investigating problems connected with the various branches of poultry work which are beyond the scope of the average producer to carry out.

During the year the Poultry Instructors have been busily engaged in complying with the many requests for their services by delivering lectures, giving demonstrations, visiting plants, and generally imparting the elements of profitable poultry-keeping to farmers and poultry-keepers in all parts of the Dominion.

Wool.

The good season which the sheep of the Dominion went through was reflected in the improved condition of the wool. The quantity of wool which has come forward shows an excess over the previous year, and the increase at the end of the season should be a substantial one.

The price obtained during the season is expected to average a little over 12d. per pound, being a slight increase on that of the previous year. The market price would now appear to have become stabilized at or about its present level. Any tendency towards a movement in the price shows indications of being in an upward direction.

The following table shows the average price per bale obtained in the different selling centres throughout the Dominion for the past and previous year respectively :—

	1925-26. (per Bale) £ s. d.	1926-27 (per Bale) £ s. d.	Increase per Bale. 1926-27. £ s. d.
Auckland	15 12 11	16 8 10	0 15 11
Napier	16 15 11	17 4 0½	0 8 1½
Wanganui	16 15 1	17 5 0½	0 9 11½
Wellington	17 8 6	18 5 8¾	0 17 2¾
Christchurch	17 1 8	19 15 6½	2 13 6½
Timaru	17 0 5	19 9 0¾	2 8 7¾
Dunedin	17 2 11	19 16 4½	2 13 5½
Invercargill	14 14 11	15 19 11½	0 15 0½

As will be gathered from the table, those districts growing the finer wools obtained a relatively higher average increase, showing this class of wool to be in better demand by the buyers than during the previous season.

The matter of wool-deterioration has been receiving the attention of departmental officers, and with a view to assisting farmers to improve the quality of their wool by using rams showing purer wool the examination of wool staples from rams has been taken up by the Department and reports supplied to the owners. In this way and by practical demonstrations at lectures and on the farms much good work in the direction of improvement should be accomplished and many of the defects removed. The trouble is, however, more apparent in small flocks, when the selection of a ram, unfortunately, does not always depend so much on the question of the quality of the wool as on the price at which it can be purchased. So long, therefore, as purchasers of rams neglect the question of the quality of the wool, so long will wool-deterioration be a burning question. Another matter which has a very decided bearing on the question of wool-deterioration is that of the retention of the ewe lamb for the future flocks, and greater care is necessary to see that the best of the ewe lambs are retained for this purpose and not the culls. No breed can be exempt from wool-defects if breeding is not carried out with proper regard to maintaining and improving quality; but as the Romney Marsh is our dominant breed, particularly in the North Island, that breed has naturally received most mention from abroad in regard to wool-defects. The trouble is one not so much of breed as of breeding.

The question of jute-fibre in wool has also received attention, and various "all-wool" wool-bales and treated jute-bales have been examined and reported on. The all-wool bale is not yet satisfactory.

Swine Husbandry.

The development of the pig industry has been slow, but the past year has shown a somewhat more satisfactory increase. It is also a promise of greater development ahead to note the increased activity in stud-stock breeding which is taking place throughout the Dominion. A considerable number of stud pigs (mostly Large Whites) have been imported from Australia during the year, and a keen demand has also been manifested for the purchase of good stud stock bred in New Zealand. The statistics taken as at the 31st January, 1926 (the last available), show an increase of 32,419 pigs compared with the previous year, and exports have increased during the year from 39,175 cwt., of a value of £146,668, to 90,630 cwt., of a value of £341,868. The Department has endeavoured on all possible occasions to stimulate an interest in the pig industry as one offering good prospects for increasing our exports, but it is nevertheless recognized that the matter is largely one of economical production in order that the price available might be a payable one. A demand exists for out production of frozen pork at what appears to be a payable price, and there is an insistent demand for it from the trade in England, so if production costs can be reduced to a minimum the export should be profitable.

Rabbit Nuisance.

The unremitting efforts which have been waged against the rabbit pest since this Division took over the work in 1919 and so organized its staff as to allow of the most effective work possible being concentrated on the administration of the provisions of the Rabbit Nuisance Act have given good results. This year has shown such an improved position in regard to the reduction of the pest that the hope of reducing the pest to a minimum shows greater promise of fulfilment than ever before in the history of the rabbit pest in New Zealand. An improved position is reported from all over the Dominion, and although there are still some isolated cases where the improvement is not quite so satisfactory, particularly in the most southern part of the South Island, the decrease is, on the whole, most marked. The North Island is to-day in a most favourable position in regard to the pest. Knowing the almost unanimous feeling that exists in the desire to push the rabbit right out, I feel satisfied that the present improved position can be more than maintained.

The Rabbit Boards have continued to do good work, and are to be congratulated on the results of their operations. A keen interest has been manifest throughout and the co-operation which has taken place between the members of the Boards and the Department and its Inspectors has been a satisfactory feature of their operations and has contributed largely to the success achieved.

During the year sales of strychnine amounted to 13,758 oz. This poison is rapidly taking the place of phosphorized pollard.

Amendments to the Rabbit Nuisance Act are necessary, particularly to those parts of the Act pertaining to the respective Boards, and I trust that it will be found expedient to have these amendments brought forward for consideration by Parliament during the coming session. The necessity to bring down amendments in order that various anomalies might be removed, particularly in respect to the machinery clauses of the Act, has been recognized for some time, and Rabbit Boards have pressed for them. A measure consolidating the Rabbit Nuisance Act and containing the amendments now required has been practically completed, and as the principal amendments pertain to what might be called the machinery clauses of Parts II, III, and IV of the existing Act relating to Rabbit Boards, as asked for by the Boards' representatives, they are recommended for early consideration.

I append hereto the following extracts from the reports of the District Superintendents at Dunedin, Christchurch, Wellington, and Auckland respectively in regard to the condition of their respective districts :—

District Superintendent, Dunedin.

It is gratifying to be able to report a decided decrease in the state of the rabbit pest, although Southland inspectorates have not shown an improvement as compared with the Otago portion of the district. This, to my mind, is accounted for by more trapping in the former and less trapping and more poisoning in the latter. Canning and freezing of the rabbit is going on in Southland, while very little of this is heard of in Otago. Some of the pastoral country in Otago that was a few years ago literally swarming with rabbits is now in a very creditable condition. The pest has been reduced to a minimum, there is feed in abundance, more sheep are being carried, whilst both the wool-clip and the lambing percentages have increased. There are, however, always the dilatory landowners who do little or nothing towards control during spring and summer.

There is no doubt about the wet spring and summer of 1926 following somewhat similar conditions of 1925, assisted by the more general use of strychnine with carrots and apples in winter, strychnine and oats in summer, together with considerably less trapping, whereby the natural enemy increased and did good work, was responsible in a marked degree for the satisfactory improvement manifested. The cutting-down and in some cases the total eradication of overgrown gorse hedges which had not been dealt with for many years has also made an apparent difference.

Fumigation with either the smoke (the king of all in large warrens), carbon-bisulphide, or calcium-cyanide fumigators, where well carried out, are all giving good service. An improved light calcium-cyanide blower, known as the "Feeny pump," has been invented and manufactured in New Zealand. This was put on the market this season at £4 10s., and, I understand, a large number have been sold. These little machines are more durable and cheaper than the Buzacott blowe .

Owing to the improved state of the pest, prosecutions this season have been fewer.

A decrease in phosphorized-pollard sales took place during the year by 42,725 lb., and as last year's sales of this commodity were below 1924–25 by 37,736 lb. a total decrease of 80,461 lb. has occurred in two years. Our output for the current year was only 52,937 lb. Probably the abnormally wet spring and summer reduced the output considerably. Nevertheless, strychnine is gradually becoming more popular, and although our sales of this dropped from 7,484 oz. in 1925–26 to 6,510 oz. in 1926–27 our supplies were exhausted at the season when most in demand. Private vendors, however, came to the rescue, and were able to supply all that was required.

Rabbit Boards.—The Rabbit Boards remain as before, four in number, and these show an improvement on present years' operations.

Hereunder is a summary of rabbit-poison and material sold to the public, used on Crown lands, Native lands, and railway-lines, together with a comparison to the previous year :—

Article.	Sold.		Crown Lands.		Railway-lines.		Native Lands.	
	1925–26.	1926–27.	1925–26.	1926–27.	1925–26.	1926–27.	1925–26.	1926–27.
Phosphorized pollard (pounds)	95,662	52,937	2,965	2,390	3,875	3,107	179	144
Phosphorized oats (pounds) ..	3,532	2,861	88	200	191	141	6	31
Bisulphide (pounds)	..	26	530	497	672½	812	20½	8
Phosphorus (pounds)	172	69	..	..	..	..	..	..
Strychnine (ounces)	7,484	6,510	21	36	..	..	..	2
Cartridges (number)	..	..	1,017	740	..	..	..	..

District Superintendent, Christchurch.

Weather conditions during last winter were exceptionally mild, thus enabling settlers to carry out the work of rabbit-destruction right through the winter and spring. This was especially fortunate for back-country runholders—a marked contrast with the previous winter, when so much energy and material was wasted by adverse weather conditions. On the other hand, on account of the mild winter, rabbits commenced breeding much earlier than usual—in fact, in some localities adjacent to the seaboard they bred right throughout the winter. As a result settlers had

to contend with numbers of young rabbits in the late spring and early summer. However, it is pleasing to be able to state that owners generally co-operated very well with the Department's Inspectors, and, generally speaking, there is a very marked improvement in comparison with last year. Inspectors were instructed to bring pressure to bear on occupiers of rabbit-infested areas to carry on destruction work throughout the summer months, and I am certain that the present satisfactory state of the district as regards rabbits is in no small measure due to the very satisfactory work carried out during last summer.

Strychnine and carrots, and strychnine and oats, are the usual methods adopted for poisoning during the winter and spring months. The demand for phosphorized pollard is decreasing year by year in this district. This is no doubt due to the disappointing results obtained from this poison, especially where settlers have to keep harassing the rabbits during the greater part of the year. On areas where rabbits have been reduced to such an extent that all that is required is a thorough poisoning once a year, excellent results are still obtained from the use of phosphorized pollard. During last summer settlers in the Kaikoura, Rotherham, and Amberley districts have gone in for fumigation on a fairly extensive scale with calcium cyanide, cynogas (a crystallized form of calcium cyanide), or carbon bisulphide, and results were highly satisfactory. All the Inspectors report a reduction in rabbits in comparison with last year—in fact, the position generally is undoubtedly much more satisfactory than for many years.

During the year approximately 25,000 lb. of phosphorized pollard were sold from the depots in this district, and approximately 2,500 oz. of strychnine were sold. It may be quite safely stated that at least an equal amount was sold by the local firms dealing in this poison. The amount of carbon bisulphide sold from the depots was slightly over 2,600 lb.

District Superintendent, Wellington.

The various Rabbit Boards throughout the district continue to do good work, and I am pleased to be able to report a continued reduction in the numbers of the pest in each Board's area. On lands controlled by this Department's Inspectors I am pleased to be able to report a general reduction also, and am in hopes that within the next few years we will have the pest reduced to a minimum throughout the whole district. There is a good deal still to do before this happy condition will be accomplished, but if the reduction continues year by year, and new Boards are formed where rabbits are in evidence, I have every hope of ultimate success being obtained.

District Superintendent, Auckland.

The condition of the pest may be briefly described as very satisfactory. Reports from every inspectorate in the Auckland Province record a very marked decrease, which, as the result of my personal observations, I am in a position to endorse.

