

SESSION II.
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NEW ZEALAND.

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT FOR 1922-23.

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

MY LORD,— Department of Agriculture, Wellington, 30th June, 1923.

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.

I have, &c.,

W. NOSWORTHY,

His Excellency the Governor-General.

Minister of Agriculture.

MINISTER'S REPORT.

THE agricultural year of 1922-23 may be fairly described as a good all-round period for primary producers in New Zealand. Production of our main staples has been heavy, average market prices satisfactory in general, and financial conditions distinctly easier compared with the preceding season. Climatically the main season in most parts of the Dominion has been marked by an exceptionally high average rainfall. Generally speaking, this proved of great benefit to the grasslands, and to those leading branches of farming mainly based on pasturage. Floods, unfortunately, were experienced during the past autumn in certain localities liable to inundation, as a result of abnormal falls.

The chief feature of the year has been the phenomenal expansion of the dairy industry, as evidenced by another big advance in production and all-round development. With a surplus output this season of some 66,000 tons of butter and 60,000 tons of cheese New Zealand may claim to have become the largest exporter of dairy-produce in the world. As a supplier of the British market we have now actually taken the lead in cheese, and are running close up to Denmark for first place in butter-supply. The manufacture and export of dried milk has now reached a volume which warrants its regular inclusion statistically, while preserved milk, casein, and sugar of milk must also be reckoned with. Further great expansion of the industry may be confidently anticipated. Large tracts of fresh land are being brought in, and older pastures improved by top-dressing; the growing of auxiliary forage crops is increasing, and better feeding-methods practised generally. Together with these factors is the present remarkable development of the herd-testing system, which, by gradually eliminating unprofitable animals, cannot fail to result in a steady increase in the average yield of dairy cows in the Dominion. Complementary to this movement is the valuable certificate-of-record testing-system, which provides authenticated purebred sires for grading up the ordinary

herds. The annual statistics taken in January last show an increase of another 100,000 dairy cows in the Dominion, bringing the total number to over 50 per cent. higher than five years ago. The markets for butter and cheese have shown great fluctuations during the past year, but average returns for the whole season should be satisfactory to the producers. The aggregate exports from all branches of the industry for 1922-23 are valued at between sixteen and seventeen millions sterling.

An excellent account may also be given of our great pastoral farming interests, more particularly as regards the dominant sheep section. After recording for several successive years a decrease in the Dominion's sheep-stocks, it is very gratifying to be able to note that a turn has taken place, the preliminary returns as at 30th April last showing the substantial increase of over seven hundred thousand head compared with 1922. The exact position cannot be arrived at until the complete returns are ready, but it promises well that breeding-ewes have shown an increase in the two previous years. Another high average lambing-percentage was recorded last spring, and lamb-fattening for export has been carried out on a big scale during the season, in spite of difficult conditions of weather and feed at times. On the other hand, there has been a considerable drop in mutton-killings at the freezing-works, due partly to a shortage of wethers and partly to the high prices ruling for breeding-sheep. High average prices have ruled for fat lambs and sheep for export throughout the season—at times, indeed, above current British market parity. Wool has continued to appreciate in value—steadily for medium and coarse sorts, and more rapidly for the finer qualities—record prices, in fact, having been touched in certain of the latter sorts. The value of the Dominion clip for the year is placed at some twelve millions sterling, an increase of considerably over four millions compared with the previous twelve months. Having regard to the heavy shrinkage of the last few years in the world's sheep-stocks, the statistical position of wool-growing may be regarded as very sound. The beef-market has remained very depressed, although even in this section there has been some renewed activity, exports having exceeded those of the previous season. Prospects seem to have been somewhat better latterly, and it may be hoped that cattle-grazing, which is so important a factor in good pasture-management, will be maintained in proper degree. As regards pigs, the last returns record another substantial increase; the export of frozen pork has also shown expansion this season. Altogether the pastoral section—wool, meat, skins, tallow, and other by-products combined—takes the lead as regards value in the Dominion's export list for the past year.