On extensive areas in Waikato where four or five years ago the country was literally alive with rabbits only an occasional one can now be seen, and the rabbit-infested appearance of the country is fast disappearing. Although the present condition of the pest has ceased to be the serious menace of a few years ago, it is recognized that there are still a sufficient number about to again become a very serious problem if given the opportunity. The experience gained by settlers during the war and immediate post-war period is, no doubt, valuable, in that there can be no argument as to the enormous damage which can result from a rabbit-invasion even in the case of closely settled, high-class land. The prevalent contention that rabbits cannot increase to the extent of being a serious menace in such country has been completely exploded, and the experience thus gained should be a sufficient insurance against any serious neglect in controlling the pest in the future.

Although, speaking in general terms, the rabbit nuisance is now well in hand, there are still patches in most of our rabbit-infested districts which require very careful attention. These patches are generally to be found on the poorer-class lands, the owners of which in many cases are financially embarassed; also on the extensive areas of more or less unoccupied Native lands, which, as a general rule, are overgrown with all manner of weeds and rubbish, providing a sanctuary to the pest which is a perpetual menace to the community.

In the northern peninsula a badly infested area was discovered in the Moengawahine and Maungakahia districts. The main source of supply was located at the head of Moengawahine Valley, on unoccupied "individualized" Native lands. This block, which is fairly extensive, is apparently only partially partitioned, the individual owners in such case being unable to identify their respective holdings. The control of rabbits on this class of country is extremely difficult. However, it is imperative that the rabbits be reduced to a minimum, and means will be found to have the necessary work carried out without delay.

The extensive areas of Crown and unindividualized Native lands situated in the backblocks of Rotorua and Taupo districts are now clearer than they have been for many years, with the exception of a block of approximately 60,000 acres situated in the East Coast Rabbit Board's district east of Rangataiki River. This block is less satisfactory, and was the subject of a special report in March last.

The methods of rabbit-destruction employed here have been similar to those of former years, except that strychnine poison has to a greater extent than before taken the place of phosphorized pollard.

The various Rabbit Boards operating throughout the province continue to do excellent work, and are the subject of favourable reports by Inspectors in charge of all the districts where they are operating. The closer contact between the ratepayers and their Board members is no doubt productive of a personal influence which makes for a greater measure of co-operation and combined action than can result from the efforts of any individual officer.

Sales of phosphorized pollard from Frankton Junction depot show a further decided drop for the year ended 31st March, 1927, as represented by the following comparative table:—

	1926.	1927.
Despatched to Wellington District	19 tons	4½ tons.
Despatched to Auckland District	29 ,,	2¾ ,,
Sales of strychnine	1,739 oz.	1,988 oz.
Sales of carbon bisulphide	373 gal.	379 gal.

The increase in sales of strychnine to a certain extent accounts for the decreased demand for phosphorized pollard, but the main reason is to be found in the general diminution in the number of rabbits in the country.

Noxious Weeds.

The Administration of the Noxious Weeds Act has been carried out during the year in an endeavour to effect some improvement in the condition of the weed-infested lands of the Dominion without asking for impossibilities, and, while no doubt some improvement has been effected, the difficulties surrounding the question of noxious weeds do not diminish. Blackberry is admittedly a serious weed and one that constitutes a problem in its control, but it is a question as to whether ragwort is not sometimes a more difficult economic problem on lands where it has taken possession. It was necessary during the year to prosecute occupiers to the number of 202 for failure to carry out the reasonable requests of the Inspectors.

I quote hereunder the following extract from the annual report of the District Superintendent, Auckland, whose remarks on the question of noxious weeds appealed to me as being indicative of the position as it affects the Dominion as a whole :—

This pest may, I think, be given pride of place among the various nuisances with which settlers in the Auckland Province have to contend. The matter of eradicating or preventing the further spread of weeds is an ever-present problem to the settler as well as to the officers of this Department. Unfortunately, it is generally found that the more generally infested lands are of doubtful quality, and occupied by a class of settler whose financial embarrassment is more or less chronic. Adverse criticism is frequently made by the casual observer on what at first sight might appear neglect or apathy on the part of the occupier on the one hand, and the Inspector on the other, in that he has failed to enforce the penal clauses of the Act in such case; but if the real cause underlying such apparent neglect were more generally known it would present a very different picture, and would give some indication of the struggle being made by some of our less-favoured settlers. But, even with a full knowledge of the hardship to be inflicted, the Inspector is frequently, although reluctantly, compelled to punish the individual in the community's interest.

The matter of dealing economically with weed-infestation of vast areas of Crown and Native lands in this province is one of the greatest problems with which we are confronted. The present condition of weeds on these lands is of grave consequence, and constitutes a very real danger to extensive areas of privately owned and reasonably clean lands. Native lands more particularly, which are almost invariably weed-infested, present difficulties in the matter of controlling weeds, which are practically insurmountable. Many blocks which have come under the influence of the Court, and have been investigated, ownership established, and a partial partition made, reach a point where the legal interpretation of the term "unindividualized" becomes an unknown quantity. Then, again, we come up against a number of cases where individualization in the more literal sense has been effected, but as the result of incomplete survey it is quite impossible to identify the different allotments. Although notices are served on the several owners, no action follows, and in such cases it is quite useless to attempt any legal action, consequently the weeds continue to flourish and spread to the annoyance and detriment of surrounding settlers. Delay in obtaining the authority of the Native Department in respect of clearing weeds on unindividualized Native lands has made it impossible to proceed with any clearing during the past season, and the moneys available could not be expended. This is regretted, as the value of work previously carried out is to a great extent lost.

Blackberry, which is prevalent throughout the province, and was formerly looked upon as the most serious of the scheduled weeds, is being forced into second place in many districts a the result of more rapid spread of ragwort. Large areas formerly covered with blackberry are now apparently permanently recovered by the use of paspalum, encouraged by top-dressing with artificial manures. This method of control is more successful from Waikato northwards, where the climatic conditions are more favourable to the growth of this grass. Crown lands, huge areas of which are badly infested, have received as much attention as the limited means at our disposal would permit. The moneys available have been expended where work was most urgently required, and where the greatest measure of permanent benefit is likely to result.

Ragwort.—The rapid spread of this weed is of most serious consequence to all classes of farming operations, more particularly so to those engaged in the dairying industry. In parts of the King-country serious losses have already been reported, affecting both cattle and sheep. Settlers are now beginning to recognize that, if they are to carry on, this weed must be controlled, and, on the whole, a very commendable effort has been made. The seriousness of the case calls for drastic action against defaulters. They must be made to recognize their responsibilities in the matter; undue leniency on the part of the controlling officers would not be in the best interest of the district or the individual. The efforts of the majority must be supported even at the risk of hardship to the few. In view of this I have been forced to recommend a number of prosecutions, being convinced that such action will ultimately be most beneficial to the whole. In districts where this weed has not yet become established to any great extent it is astonishing to note the indifference of many farmers to the odd plants which appear on their properties. One might reasonably expect that they should to a greater extent be guided by the unfortunate experience of those who have already suffered in ragwort-infested districts.

Shearers' Accommodation.

The administration of the Shearers' Accommodation Act has continued to be carried out by this Division, and it is satisfactory to report that a gradual improvement in the accommodation provided generally is being effected. Consequent on complaints to the Hon. the Minister of Labour regarding the conditions of the accommodation provided on the East Coast and Hawke's Bay districts more particularly, arrangements were made for a comprehensive inspection of the sheds in these districts by a responsible officer, and a copy of his report was supplied to the Hon. the Minister of Labour. Generally the accommodation was found to be satisfactory. In all cases when the contrary was found instructions were issued and arrangements made to enforce compliance. In a number of cases bunks and mattresses were not in evidence, and these were ordered to be supplied. It is usually asserted that the Native shearers, who are largely employed on the East Coast, do not use the bunks when provided; but, on the other hand, complaints were made by representatives of the Maoris that they are not provided, and in the circumstances it is not unreasonable to require that they be available for use.

Staff.

All officers have shown a genuine desire to carry out their various duties to the best of their ability and with one purpose only. While it is unavoidable that officers administering statutes such as the Noxious Weeds Act and the Rabbit Nuisance Act may sometimes come into conflict with settlers, the endeavour is that they should do their utmost to carry out their duties with a minimum of friction. Considering the nature of that portion of their work, it is in my opinion creditable that they manage as well as they do. These duties are of a worrying and trying nature, and the officers engaged on them are not usually overwhelmed with compensation. I think it only right, therefore, that they be accorded a word of appreciation when the work of the year is under review.

DAIRY DIVISION.

REPORT OF W. M. SINGLETON, DIRECTOR.

The Season.

Weather conditions during the year have, on the whole, been excellent from a dairying standpoint. Favoured with a fairly mild spring and a regular rainfall throughout the summer months, in most districts there has been an abundance of succulent feed available for dairy cattle, thus ensuring a high production of butterfat.

Hay crops have been exceptionally good, root crops are fairly plentiful, and it is anticipated that dairy cows will commence their next lactation period in excellent condition.

Production.

It is satisfactory to record that the production of butterfat exceeded that of the previous year, and came within a few tons of equalling the 1924–25 record year, favourable weather conditions, together with an increased area of pastures top-dressed with fertilizers, being influencing factors to this end. It is anticipated that the actual dairy year which closes on the 31st July next will show a small margin in production over the peak dairy year ending July, 1925.

Quality of Butter.

Probably during no period in the history of dairying in New Zealand has the quality of butter shown such a satisfactory improvement as during the past year. Contributing factors towards this have been the introduction of a "finest" grade, differential advances by the Control Board for the different grades of butter; the complusory grading of cream; improved methods in the collection of cream in some districts; prizes offered by the Dairy-produce Control Board to dairy companies showing the greatest improvement in their average grade; farm dairy instruction; and the keenness on the part of dairy-factory staffs to turn out a high-quality article.

There is a general inclination amongst managers to use less material in partially neutralizing the acidity in cream, and complaints of "soda" flavour are now rarely heard. The body and texture of the majority of our butter is of a highly uniform character and the moisture is evenly distributed.

Whey Butter.

The quality of this class of butter has evidenced some improvement. Extra care has been taken in the handling of whey cream, but further efforts on the part of some of our cheese-factory managers is desirable in this connection to enable buttermakers to manufacture a higher-quality article. The elimination of "press fat" from this product, as provided for in the Dairy Regulations gazetted on the 25th November last, has had a desirable effect on quality.

Quality of Cheese.

The quality of cheese justifies a good deal of satisfaction. As in the case of butter, factors have been in operation which have tended to induce suppliers to forward a better quality of raw product, and to encourage factory-managers and assistants to put forward greater efforts to turn out the best quality possible. Some of the troubles experienced in past years, such as slimy milk, and milk in which the development of lactic acid is a difficulty, were much less in evidence during the season.

The finish of our cheese still shows improvement, and the use of a cheese-hoop which enables factory-managers to turn out a rimless cheese is becoming more general.

The pasteurization of milk for cheesemaking is steadily becoming more general, the quantity of cheese so manufactured being equal to 86 per cent. of the output, as against 76 per cent. the previous year. Further installations of plant are contemplated during the winter.

Storage of Cheese and Butter.

The storage of cheese and butter prior to shipment now gives general satisfaction. All cheese is pre-cooled, and, generally speaking, butter is held at suitable temperatures. Attention to temperatures at time of shipment is given by the graders in charge, and the shipping companies give this matter special attention during loading operations. The shipping supervisor of the Dairy-produce Control Board pays special attention to the suitability of storage conditions on Home steamers.

QUANTITIES OF BUTTER AND CHEESE FORWARDED TO GRADE STORES FOR YEARS ENDED 31ST MARCH, 1927 AND 1926.

Port.	1927.		1926.	
	Butter.	Cheese.	Butter.	Cheese.
	Cwt.	Cwt.	Cwt.	Cwt.
Auckland	870,946	237,787	759,042	224,948
Gisborne	15,570	..	15,250	..
Napier	18,216	2,453	18,854	1,876
New Plymouth	116,108	306,035	104,137	293,716
Patea	27,718	348,818	21,599	338,990
Wanganui	70,068	84,647	68,174	44,534
Wellington	150,870	241,028	152,866	299,442
Lyttelton	40,483	27,479	40,024	22,852
Timaru	10,735	14,173	10,191	11,735
Dunedin	34,344	36,991	26,662	35,393
Bluff	12,799	215,764	9,460	188,720
Totals	1,367,857	1,515,175	1,226,259	1,462,386

INTRODUCTION OF "FINEST" GRADE.

Since the inception of the grading of dairy-produce in New Zealand three grades have been in use—*i.e.*, "first," "second," and "third." This year it was decided in the interests of the industry to create an additional grade for high-class quality, and as from the 1st September, 1926, "Finest" grade, to include all creamery butter and factory cheese scoring 93 points and over, came into operation. As an incentive to factory-managers to produce "finest" quality, the Dairy-produce Board are advancing a premium of ½d. per pound for butter and ¼d. per pound for cheese graded "finest" over and above the advance for first-grade quality. That this is a forward move is evidenced by the fact that 68·94 per cent. of the butter graded scored 93 points and over against 45·87 per cent. for the previous year, and 50·16 per cent. of cheese, as against 21·06 per cent. Furthermore the percentage of second grades dropped from 5·46 per cent. in 1926, to 3·95 per cent. this year for butter, and from 3·97 to 3·51 per cent. for cheese.

MARKETING.

The market conditions during the year under review have been comparatively unsatisfactory from the point of view of the New Zealand dairy-farmer. During the latter end of the 1925–26 season many dairy companies, instead of meeting the market, preferred to hold their butter for higher prices, which they considered would obtain during the August–September period. The holding was overdone, and whereas prices ruled from 170s. to 178s. per hundredweight from April to July inclusive, they receded during the August–November period until "price-naming" was commenced by the Dairy-produce Board about the middle of the latter month. At that time prices for butter had reached the comparatively low level of 144s. The coal strike in England, which was followed by the more general strike, commenced in May and lasted some six or seven months. This produced very unfavourable conditions for trade in the United Kingdom, and it is considered a direct and important influence toward the reduction of prices for our dairy-produce. This would refer to the stored butter of the 1925–26 season. Price-naming came in with reference to the new season's butter about the middle of November, and during the December–February period prices ranged from 170s. to 176s.; but between the latter end of February and the middle of March, when the Board discontinued price-naming, prices had receded to 160s. Price-naming was then discontinued by the Board, and immediately prices fell to around 146s. When discontinuing price-naming, however, the Dairy-produce Board stipulated that only 90,000 boxes of butter and 45,000 crates of cheese were to be sold per week. Prices have since gradually recovered, and are now above those named by the Board immediately prior to its recession from price-naming. It would appear that the position respecting demand and supply was much less unfavourable from the New Zealand producers' point of view than was presumed to be the case by those who induced the Board to permit free selling. A special feature in connection with this season's experience is that a larger proportion of butter than usual went to markets other than the United Kingdom. Owing to the unfavourable climatic conditions in Australia the make of the Commonwealth was curtailed, and a considerable quantity of butter was exported to Australia. Considerable quantities have also found their way to Canada, United States, South Sea islands, and the East. Other quantities have been re-exported from the United Kindgom to North America.

Cheese-prices have evidenced a trend in very close sympathy with butter. They were influenced in the same direction and about the same time. It is also considered that the comparatively low prices for meat have had a "bearing" influence on cheese-prices.

Value of Exports.

Prices for both butter and cheese have been substantially lower than for the previous year, and despite the increased output the returns for these two main classes of dairy products show a decline of £390,725. Including butter, cheese, dried milk, casein, condensed milk, and milk-sugar, a total value of £15,232,471 was reached, as against £15,746,904 for the previous year—a total decrease of £514,433.

Casein.

The quality of casein continues to be of a uniformly high standard. Rennet casein commands a high market value, being particularly low in butterfat content. Quantities manufactured for export show a slight increase over the preceding year of 14½ tons, the figures being 1,613½ tons lactic and 151 tons rennet casein, as against 1,126 tons lactic and 624 tons rennet.

Testing Butter for Water Content.

This work continues to be carried out with very satisfactory results, buttermakers having maintained a very even water content in their butter during the year. 133,206 churnings were tested, the average water content being 15·15 per cent. as against an average of 15·174 per cent. during the previous year. The number of churnings over the legal limit represent a percentage of 0·694, and these were returned to the dairy companies to be reworked with drier butter.

Branding of Dairy-produce with National Brand.

Soon after the Dairy-produce Control Board functioned consideration was given to the establishment of a national brand for creamery butter and factory cheese intended for export, and after collaboration with the Division it was finally decided that the time was opportune to institute a brand of this description for all "finest" and "first" grade creamery butter and factory cheese, as from August, 1926. Competitive designs were invited and a prize offered to the successful designer. The brand finally decided on took the form of a fern-leaf with the word "New Zealand" through the centre of the leaf, and replaced the factory brand through the centre of the usual circular impress die.

Cream-grading.

Although the grading of cream and the payment of a differential price for different classes had extended on a voluntary basis during the year, the general position in many districts was still unsatisfactory. For some time the consensus of opinion amongst the majority of suppliers and those in control of dairy factories was that the grading should be made compulsory, and during the year the Department was requested to prepare the necessary legislation to give effect to this proposal. Regulations along this line were therefore gazetted on the 25th November, 1926, and became operative from that date. Two months' time was allowed dairy companies to appoint the necessary cream-graders. The Division fixed the standards for "finest," "first," and "second" grade creams, carried out the examination of all applicants, and issued certificates to successful candidates. To date, these certificates number 481. Generally speaking, dairy companies fell into line without any undue delay, and this new system is now working comparatively smoothly.

Farm Dairy Instruction.

It is regretted that this work has had a temporary setback in so far as the number of Farm Dairy Instructors is concerned, there now being thirty-three of these officers, as against thirty-eight last year. Two new appointments were made during the season, and one dairy company terminated the official engagement of seven officers in order that work outside of the scope of the Division could be undertaken in addition to that of farm dairy instruction.

That this branch of the service is of inestimable value to the industry is evidenced by the advancement in quality of the dairy-produce manufactured by dairy companies employing an officer of this status. Now that cream-grading is in general operation, dairy companies would be well advised to give serious attention to the employment of these officers. The ideal method would undoubtedly be to make the work general throughout the Dominion on the block system, as in operation at present in the Manawatu and Palmerston North districts.

Inspection of New Zealand Produce in Great Britain.

This work is still being carried out by Mr. Walter Wright, with the assistance of Mr. A. C. Ross. Many reports have been received on the quality of dairy companies' exports, and copies of these have been forwarded to the factories concerned. Subjects of importance to the Division have also been fully reported on. The value of the work carried out by these officers is fully recognized by the industry.

Preservatives in Butter.

Dairy companies are reminded that the use of preservatives in butter consumed in the United Kingdom will be prohibited as from the 1st January, 1928. The majority of dairy companies in New Zealand manufacture their butter intended for export free of boron compounds, and the period of grace allowed since this regulation came into force should enable those dairy companies which have been using preservatives to make the necessary adjustments in ample time.

Dairy Laboratory and Experimental Factory.

When the previous annual report of this Division was prepared it was anticipated that before now the Division would have had in operation its bacteriological and chemical laboratories and small

experimental dairy factory equipped for the manufacture of butter and cheese. The report of Sir Frank Heath caused the erection to be deferred. Much consideration has since been given the matter, and the decision to erect a Dairy Institute at Palmerston North has made a revision of the previous decision necessary.

It has now been decided that the Dairy Division's laboratories shall be on the land belonging to the Crown at Palmerston North and adjacent to or in the buildings erected for the purposes of the Dairy Institute. Dairy Division officers are to have access to the Dairy Institute dairy factory when the Division desires to undertake experimental work. While the arrangement has certain disadvantages, it is hoped the future will prove the decision to have been made wisely.

General Regulations under the Dairy Industry Act, 1908.

Reference has already been made to the Dairy-produce General Regulations gazetted in November last. The regulations these supersede were gazetted in 1899. Many of those old regulations were no longer applicable. Many new phases of endeavour in connection with the industry had been undertaken, and any administration in connection with these from the Department's standpoint had to come directly under the general provisions of the Dairy Industry Act in a general way rather than under the regulations. A few regulations had been made subsequent to 1899, and the latest regulations not only amend the original regulations by deletions and consolidate those retained, but they have been so extended as to be quite up to date so far as present requirements necessitate. The necessity of gazetting special regulations this season with reference to the compulsory grading of cream made it appear to be wise to give effect to the revision and extension and consolidation to which reference has been made. It is pleasing that the consideration given to this work was such that no serious complaint has since arisen. Much credit is due to Mr. F. S. Pope, Assistant Director-General, for lengthy painstaking work in this connection. Constructive criticism of the earlier drafts by such bodies as the Dairy-produce Control Board, the executive of the National Dairy Association, the Proprietary Dairy Factories' Association, the Milking-machine Vendors' Association, the Federation of Dairy Factories in south Taranaki, and representatives of South Island dairy companies manufacturing butter is gratefully acknowledged.

The issue of these regulations is causing more work to devolve on officers of this Division. One phase of this new work includes the testing for accuracy of all Babcock or Gerber test bottles and pipettes used in the testing of milk or cream when payment is to be made on the basis of pounds of butterfat. This work is being undertaken during the winter months, so as to cause least possible inconvenience to dairy companies. Further, we have made arrangements to do the work at Auckland, New Plymouth, Wellington, Lyttelton, and Dunedin. This should meet the position in a very practical manner.

Certificate-of-record Testing of Purebred Dairy Cows.

The past year failed to improve the position regarding our certificate-of-record testing, a further decrease in the number of entries having been experienced. During the calendar year 1926 some 756 certificates were issued, as compared with 506 for 1925. In December, 1926, there were 700 cows on C.O.R. test, which was the highest number under this test for any one month during the past season. This compares with 786 for the month of September, 1925. The 700 cows mentioned were tested by 205 breeders, making an average of 3·41 per breeder, which, from this point of view, shows an improvement over the figure of 2·84 for the 1925–26 season.

Association Testing of Ordinary Herd Cows.

Statistics relating to herd-testing show that during the season 1925–26 some 169,776 dairy cows were tested for butterfat-yield. Our figures for 1926–27 are not yet to hand, but it is not expected that an increase over the previous year will be evidenced. Of the total just quoted, 105,227 cows were tested under the "group" method.

The Dairy Division continues to render assistance by carrying out a proportion of the testing-work, and during the season just ending our officers have done the testing of samples and figuring of returns for 8,601 cows. Of this number, returns for 6,740 cows have been compiled at the Dairy Division's headquarters. The 8,601 cows tested by Dairy Division officers were included in forty-four associations.

Staff.

The able assistance rendered by Mr. W. E. Gwillim, Assistant Director, is gratefully acknowledged. Messrs. J. O'Dea and S. Clayton, Graders in Charge at Wellington and Lyttelton respectively, have continued their additional duties as Supervising Graders, and made periodical visits to the various grading-ports in their respective districts.

The season has been a particularly busy one for the staff, and their willing and efficient service is highly appreciated. The instructors in buttermaking have had a very arduous time in the initiation of the compulsory grading of cream, and the fact that there have been but few complaints in connection with the cream-grading testifies to attentive, tactful work on the part of these officers.

Appreciation.

The valuable assistance rendered by the Department's Chemist, the Bacteriologist, also the helpful co-operation of the Forest Products Branch of the State Forest Service, are gratefully acknowledged. Thanks are also extended to the cattle-breeding associations and to the various freezing companies for their able and willing assistance during the year.

HORTICULTURE DIVISION.

REPORT OF J. A. CAMPBELL, DIRECTOR.

The Fruitgrowing Industry.

Generally speaking the year just closed has been a satisfactory one to the fruitgrower. The crop of pip-fruit (apples and pears) was a fair average one. Damage by hail-storms, which were experienced in a number of commercial fruitgrowing districts, reduced the quantity of fruit suitable for export. The stone-fruit crop was on the light side, but the satisfactory prices realized for this class of fruit made up for the short supply. In portions of the Otago Central district, which produces stone fruit of high quality, considerable damage was done to the apricot and cherry crops by a blizzard in the early part of the season.

A steady increase is taking place in the area planted in citrus trees, particularly lemons, and satisfactory crops of good-quality fruit are being obtained. In the Tauranga district, which is well adapted to citrus culture, it is estimated there are approximately 160 acres planted in lemon-orchards.

The tomato season was a successful one. In the Nelson district frosts in the early part of the season caused heavy losses in young plants, both under glass and outdoor. Replanting, however, was undertaken, and the production was much better than anticipated, most growers receiving satisfactory returns. A considerable increase in glasshouses for tomato-culture is noticeable throughout the Dominion.

Small fruits, such as strawberries, raspberries, and gooseberries, have given good returns, heavy crops being harvested in some localities.

In the majority of commercial orchards, where proper measures were taken, the bulk of orchard pests and diseases were kept well under control. There are still, however, a number of growers who neglect to keep their trees clean, and it was found necessary to take proceedings against some of these in different districts during the year.

The cool weather conditions did not favour the development of black-spot disease.

Brown-rot, bronze beetle, red mite, and leaf-roller caterpillar were fairly conspicuous in a number of localities.

Pear-midge continues to be a troublesome pest, more especially in the northern districts, doing considerable damage to the young shoots, and thereby causing loss of fruit. The experimental work carried out by officers of the Division in co-operation with the Biological Laboratory for the control of this pest has not yet produced any satisfactory results.

Although fireblight disease has been less virulent in the infected areas, it has made its appearance in the Manawatu, Wairarapa, and Hawke's Bay districts, and the question of gazetting the whole of the North Island a fireblight area is at present under consideration. Energetic measures are being taken to keep the disease under control, and fruitgrowers generally are co-operating with the Department in this direction.

Reports to hand indicate that good work continues to be done by the *Aphelinus mali*—the natural enemy of the woolly aphis—some orchards being kept entirely free of this pest by the ladybird. Many requests for parasitized insects were received from various parts of the Dominion, and the necessary material has been supplied.

The total area in commercial orchards for the whole of the Dominion stands at approximately 30,000 acres. During the last planting season some 264 acres were planted, the largest extensions being in the Hastings and Motueka districts.

A considerable area of neglected and abandoned orchards was cut out during the year, particularly in the Nelson district, thus removing a serious menace to clean orchards in the vicinity.

Fruitgrowers generally are adopting up-to-date orchard appliances in the way of power sprayers, tractors, mechanical fruit-graders, and other packing-shed equipment to facilitate the handling of fruit.

The installation of stationary spraying plants is also receiving attention, several of these having now been installed, and are reported to be giving satisfactory service. One of the main advantages of the stationary outfit is that spraying can be carried out immediately after rain, whereas with the ordinary horse-drawn vehicle it is frequently necessary for two or three days to elapse before the land is in a suitable condition for haulage purposes.

Export of Fruit.

The 1926 export season was a record one since the inauguration of the fruit-export trade. As the result of a bountiful harvest a total of 730,308 cases of fruit were exported, which was over three times the quantity exported during the previous season. Of this total, 656,611 cases of apples and 9,410 cases of pears were shipped to Great Britain; 61,185 cases apples to South America; 2,619 cases apples to Honolulu; 444 cases apples and 39 cases pears to the Pacific islands. The bulk of the fruit was exported under the Government guarantee of 1d. per pound net return to the grower. While the majority of the shipments arrived in good condition, the market at Home was unfortunately considerably affected by the coal strike. This, in conjunction with the arsenic scare, was largely

responsible for the low prices realized, and as a result the demands on the guarantee were heavy. Satisfactory prices were received for the fruit shipped to South Africa. One direct shipment was made at Port Nelson, where the s.s. " Port Hobart " loaded 71,000 cases of apples.

A guarantee has been given to cover shipments of apples and pears made during the 1927 season. A slight variation has been made in the conditions applying under the guarantee, in that the grower is guaranteed a gross market price of 11s. 6d. per case. With respect to South American markets the gross price is considered to be the c.i.f. price, plus 1s. 6d. per case selling charges.

It is expected that a total of approximately 670,000 cases will be shipped during the 1927 season—600,000 cases to Great Britain and 70,000 cases to South America.

The Canadian fruit-export case has been adopted as the standard export case for the 1927 season, and is giving general satisfaction.

With the exception of that from Otago, all fruit has been exported under the jurisdiction of the N.Z. Fruit-export Control Board in co-operation with the N.Z. Fruitgrowers' Federation. Colonel Gray, who acted as the Board's representative in England last season, and who did valuable work in connection with the distribution of New Zealand fruit on the Home markets, is again acting in a similar capacity this year. It is satisfactory to be able to report that the Board has the full confidence of the majority of commercial fruitgrowers in the Dominion, little criticism being raised in regard to its operations.

Local Markets.

Close attention has been given to the inspection of New-Zealand-grown fruit at shops and auction markets. The great increase in the quantity of apples exported overseas reflected somewhat on the local markets, there being a tendency to flood the markets with low-grade fruit. The marketing of this class of fruit is not profitable to growers. It is hard to dispose of, deteriorates rapidly, and also has the effect of lowering the prices for high-quality fruit. Pears were in moderate supply during the year, and the quality, on the whole, was good. Owing to light crops generally, the supply of stone-fruits did not keep pace with the demand, and consequently the returns received were very satisfactory. Vegetables have been fairly plentiful and prices good. The new regulations as to fair packing of fruit and vegetables have been responsible for more uniformity in packing.

A considerable number of warning notices were issued to growers offering disease-infected fruit for sale, and also for other breaches of the regulations governing the sale of New-Zealand-grown fruit for local consumption.

Instructional and Experimental Work.

The demand on the officers of the Division for advice and instruction on the many phases connected with horticulture continues to be considerable. Every effort is made to comply with these requests by correspondence, lectures, and practical demonstration, and the work of the Division in this respect is keenly appreciated by growers.

Following the usual custom, classes in fruit grading and packing have been conducted by the Orchard Instructors in the main commercial centres during the winter months in co-operation with the fruitgrowers' associations. These were well patronized, and a number of those attending subsequently sat for the departmental examination, several gaining certificates of competency in apple grading and packing. Practical demonstrations in pruning, spraying, &c., were given during the year in the different districts. Examinations in these subjects were also held and a fair percentage of passes recorded.

The testing of several new spraying-compounds has been carried out in co-operation with reliable fruitgrowers. These tests usually require to cover at least two seasons before any definite pronouncement can be made as to their efficacy or otherwise.

Experiments are being conducted for the control of brown-rot of stone-fruit in the Auckland district, Coniothecium and black-spot of apple-trees, Moutere Hills, and strawberry disease, Auckland. Apple and citrus variety tests are also receiving attention in several districts; and avocados are being tried out in the Thames and Gisborne districts, and persimmons in Otago and Hawke's Bay.

Officers of the Division have been co-operating with the Biological Laboratory staff with the view of determining some reliable means of controlling the earwig pest, which has become a serious menace to the stone-fruit grower, particularly in the Otago Central district. The use of hedgehogs and various baits is being tried, but so far no appreciable reduction of the pest is noticeable. Growers are in great hopes that the parasite which has recently been introduced by Dr. Tillyard, of the Cawthron Institute, will be a success. The matter is at present in the experimental stage, large supplies of earwigs having been forwarded to the Institute for the insects to work on.

The periodical heavy losses sustained in Central Otago from late spring frosts have made growers seriously consider some method of combating them, and it is anticipated a definite attempt at orchard-heating will be made during the coming season. Full information on frost-fighting methods is being supplied by the Division, and the Department is also assisting in the carrying-out of tests in this direction.

The only co-operative fruit-testing area at present in operation is that established at Tanekaha (North Auckland), which is planted in mixed fruit-trees. This is making satisfactory progress, but definite results will not be available for a season or two. The agreement in regard to the citrus-test area planted at Henderson in 1919 terminated during the year, and the plot was handed back to the owner.

Fruit Cool Storage.

The storage capacity of the fruit cool stores was fully taxed during the year, and the bulk of the fruit kept in good condition. It is very satisfactory to report that as a result of the continued investigations carried out in the Nelson district by Mr. R. Waters, of the Biological Laboratory, with the assistance of officers attached to this Division, there was very little sign of flesh-collapse in the Nelson and Motueka cool stores during the past year. Arrangements have been made for the carrying-out of investigations in regard to fruit cool storage in the Auckland district during the coming year.

Viticulture and Wine-making.

The area planted in vineyards is steadily increasing, the total area now under grape-vines being estimated at approximately 261 acres. The past season was very unfavourable to grape-production, both outdoor and under glass, continuous cold wet weather experienced in most of the vine-growing areas preventing the proper ripening of the fruit, which as a result was low in sugar content. Considerable damage was also done by hail to outdoor-grown crops, and fungus disease was more prevalent than usual. Downy mildew made its appearance in several districts in the North Island. Energetic measures are being taken to keep this somewhat serious disease under control.

In consequence of the abnormal season the grape crop, both table and wine-producing, was considerably below the average. The quantity of wine produced in the Dominion is estimated at 60,000 gallons, valued at £24,000, which is well below that of the previous year—viz., 85,000 gallons, valued at £34,000. There is a good demand for hothouse-grown grapes, and a number of new glass-houses have been erected during the year.

Cider-making.

The making of cider is receiving increased attention in districts throughout the Dominion, a large number of fruitgrowers now recognizing that the manufacture of this beverage is a profitable side-line to their business. It is estimated some 60,000 gallons of cider were produced valued at approximately £13,750—an increase of 10,000 gallons as compared with the previous year's figures. Up-to-date cider mills and presses are now being made in the Dominion, several of these having already been turned out to order.

Te Kauwhata Horticulture Station.

The weather experienced during the year was extremely wet and unseasonable, and, while it was favourable to grass production, the conditions were totally unsuitable for the production of most fruits. Grass was very slow in starting in the early spring, but after September the growth was phenomenal. Approximately 30 tons of hay were secured from 12 acres which had been shut up for the purpose. Eleven acres were sown in swedes, and 4 acres of old worn-out pasture were broken up and laid down in permanent grass, both crops being now in a flourishing condition. About 30 acres of the wattle plantation have been cleared and burnt, and a portion of 3 acres stumped and ploughed during the winter. This is now carrying a crop of swedes.

The breeding-ewes wintered satisfactorily, with only a slight mortality, which was due no doubt to the excessive wet weather experienced during the lambing period. The returns received from the sale of live-stock were: Wool and skins, £118 4s. 5d.; fat lambs, £313 7s. 2d.; fat sheep, £66 16s.; cattle, £27: total, £525 7s. 7d. There being little demand for wattle-bark, none was stripped from the plantations during the year. Approximately 60 tons out of 100 tons on hand at the end of last financial year were sold to tanners. Timber-cutting on a royalty basis was carried on, and a fair quantity of firewood was cut and sold locally. The revenue from the plantations for the year was: Wattle-bark, £524 4s.; firewood, £129 4s.; posts, £5 13s. 6d.; royalties, £263 6s. 3d.; grazing-rights, £6 10s.: total, £928 17s. 9d. The gall fungus is still making headway in the plantations, and has caused a large number of trees to die out during the year.

Considerable difficulty was experienced in carrying out cultural and spraying operations in the vineyard owing to the continued wet weather. The adverse conditions prevented free pollination, and as a result the grape crop was a very light one. The manurial experiments in the vineyard, which were commenced last year, were continued, but they were hampered as regards definite results by the extremely wet weather experienced right throughout the growing-period. It has been decided to continue the experiments for another two seasons.

Wine-sales were not quite so brisk as those of the previous year, but are considered, on the whole, satisfactory. The quantities of wine sold during the year are as follows:—

	Quantity. Gallons.	Value. £ s. d.
Frontignac	8,297	4,037 0 6
Madeira	2,770	1,483 6 7
Claret	216	133 15 5
	11,283	£5,654 2 6

The above represents a decrease of 1,648 gallons and £857 4s. 8d. in value as compared with the previous year's figures.

An addition has been made to the cellar buildings. This will relieve the present cramped conditions, and will also tend to economize labour in the handling and storing of wine.

Orchard-registration and Orchard-tax.

A total of 6,347 commercial orchards were registered during the year and tax-demand notices issued to the occupiers. The amount collected under this voluntary orchard-tax was £1,571 9s. 7d., which was handed over to the New Zealand Fruitgrowers' Federation, Ltd., Wellington, less cost of collection. Some difficulty is experienced in getting all taxable orchardists to register and pay the tax. While the majority recognize their obligations in this respect, there are some who neglect to comply with the regulations. Proceedings had to be taken in a number of instances for non-registration and payment of tax.

Registration and Inspection of Nurseries.

This work is proceeding satisfactorily, the bulk of the nurseries being comparatively free from disease. There has been an increase in the number of nurseries registered, the total being 637, as against 593 for the previous year. £637 was collected in registration fees.

New Zealand Institute of Horticulture.

The New Zealand Institute of Horticulture is now becoming firmly established, and is receiving the support of scientists, nurserymen, fruitgrowers, and horticulturists generally, who recognize its value and importance to the well-being of the country. Matters connected with nomenclature, improvement of economic plants by selection and hybridization, and training of young men and women in all branches of horticulture are some of the main features of the work of the Institute.

Several inquiries have been received from persons desirous of obtaining instruction in horticulture, and the establishment of a central School of Horticulture, referred to in previous reports, is a matter that is strongly advocated by the Institute.

Imported Fruit, Plants, etc.

The Fruit Inspectors report that the bulk of the consignments of imported fruit, plants, and bulbs arrived in good condition. With the exception of Auckland, the total quantities imported show a slight decrease as compared with the previous year's figures. A falling-off took place in the quantity of lemons imported from Sicily.

The quality of the fruit from Australia was not up to the usual standard, several consignments of mandarins arriving in very poor condition. There was an increase in fruit-imports from United States of America, due to the removal of the embargo in connection with foot-and-mouth disease. A considerable improvement is noticeable in the quality and packing of oranges and bananas from the Cook Islands.

Most consignments arrived clean and free from disease. One or two lines were condemned and destroyed on account of fruit-fly infection, and a quantity of almonds and walnuts had to be similarly dealt with for Indian meal-moth. Fumigation was found necessary in connection with a few consignments found on examination to be affected with live scale. Importations through the parcel-post show an increase. With very few exceptions bulbs were of first-class quality, and bulb-mite was considerably less conspicuous.

Hop-culture.

Reports received from the Nelson and Motueka districts indicate that the hop crop is an exceptionally heavy one, nearly all the gardens returning a record crop. With the limited demand for New Zealand hops on the Home market, some little difficulty will be experienced by growers in disposing of their stocks at payable prices. The quantities and values of hops exported during the last five years ended 31st March are as follows: 1923, 2,243 cwt., £21,153; 1924, 3,883 cwt., £27,615; 1925, 4,469 cwt., £31,112; 1926, 3,608 cwt., £21,780; 1927, 2,937 cwt., £15,203. It will thus be seen there was a considerable falling off in the quantity exported during the year.

Tobacco-culture.

It has been fully demonstrated that tobacco-leaf of high-grade quality, both for pipe and cigarette smoking, can be produced in certain localities in the Dominion—notably Nelson, Hawke's Bay, and Auckland. In order to assist in ascertaining the possibility of establishing an export trade in New-Zealand-grown tobacco-leaf, the Government recently granted a guarantee to growers on all tobacco-leaf approved for export by the Department. The guarantee is offered in respect to tobacco-leaf exported during 1927, 1928, and 1929, and the grower is guaranteed an average gross market price of 2s. 3d. per pound on the open market in London on all leaf of Class 1 and 1s. 4d. per pound on leaf of Class 2, the gross liability of the Government not to exceed £3,500 in any one year.

This offer is being taken advantage of by a number of growers in the Motueka district, where some 30 acres have been specially planted under the supervision of an Instructor in Tobacco-culture appointed by the Department. All operations—planting, cultivation, curing, &c.—are being carried out under the direction of the Instructor, and it is expected that some 10 to 20 tons of leaf will be available for export at an early date. A branch of the Nelson District Tobacco-growers' Association has been formed at Motueka for the purpose of furthering the interests of the tobacco-growing industry in that district.

Later.—Since the foregoing was written, developments have taken place which preclude the possibility of the Government being called upon to proceed with the guarantee on tobacco for this season.

The Beekeeping Industry.

The past honey season varied considerably throughout the Dominion. In the early spring the weather conditions were very unfavourable, and beekeepers experienced a trying time in keeping colonies up to normal strength. The situation was satisfactorily handled by the more experienced commercial men, but a number of less experience sustained considerable losses. The advent, however, of better weather later in the season resulted in a good honey flow in most localities. In the Auckland and Waikato districts the crops were lighter than usual. Good average returns were secured in Taranaki, Hawke's Bay, Marlborough, and West Coast. The crops in the Canterbury, Otago, and Southland districts were above the average. The average quality of this season's honey crop is excellent. There is every indication that the industry continues to expand, several new commercial apiaries having been established during the year, and considerable extensions made to existing ones.

The demand for information and advice from persons intending to take up beekeeping as a means of livelihood, and others already engaged in the business, is also increasing. Inspectional and instructional work has been well maintained during the year. Public lectures and practical demonstrations were given by the Apiary Instructors in different localities in their respective districts and were well patronized.

Good work has again been carried out by the part-time Apiary Inspectors in assisting with the inspection of apiaries for disease. In addition to the districts covered last year, a start was made in the North Auckland, Taranaki, and South Canterbury districts. This system of inspection enables concentrated action to be taken in cleaning up districts of disease and box hives. Proceedings were taken during the year against a number of persons for breaches of the Apiaries Act, 1908.

The grading of all honey for export has been attended to at the various grading-ports during the past season by the Apiary Instructor at Hamilton (Mr. T. S. Winter). The bulk of the honey graded for export is of prime-grade quality, and the packing and branding of the packages well up to the requirements of the regulations. The total quantity of honey exported during the year was 10,590 cwt., valued at £34,695. Figures showing quantities and values of honey exported from the Dominion during the last five years are as follows: 1923, 10,605 cwt., £43,032; 1924, 9,157 cwt., £26,910; 1925, 10,836 cwt., £30,549; 1926, 15,770 cwt., £51,733; 1927, 10,590 cwt., £34,695.

Under the Honey-export Control Act, 1924, all honey for export to the United Kingdom, the Irish Free State, and the Continent of Europe comes under the jurisdiction of the New Zealand Honey Control Board. There is every indication that the Board has the confidence of the bulk of commercial beekeepers in the Dominion.

Registration of Apiaries.

The triennial registration of all apiaries from one hive upwards, which was to have taken place in June, 1926, was held up pending an amendment to the Apiaries Act, 1908, which was not dealt with by last session of Parliament. This will no doubt receive attention during the coming year, and a date be fixed for apiary registration. The total number of registered apiaries now stands at approximately 7,500, representing some 100,000 colonies of bees.

Staff.

Thanks is due to all members of the staff of the Division for their loyal co-operation during a strenuous year's work. It is with deep regret that I have to record the death of Mr. G. H. Sargeant, Apiary Instructor, Christchurch, which took place in January last. The deceased was a very capable and energetic officer, and a great loss has been sustained both by the Department and beekeepers generally.

FIELDS DIVISION.

REPORT OF A. H. COCKAYNE, DIRECTOR.

The Season and Crops.

Agricultural operations in the earlier part of the season were considerably hampered by unsettled weather, but conditions much improved about New Year, and a good summer and autumn from the pasture point of view have been experienced generally, particularly in the North Island. The exceptional growth of grass resulted in greatly increased amounts of both hay and ensilage being made in most localities. There is every prospect that the coming winter will be a good one from the stockowners' point of view.

The season's cereal harvest has proved to be an exceptionally good one so far as actual threshings to date have disclosed. While actual figures are not yet available, it is estimated that 222,000 acres of wheat were sown, as against an actual sowing of 151,673 acres in the previous season. For the 1925–26 season the 151,673 acres yielded a total of 4,617,041 bushels, or 30·44 bushels per acre. The estimated Dominion average yield per acre for 1926–27 was 33·92 bushels, or approximately 7,500,000 bushels total yield. Actual threshings to date show that the yield per acre is 38·02 bushels, which is approximately 4 bushels above the estimated yield. At the yield of 38·02 bushels per acre 5,436,622 bushels have been secured up to the present. This yield is obtained from about 143,000 acres. This leaves approximately 79,000 acres still to be threshed. Even if the average yield of this 79,000 acres dropped to between 26 and 27 bushels the total yield would equal the estimated 7,500,000 bushels. It is hardly likely that the average for the remaining 79,000 acres will drop from 38·02 bushels (obtained for the first 143,000 acres) to 26 or 27 bushels, and I feel confident our actual wheat-supply will exceed the estimated supply.

As far as the oat crop is concerned, threshings to date average 43·25 bushels per acre. This is between 5 and 6 bushels per acre above the Dominion average for the last five years, and over 3 bushels above last season's actual yield. The area in oats for 1926–27 was estimated at 405,000 acres, as compared with 347,511 actually harvested in the previous season. The position in respect of oats and oaten chaff is therefore highly satisfactory.

The area in potatoes in 1926–27 was estimated at 24,500 acres, as against an actual area of 23,484 acres in 1925–26. The yield per acre in 1925–26 was 6·09 tons per acre, giving a total yield of 143,781 tons. Assuming that the yield per acre in respect of the crop now being dug equals the Dominion average over a number of years of 5·55 tons, we will produce about 140,000 tons. This would leave a fair quantity above Dominion requirements available for export, but unfortunately our nearest market—Australia—is at present closed to us.

The top-dressing of grassland with phosphatic manures has increased enormously. The extension of this top-dressing practice must be reflected in an increased output of the Dominion's primary products, the more so as the top-dressing of grassland is not being restricted to areas on which the manures can be applied by machinery, but is extending to hilly sheep-country where the fertilizers have to be applied by hand. In connection with the top-dressing of hill country at least two good patent distributors have been invented. These lighten the work considerably and make it possible for a man to cover a much larger area per day, and with greater comfort, than he could otherwise do.

Second-growth Country.

The experimental work on the hill country reverting to secondary growths in the centre of the North Island has been carried on, and full reports published, as information became available, in the Department's *Journal*.

A commencement has been made by the Lands Department to start demonstration farms under the provisions of the Deteriorated Lands Act. These farms it is intended shall be run by a committee comprising the Chairman of the Deteriorated Lands Board, the Commissioner of Crown Lands for the district, and the senior Instructor in Agriculture for the district. The work at present being performed by this Division's field officers for the Lands Department in connection with advances under the Deteriorated Lands Act, particularly in the King-country, has assumed large proportions, and it will probably be necessary to appoint additional officers if the work in connection with the loans in question is to be properly carried out.

Instruction in Agriculture.

The instructional staff was strengthened during the year by the appointment of several additional Instructors. This extra assistance is greatly appreciated, but more men are necessary before instruction can be as widespread as one would like. However, it is quite recognized that expansion must of necessity be gradual, and that sufficient staff to put instruction on an intensive basis cannot be provided with great rapidity.

Farm Economics.—The officer appointed in 1925 to deal with farm economics in New Zealand is making good headway in the work. To get sufficient data to enable a proper examination to be made in respect of any particular branch of farming is a work of some magnitude, and rapid progress cannot be expected. At first farmers were rather diffident about giving the desired information, particularly that relating to finance, but with a better understanding of the position no great difficulty is now experienced. Once the farmer is assured of the purpose of the inquiries, and guaranteed that any information given by him will be treated in the strictest confidence, he is, as a general rule, quite willing to do all in his power to further the investigations.

Experimental Areas.

Puwera.—Dairying operations were continued on this area, and the herd increased to twenty-one head. The carrying-capacity of Puwera is a cow to 2 acres, and the results to date give increasing evidence in favour of the clay gum lands being capable of being converted into small dairy farms, provided finance is available for the initial breaking-in of the land.

Albany.—The small experimental area at this place having served the purpose for which it was originally established was closed during the year.

Marton.—The work at this farm has been much on the same lines as the previous year, and comprised mainly an elaborate series of top-dressing trials. Full details will be supplied later in a special report.

Ashburton.—Wheat variety trials have been continued, as have also the soil-fertility-increase trials. Work in the selection of pure lines of seed potatoes is also carried out.

Gore.—The main work at this area has been the testing of different varieties of field roots and potatoes—in the case of the former particularly from the aspects of dry-rot and club-root.

Winton.—This area was taken over during the year by a local committee and is now run as a subsidized farm. The work conducted at Winton in the management of pastures has had a great effect on grassland management in Southland.

Galloway.—Dairying operations have been continued at Galloway to demonstrate the butterfat capacity of irrigated soil in Central Otago. A detailed report will be submitted so soon as the season has closed.

Waimaunga.—Dairying has been carried on at Waimaunga during the year, and so soon as the season closes a detailed report will be furnished.

Subsidized Farms.—The subsidized farms at Stratford, Manaia, and Dargaville have continued to do useful work. As indicated above, a fourth subsidized farm is now in being at Winton.

Co-operative Experiments.

Co-operative experimental work has been conducted in various localities throughout the Dominion. A few of these experiments are of a demonstrational character, but the majority are conducted on modern lines of experimentation, where the results can be accurately interpreted on statistical lines. This latter method is the best one from an instructional standpoint.

Winter Farm Schools.

The holding of farmers' classes was continued during the winter of 1926. As far as possible the classes were limited to about two days in each centre, instead of devoting a week to each place. This enabled the lecturers to visit an increased number of centres, and as a consequence a much larger number of farmers were enabled to attend the lectures. These classes are extremely popular, and the instruction given is much appreciated.

Ruakura Farm Training College.

This institution continues to meet the popular demand, and an increased number of students is in residence. At present there are fifty-two students, and this number necessitated the appointment of an additional Instructor during the year.

Boys' and Girls' Agricultural Clubs.

These clubs are still conducted in various parts of the Dominion, and a considerable increase in the number of clubs has taken place, especially in Taranaki, Wellington-West Coast, and Wairarapa districts. They are doing good work.

Farmers' Field Competitions.

These competitions continue to flourish. Interest in them is well maintained, and their value to the farming community is undoubted.

The Hemp Industry.

The principal phormium areas are reported as healthy in regard to the condition of the plant. Phormium-cultivation has been much to the fore, and the formation of several new companies for the growing and milling of phormium has been quite a feature of the year.

The production of fibre during the year showed a decrease when compared with the previous year, but this decrease was the result of heavy floods in some phormium-milling areas in the early spring of 1926.

The amount of hemp graded for the year ended 31st March, 1926, was 87,871 bales, as compared with 93,875 for the previous year, a decrease of 6,004 bales. The quantity of tow graded was 25,445 bales, as against 25,211, an increase of 234 bales. Of stripper-tow 2,079 were graded, as against 2,979, a decrease of 900 bales. The number of bales of stripper-slips graded was 2,629, as against 3,430, a decrease of 801 bales. Of the hemp graded 9·12 per cent. was good-fair, 47·29 per cent. high-fair, and 30·75 per cent. low-fair grade; 12·37 per cent. of the tow was first grade, 67·85 per cent. second grade, and 15·04 per cent. third grade; stripper-tow was 3·36 per cent. first grade, 80·95 per cent. second grade, and 15·58 per cent. third grade; of stripper-slips 53·25 per cent. was second grade, and 46·75 per cent. was below that grade, but of this latter amount 43·48 per cent. was allowed to be exported for use mainly in the manufacture of cheap lashings, for which it has been found useful.

Biological Laboratory.

Research connected directly with the problems of primary production has been extended during the past twelve months, there being a marked increase in the demand for this class of work. This demand—not merely local, but an outstanding sign of the times throughout the Empire—has called for the visit of notable oversea authorities, and the formation of various scientific bodies to inquire into, advise upon, and provide for the development of scientific and industrial research in New Zealand; considerable monetary provision for this advance has, in fact, already been made. Coincidentally, therefore, with these events arose another highly important feature of the past year's work—namely, the discussion and planning of various methods of reorganization whereby the activities of this laboratory might be wisely extended and improved, properly co-ordinated with those of other scientific institutions, and generally brought to a standard commensurate with the demands of the present time. Pending the settlement of those broader issues such matters as the accommodation of the present staff and the reconstruction of the seed-testing staff have had necessarily to remain in abeyance.

Seed-testing Station.

8,627 seed-samples were tested, showing an increase of 481 over the number for the previous year. With the exception of 111 samples, the whole of the number required germination tests and approximately 20 per cent. an additional purity test. It is obvious, judging by the districts from which samples are received, that most of the testing is concerned with seed production and export, as, with the exception of Auckland, the number of samples received is roughly proportional to the intensity of seed production and export. The bulk of the imported samples, together with about half the retail samples and a small proportion of the export samples, are received from Auckland.

A good standard of quality is being maintained, although there is undoubtedly a considerable amount of poor-class seed yet being sown. Noxious-weed-seed contamination, judging by the appearance of such seed in grass and clover samples, is slightly on the increase.

Following are notes on seed-production for the period under review:—

Rye-grass: Southland and Canterbury experienced unfavourable harvesting weather in 1926, and, while the yield was good and the seed of good appearance, germination was poor. In consequence there has been a large carry-over of second-grade seed into 1927.

Crested dogstail: The 1926 crop in Southland was frosted in the milk stage, and the yield was greatly reduced. The Sandon yield was also below average, so that last year dogstail was the scarcest and dearest of the grass-seeds. This shortage coincided with a European crop-failure, so that in dogstail peak prices were reached the world over. Had the New Zealand crop been normal, excellent export business would have been done. The 1927 crop is a good one, and prices are already reduced.

Chewings fescue: The wet season in Southland in 1926 forced the growers to leave the fescue out for over two months, so that an excellently matured crop resulted. The American demand was particularly good, and both American and British buyers were very pleased with their deliveries. An investigation recently carried out demonstrated the value of thoroughly matured seed for export purposes, and the 1926 crop ably upheld this. The 1927 crop has shown a good yield, but the very dry season "rushed" the crop to ripeness, with the result that little of the seed is as fully matured as in 1926. The carrying-quality will be watched with interest.

Brown-top: Production of brown-top in Southland has increased considerably. Last year good export business was done, and the indications are that this year the combined southern and Canterbury crops will more than meet the export and local demands. The ability of the southern merchants to buy farmers' dressed seed at a reasonable figure has enabled them to deliver fully dressed seed at a fair price, so that the export demand has firmed.

Danthonia: The saving of Danthonia pilosa seed commenced in Canterbury last year, and it would appear that the South Island will become one of the chief sources of supply. The Canterbury samples are of a particularly high quality, and are free from the usual high percentage of impurity met with in Hawke's Bay seed.

White clover: Heavy importations of white clover were made during 1926 with a fair export of New-Zealand-grown seed. The New Zealand wild white-clover seed business is still unsatisfactory. In the absence of guarantee the British merchants either do not care to handle New Zealand seed or purchase any New Zealand seed and retail it as wild white.

General: The arrangement whereby analyses for the purposes of the Canadian Seeds Importation Act, 1923, are made at this station has worked smoothly and has been responsible for an entire absence of trouble during entry at Canadian ports.

The need for changing over to the almost universally adopted Continental system is evident, especially in export and import business, where it becomes necessary to compare overseas with New Zealand analyses.

Laboratory work in connection with the pre-drying and sealed storage of seeds, the causes and extents of variations in germination tests, and co-operative tests with other countries, have been undertaken during the year.

Agrostology.

General work on the grass-lands of New Zealand has been steadily pursued. This general work is directed largely towards the classification of grassland types, towards the evaluation of each type, and towards the determination of successional development of those types under the varying factors that operate or may be brought to operate upon them under the respective types of farm-management in vogue.

The pasture type growing on any one soil is affirmed to be an exact measure of the environment summed up in the soil, the climate, and in the pasture-management conditions under which the pasture sward is growing. The determination and measuring of the exact biological phenomena that guide the increase or decrease of species in the change or successional development of grassland associations is fundamental to the production and utilization of grass on the best possible lines. Up to the present time the determination of the part played by each of the various factors that operate to produce change in the composition of the pasture sward has been made almost entirely by eye. Work along the lines of exact measurement is most desirable and during the year some progress has been made in this direction by the application of the point method of pasture analysis. This consists of taking a large number of points with a small instrument called the point-analyser and calculating from the figures secured not only the species present in the pasture, but also the percentage of ground that each species is covering. By this instrument the increase or decrease of the component species of any pasture sward over a number of years may be measured and recorded. Changes in composition induced by alterations in the plant-food content of a soil may be measured, and it seems possible to express in terms of increase or decrease of the components of the sward virtually all those factors that operate in the production of grass.

Mineral Content of Pastures.

A committee has been set up by the Department of Scientific and Industrial Research to advise on work in this connection in New Zealand. It would appear that most of the work performed in Great Britain and elsewhere on the mineral content of pastures has for its objective the determination of definite mineral deficiencies that lead to definite malnutrition of stock. This work also is of importance to New Zealand, but doubtless it should form but a part of a larger and fuller scheme that has for its objective the total nutrient content of pasture herbage.

The determination of the nutrient content of the constituent species of pastures is important mainly from four aspects: (1) From the point of view of formulating the highest potential food-value pasture mixture possible to secure on each soil-type; (2) from the point of view of determining the optimum milk-producing life-form stages, as distinct from the non-milk-producing life-form stages, fattening and non-fattening life-form stages, of the herbage of the component species of the pasture on each soil-type; (3) from the point of view of determining nutrient (including mineral) content alterations that occur on top-dressed land; (4) from the point of view of determining on certain soil-types mineral deficiencies that result in definite stock malnutrition.

Before we can really claim to be in the best position possible we must know the species thoroughly—(1) morphologically, (2) ecologically, and (3) chemically. Determination of relative nutrient content will help towards maximum efficiency in regard to mixture formulæ. The determination of nutrient content at different stages in the life-form of the individual should throw much light on why certain farm practices are preferable to others. The stage of growth underlies a fundamental principle in pasture-management, and virtually the whole of efficient pasture-utilization has for its objective the maintaining of the pasture herbage in that condition of growth that stock produce their best when grazed upon it. In other words, there is a stage in the growth of all species when nutrient content is at a maximum. The determination of this maximum point by chemical analysis would be of infinite value towards directing pasture-management on the best possible lines.

The part played by top-dressing in providing a better-balanced mineral ration to stock may be to some extent measured from chemical analyses of the herbage from top-dressed and un-top-dressed soils, and in the case of definite malnutrition areas the determination of some mineral shortage may lead to corrective methods along the lines of top-dressing the pastures with suitable fertilizers.

The work relating to regrassing experiments on hill country has been carried on, and a great deal of careful analytical work in regard to the growth and covering-capacity of each species sown has been accomplished. The experimental sowings have been written up in the *Journal of Agriculture*, and a preliminary report on the sowings up to the end of the third year has been published. Included in this report are given seed-mixtures for secondary burns which are compiled from the statistical figures secured from the botanical analyses made of the sowings, using the point method of pasture-analysis.

A prominent feature of last year was the visit of Professor Stapledon, Director of the Welsh Plant-breeding Station, Aberystwith, Wales. Many special and general topics relative to grassland research were discussed, and many mutual benefits were secured as the outcome of his visit.

Agricultural Botany.

Large numbers of specimens have been received for identification from farmers, officers of the Department, and even some from children, obviously showing a genuine interest in the science. The notes sent by the inquirers often throw much light on the local behaviour of weeds, and on their real status in New Zealand, which often is totally different from that of the same plant in other countries. Unusually large numbers of weeds have been sent in that have not been previously recorded. One of decided importance is a Japanese blackberry-like plant known as strawberry-raspberry (*Rubus illecebrosus*), which has appeared near Dargaville, and is being watched in regard to its potentialities as a weed by Mr. W. A. Christie, the local Inspector of Stock. An article was written for the *Journal* (January, 1927) dealing with this weed. Constant use has been made of our valuable and expanding herbarium, and its upkeep demands increasing attention. Special mention must be made of the work done—particularly during the last few months—in collecting weed-seeds for the preparation of reference cards, for which there is a keen demand. Officers of the Department and farmers throughout the Dominion have been appealed to, and thanks are due to them for their help, while unusually large quantities of seeds have also been, and are being, secured locally.

Blackberry Investigation.

Some progress has been made with this investigation but the initial problems it presents are by no means simple. Few private persons are doing any experimental work towards finding a means of eradicating the weed: there are very few intending applicants for the £10,000 bonus up to date, and of them, not one has brought his experimental work towards anything like finality.

In regard to the Department's experimental work several important facts have been demonstrated during the past twelve months. Goats have been proved of great value in the control of the weed; on certain country they can, in a comparatively short time, convert a dense hillside of unworkable blackberry to an easily workable and controllable block. Goats have been experimented with in the Wairoa County with very good results. They have now been transferred to Opoutama, where their uses may be better and more profitably demonstrated.

The effects of many chemical compounds used as sprays, &c., have been tested, and, though none has been found capable of effecting complete eradication, two have been singled out as of special value for purposes of control, and it has been shown what great use these cheap chemicals are in reducing large areas to a condition in which the weed can be subsequently dealt with.

A very extensive survey of the main blackberry-infested areas of the North Island has been made with a view to ascertaining as complete a list of parasites attacking the weeds as possible, and the amount of damage that may be done by individual parasites or by combinations of parasites. So far no parasite of any outstanding value has been found, and the damage done in the field by them is of very minor importance.

Cutting and burning experiments have been continued every four weeks as usual, and the result has been to prove that the late summer and autumn is without doubt the best time to cut or burn blackberry, and, further, that cutting and clearing is of far greater benefit than cutting and burning.

Entomology.

No *Cryptolaemus* for the control of mealy-bug were reared in the insectary for distribution. The beetles can now be secured at Whangarei, where they are abundantly established. Several consignments of the pear-midge parasite were received from Europe, and the work of establishing the *Platygaster* was carried out through spring, summer, and autumn. *Alysia manducator* was imported from London for use in the control of sheep-maggot fly, and successfully reared from maggots in the insectary. Several field liberations have been made during the late summer both in the North and South Islands. Apart from the use of parasites, the control of sheep-maggot fly is being undertaken from the insecticide aspect. Attempts are being made to locate certain species of parasites of North American Scarabaeidae that might be of value in the control of New Zealand chafers. Experiments with calcium cyanide in the fumigation of citrus trees have been carried out, and the use of this insecticide is being extended to the control of field insects. For instance, work on the insecticide control of earwig has been undertaken, and the results are promising. Observations on the hedgehog as a possible means of earwig-control are also being made. A considerable amount of work has been done upon forest- and timber-infesting insects, and the parasitic control of *Gonipterus* and *Sirex* is being undertaken. The usual routine work has demanded a considerable amount of attention.

Mycology.

Plot experiments on the control of the smuts of wheat, oats, and barley have been continued on the lines of the previous two seasons' work, some 200,000 plants having been sown and harvested individually. The combined results over the three seasons show definitely the relative advantages of the various control methods at present known. Future work need be directed only to improvement in the practical efficiency of the best of these methods, and to the testing of new materials and methods as these are evolved. Co-operative field-scale experiments were carried out on smut-control with wheat at Ashburton and Leeston, on barley at Leeston, and on oats at Leeston, Milton, and Gore. These gave valuable information on the practical methods to be adopted in reducing or eliminating the large annual losses from cereal diseases. Further experiments with take-all were conducted this season on lines similar to those followed last year, but results were negatived, in that all plants were badly

attacked, and most of them destroyed by mildew. Wheat-scab has been the subject of laboratory-work, and it has now been demonstrated conclusively to be seed-borne. The hot-water treatment has proved effective in combating this under laboratory conditions. A second cereal-disease survey was conducted during the months of December, January, and February, most of the cereal-growing districts of Marlborough, Canterbury, Otago, Southland, and Wellington being covered. These surveys have brought to light valuable data relative to the distribution of diseases, their economic significance and dissemination.

Corticium disease of potatoes formed the subject of further experimental work. Clean seed secured as a result of last season's treatments has been sown with the diseased lines at Gore and Ashburton to ascertain the effects of the disease upon yield. In addition, further treatments with acidulated mercuric chloride were undertaken in order to secure clean seed for further experiments. Preliminary experiments in the control of this disease by the use of dusts gave such promising results that a comprehensive series of field experiments was undertaken at Ashburton and Gore. These have not yet been harvested, so that results are unknown meantime.

Dry-rot of swedes formed the major part of the research work carried out in the laboratory during the year, and results are at present being written up for publication in bulletin form. This work has proved that dry-rot is seed-borne, and has provided a control which under laboratory conditions has proved satisfactory. Field experiments based on this have been undertaken on approximately one hundred farms throughout New Zealand, where treated seed and untreated seed known to be infected with dry-rot have been grown.

Papers dealing with cereal-smut control experiments, corticium-disease control, and acacia gall fungus have been published by members of the staff in the *Journal*; in addition, numerous technical papers dealing with the systematics of New Zealand fungi have been published in New Zealand and foreign periodicals.

Routine work has been heavy, and has been confined chiefly to identification of potato, cereal, root-crop, and fruit-tree diseases. In addition, a considerable amount of work in connection with the isolation of various pathogens attacking weeds has been undertaken; this has been enforced principally on account of the growing popularity of the belief in "natural enemy" control.

Bacteriology and Physiology.

An investigation was made into the causes of an obscure disease that made its appearance last season in certain parts of the Motueka district—the blister disease of apples. Although the lesions which occurred in the fruits showed the presence of a fungus—Coniothecium—this parasite was found to be of merely secondary importance. Certain physiological irregularities had been brought about by unfavourable soil conditions, weather conditions, and orchard-management. After closely examining the circumstances in which affected trees were to be found, the conclusions reached were that the rooting-systems were feeble through shallow rooting due to an impenetrable pan, through root-injury in cultivation, and through lack of drainage. The remedy recommended was to raise the vigour of the trees by various means, such as drainage, manuring, thinning, hard pruning, &c., according to the circumstances involved. Another non-parasitic disease—brown-core of apples—which showed itself in the form of brownish masses variously distributed in the pith and cortex of apple fruit, was ascribed to similar causes, and was probably precipitated by the unusual weather conditions that preceded its appearance. There is little doubt also that the dying-back of Delicious and Sturmers that was unusually prevalent in this season was due to similar causes. There is no doubt that this investigation uncovered a group of conditions that have been insidiously operating against the orchardists on a very considerable area of country.

Samples of brown-cored apples of the 1924 picking were experimentally cool-stored at Motueka, but no increase or decrease in the numbers or the extent of the damaged masses of internal tissue was occasioned by the storage conditions. Such affected fruit stored equally as well as that from unaffected trees. In view of the difficulty of detecting the disease in some varieties exteriorly, this experiment indicated that there should be no falling-off in the condition of any affected fruits that inadvertently may have accompanied any shipments abroad.

During the year a large number of farmers have been supplied with cultures of bacteria which form the nodules on the roots of lucerne. Although no definite experimental areas have been laid out, growers have been requested to sow small control areas with untreated seed. In some localities the results have been very satisfactory, but in others, particularly in parts of Canterbury, no obvious advantage has shown up during the first six to eight months of growth, though there is every possibility that improvement will occur during the coming spring. Bacterial cultures sufficient for the inoculation of over 1,500 lb. of seed were grown and distributed from the laboratory.

A disease of swedes, known as mottled heart, has been particularly abundant for many years past in Westland, and a considerable amount of experimentation has been from time to time carried out on it. A further set of experiments established in December, 1925, gave some very important results, which are briefly as follows:—(1) None of the common artificial fertilizers exerted any deterrent effect upon the disease, which was very prevalent; (2) some of the fertilizers certainly increased the weight of the crop per acre, but this was commonly accompanied by a greater percentage and a greater intensity of the disease; (3) wood-ashes, on the other hand, gave very little improvement in weight per acre of crop; (4) wood-ashes, however, decreased or even eliminated the disease entirely, according to the quantities used; (5) the greater the weight per acre of swedes the greater the requisite quantity of ashes to secure a healthy crop. The experiments commenced in December, 1926, to ascertain what constituents of the wood-ashes were preventing the occurrence of the disease were entirely destroyed by floods.

Fruit Cool Storage.

Cool stores in various parts of New Zealand have continued to avail themselves of the information that has been secured over the past six years on the subject of the optimum storage conditions for various kinds of fruit.

The investigations into the control in cool stores of the apple-disease known as flesh-collapse have proceeded very satisfactorily this year. At Motueka the close adherence to a definitely prescribed storage programme for the production of optimum conditions for apples and pears was followed by exceptionally good results. The directors of the local storage company, reporting to their shareholders on the work of the year, stated: "The question of practical immunity from flesh-collapse is possibly the only subject calling for special mention in our report. You are aware that for some years flesh-collapse in apples, particularly Sturmers, has been prevalent throughout New Zealand, causing considerable loss. We are fortunate in the fact that no such loss was experienced at your cool stores during the past year." In the course of this work valuable records of temperature and humidity were secured, and new light obtained upon the relative susceptibility to flesh-collapse of different varieties of fruit. The special problems relating to the storage of fruit in transit to oversea markets have been fully reported upon to the Cool Storage and Transport Committee, a body set up by the Fruit Control Board in 1925 to advise as to the treatment of export fruit. At the instance of the Hawke's Bay Fruitgrowers' Association experiments on a large scale have been commenced with Hawke's Bay fruit stored in Auckland cool stores.

Photography.

During the year photographic work was carried out for all sections of the Department, there being an increase in the demand for lantern-slides for instructional work: 1,349 slides were made. The routine work includes prints, 5,762 (mainly reproduction); photographs, 1,300, covering a wide range of agricultural subjects; and enlargements, 48. Practically all the negatives in possession of the Department have now been recorded.

STAFF.

I desire to thank all members of the staff for their cordial co-operation in the carrying-out of the many and varied phases of the work coming within the scope of the Division.

CHEMISTRY SECTION.

REPORT OF B. C. ASTON, F.I.C., F.C.S., CHEMIST.

Bush Sickness (Iron-hunger) in Ruminant Stock.

In order that the soil survey and the collection of pasture-samples might be pushed forward, it was decided to station an expert officer at Rotorua, and in June, Mr. R. E. R. Grimmett, M.Sc., took up his residence there. He was systematically employed in carrying on the above work until the end of April, when he was seconded to the Rowett Institute, under the Imperial Marketing Board's scheme of mineral content of pasture-investigation, for six months' training. A local farmer, Mr. E. H. Brain, of Kaharoa, has been temporarily appointed to assist in the work during Mr. Grimmett's absence.

A number of field experiments using iron compounds for top-dressing permanent pasture were inaugurated by Mr. Grimmett, and in this way 10 tons of sulphate of iron have been distributed to farmers in the affected districts to be used in co-operative experiment investigations with superphosphate, the farmers supplying the cattle themselves.

The use of iron ammonium citrate has considerably increased; the action of the Department in supplying this drug to farmers at cost price has, judging from the sales, been much appreciated. Over a ton of this drug has been sold to farmers in small parcels of a pound or so at a time. Some farmers, however, who did not adhere to the instructions, could not obtain the desired results. The authoritative method of dealing with the trouble was therefore summarized and published in the *Journal* for August, 1926, page 98.

In order to learn whether a geological examination by an expert in land-forms would be of any value, an arrangement was made with Professor Cotton, the well-known New Zealand geomorphologist, to visit the district and report upon it. Dr. Cotton has not yet concluded his investigations, but his visit has been of considerable service to Mr. Grimmett, who has published in the *New Zealand Journal of Agriculture* for May, 1927 (page 289), a paper showing how the physical features of typical bush-sick country differ from those of typical healthy country.

During the year lectures to farmers have been given by members of the chemical staff to audiences of farmers at Tokoroa, Welcome Bay, Tauranga, Omanawa Falls, Kaharoa, and an interesting evening was spent at the Agricultural Science Club at Auckland University, when the subject of iron-starvation and the utilization of pumice lands was the subject of discussion by experts.

Soil Survey.

The soil survey of Rotorua County has been continued during the year, over 400 further samples having been collected and analysed. The provisional soil map referred to in my last report has been completed, and was published in the *Journal* for June, 1926. Sufficient data have now been obtained for the preparation of a soil map of the southern portion of the county, which it is hoped will be published shortly. A subsoil map of the Rotorua County (northern portion) has also been completed. A paper on the importance of texture in soils, with special reference to the Rotorua coarse soils, was published in the *Journal* for July, 1926.

Soils of the deteriorated hill country of the Stratford–Whangamomona district have been the subject of inquiry, and some samples have already been taken. It is proposed to extend the work during the coming summer.

A soil from Canterbury which was treated with an arsenical weed-killer sixteen years ago, and is still sterile for most crops, was found on analysis to contain 0·05 per cent. of arsenious oxide (As_2O_3) in the topsoil. The matter is being further investigated.

At the request of the Tahiti Administration, through the Consul for France, Wellington, the analysis of a number of soils from Tahiti was undertaken, and a report supplied.

Other soil-work included the testing of soils for lime requirement for Fields Division officers, and examination of soils for the State Forest Service.

Fertilizers.

No official samples were submitted by Inspectors under the Fertilizers Act during the year, but twenty unofficial samples were received from officers of the Department, and twenty-four samples were sent in by purchasers for comparison with the invoice-certificates.

The quality of the basic slag imported into New Zealand has received attention. It was not found that any low-grade slag was being offered, but in certain instances slag that was distributed direct to the consumer from the ship's side was found to be below the manufacturers' guaranteed analysis, and a suggestion by this Section that imported basic slag should be examined before shipment to New Zealand has been adopted. Arrangements have now been made whereby slag exported to New Zealand from British and Continental ports will be sampled and analysed in England by the

chemists of the Imperial Institute. It will thus be possible to warn importers of any shipments that do not comply with the manufacturers' guarantee, and so allow of adjustments being made before the fertilizer is placed on the New Zealand market. The scheme, which is now in operation, has received the unanimous approval of importers, whose co-operation is necessary to ensure that all shipments are sampled.

Several instances of technical breaches of the Fertilizers Act (failure to register or to supply invoice certificates) have come under notice, and the vendors concerned have been warned.

The registration of vendors of fertilizers under the Fertilizers Act has been dealt with as in previous years. The statistics concerning the importation of fertilizers into New Zealand were compiled and published in the *Journal* as usual. A fertilizer-mixing chart, with notes, was prepared and published in the *Journal* for September, 1926. The chart is also issued as a departmental leaflet.

Reputed Fertilizers and Phosphate Rocks.

None of the sixteen samples of reputed fertilizers or phosphate deposits was found to be of any commercial value.

A sample of the product of the Wellington City Corporation's house-refuse masticator was analysed for the State Forest Service. The sample, after drying, contained over 50 per cent. of organic matter, but almost negligible amounts of nitrogen, potash, and phosphates.

A reported discovery of highly phosphatic limestone in the Piopio district was fully investigated, samples being taken by the Director of the Geological Survey and analysed in this laboratory. The deposits proved to be remarkably pure limestone, containing less than 0·1 per cent. of phosphate, but 98 to 99 per cent. carbonate of lime.

Lime and Limestone.

Over one hundred samples of lime and limestone were received during the year, including several of exceptional purity, and also some from deposits of soft carbonate of lime that could be applied to the land without previous grinding. A number of samples of commercial ground limestone were submitted for examination. Generally the fineness of grinding was quite satisfactory, but there was a wide variation in the quality of the stone treated, which ranged from 74 to over 90 per cent. carbonate of lime.

Investigation of Wheat and its Products.

Twenty-five samples of New-Zealand-grown wheat were received, but owing to pressure of other work no experimental milling has been possible during the past autumn. It is intended to recommence this work shortly. At the instance of the Department of Industries and Commerce it is also intended to collect and examine samples of bran and pollard produced in the Dominion, with a view to establishing standards of quality for these by-products of the flour-milling industry.

Toxicological.

Seventeen specimens of organs and ingesta from domestic animals suspected of having been poisoned were examined and reported on. This work is only undertaken in connection with cases investigated by officers of the Live-stock Division, and it is expected that specimens sent in shall be adequate in quantity and of a nature suitable for examination for suspected poisonous substances. Unfortunately these conditions frequently are not complied with, making it difficult, and often impossible, to supply more than a negative report on the material examined. Instructions for taking and forwarding specimens were published in the *Journal*, Vol. 8, page 142, which should be referred to by officers concerned.

Mortality in Lambs in Central Otago.

In collaboration with the Live-stock Division, the mortality in lambs in Central Otago, due to renal congestion, or "pulpy kidney," was investigated. Samples of soil, pasture, and ewes' milk were obtained and analysed. An interim report on the investigation (which it is proposed to continue next spring, when it is usual for the mortality to occur) was published in the *Journal* for April, 1927.

Work for the Departmental Divisions.

For the Live-stock Division the periodical examination of cattle-dips from Auckland and Taranaki districts has been continued, some 200 samples having been submitted from the public dips in these districts. The provision of material for use of officers in making dip-side tests of the strength of dipping-baths has also been continued. Complaints having been made by woollen-manufacturers that preparations were in use for branding which were not removable by the usual scouring processes, samples of the branding-fluids on the market and of branded wool were submitted for examination. Several of the wool-samples contained coal-tar, but it was not found that this substance was an ingredient of any of the commercial fluids examined. Other samples of wool were found to contain thick masses of pigment that could only be removed by prolonged scouring or by a brief preliminary treatment with a suitable solvent. In such cases it would appear that the trouble complained of is the result of failure to keep the branding-fluid stirred while in use, resulting in some of the fleeces receiving a heavy brand of thick pigment from the bottom of the can. The investigation is being continued.

Work done for the Fields Division included examination of soils and fertilizers sent in by the Instructors in Agriculture.

For the Dairy Division analyses have been made of various dairy products, of stock-foods, tonics, &c., of waters for dairy use, and of various preparations used in the dairy industry. Under the new Dairy Regulations, which require all calibrated glassware used in the purchase of butterfat to be tested by the Department, the examination of skim-milk test-bottles, and of dairy-thermometers, is now carried out in this laboratory. Officers of the Division have been advised on many chemical questions affecting the dairy industry, and have been collaborated with in various investigations. Further samples of "vegetable parchment" for butter-wrapping were examined and reported on. The quality of paper used for butter-wrapping is now dealt with under the new Dairy Regulations. The so-called "soda flavour" in butter was investigated. The results obtained led to the conclusion that the objectionable flavour was due in many cases to the use of high-acid cream, rather than to the over-neutralization of cream of a lower degree of acidity.

For the Horticulture Division analyses were made of apples for arsenic content, of honey for metallic poisons, and of various preparations used in horticulture, &c.

Summary of Samples received during the Year.

Samples received were as follows: Soils, collected by Laboratory Staff, 417; soils, collected by Fields Officers, 35; soils, miscellaneous, 36; fertilizers, unofficial samples, 20; fertilizers, miscellaneous, 24; reputed fertilizers and phosphate rocks, 16; limes and limestones, 109; paints and paint materials, 1; toxicological specimens, 17; wheats, 25; flours, &c., 2; cheese, 22; milks and creams, 46; butters, 13; caseins, 7; honey, 1; waters, 27; fodder plants, 342; sheep and cattle dips, 231; fungicides, 2; stock foods, 31; miscellaneous, 136: total, 1,560.

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