As regards arable farming, the area under wheat for the 1922-23 season represented a considerable decrease from the exceptionally high area of the preceding year, but the average yield per acre was good. Similar remarks apply to the oat crop. Another heavy shrinkage was recorded in area under barley; the rye-grass area harvested for seed was also very much less. On the other hand, the linseed area was nearly doubled. Other crops of which preliminary statistics are at present available do not show any marked movement in area or yield. The Government control of the sale of wheat, which had been in force for several years, came to an end with the 1921-22 crop. An agreement has been entered into between the wheat-growers and the flour-millers governing prices for the past season's crop.

The hemp (phormium-fibre) industry has been passing through a period of depression, largely influenced by disease in the phormium-plant. The millers are dealing with the matter of improvement in a very practical way, and the Department is also aiding in research work. The marked shrinkage in the production of fibre recorded for the last few years appears, however, to have been arrested, and renewed development of the industry may be anticipated.

The development of the fruitgrowing industry has been hampered by marketing difficulties, but it is hoped that a system of voluntary standardization now being introduced will prove to be the forerunner of stable prosperity. The export trade in apples has registered another increase in volume this year; average returns from the British market, however, seem likely to be disappointing. The marketing of

fruit is unfortunately handicapped by the relatively small value of the product compared with its bulk, and this operates with special force as regards oversea freight rates and handling. The Government guarantee on export shipments this year—up to 11s. per case—was designed to cover all direct expenses of transport and marketing, and enabled the producers to readily finance consignments.

With ample supplies of wheat and conditional relief from the competition of Asiatic egg-pulp the poultry industry is now in an improved position, and the situation can be further ameliorated by a greater degree of co-operation among the poultrymen. It is intended by the latter to systematically test the British market next season, with a view to establishing a regular export trade in eggs. The bee-keeping industry is making steady progress, despite its share of difficulties. The exports of honey for 1922-23 considerably exceeded those for the previous year.

The Board of Agriculture, under the chairmanship of Sir James Wilson, has continued to render valuable service, many important matters having been referred to it for advice and recommendation. The mature experience of the members brought to bear on difficult agricultural questions under consideration has afforded the Department much practical guidance. This year a new Board has been appointed under amended regulations as regards nominations by the agricultural and pastoral societies. As usual, the annual report of the Board is printed as a separate parliamentary paper.

The New Zealand Meat-producers' Board has accomplished sound work during the year, such as the standardization of meat grade-marks, supervision of grading, and the limitation of small export parcels of meat. The mission of the Board's vice-chairman to London met with much success, especially in regard to the negotiation of a new freight contract for frozen meat. There can be no doubt that the concentrated weight and authority of the Board behind its representative materially influenced the substantial reduction in freight rates conceded by the shipping companies. Appreciation is also due to the New Zealand Wool Committee, which has again done valuable work in connection with regulation of the local wool-sales and other matters concerning the well-being of the wool industry.

Broadly surveying the position, the capacity of the Dominion for a steadily increasing output of primary products has been well demonstrated by the year's experience, and although world conditions are still far from stable, and more or less fluctuation in the value of food products may occur in consequence, there are many factors operating in favour of the overseas trade in our great staples of production. Altogether, the immediate prospects are good, while as regards the near future our agricultural and pastoral industries can be regarded as certain to extend greatly, not only as a result of extension of land-settlement, but also, and to a marked degree, through increased production from areas already settled, and capable, with better farming practice, of producing much more than they do at the present time. New Zealand itself is a magnificent asset for agriculture, and possesses an energetic and capable farming community. Effective mobilization of our resources, organization on extended co-operative principles, and a general pulling together, are capable of immense results for the rural interest and the Dominion generally.

A condensed but comprehensive record of the varied activities of the Department is given by the Director-General in his accompanying report, which shows that a very large amount of useful work has been carried out. It is satisfactory to note that the instructional as distinguished from the inspectional or penal side of the Department is being brought steadily to the front as circumstances allow. The requisite scientific basis on which practical instructional work must rest is also being surely strengthened in the Department's organization. Better farming—raising the average standard of practice in all branches—holds good as the objective. The continued close economy which has been necessary during the year has caused the postponement of some important projects, but having regard to the present financial improvement it is hoped that an effective advance may now be made.

Concluding this brief review of some of the more salient features of the agricultural year, I would record my appreciation of the capable and zealous personnel of the Department in its various branches.

W. NOSWORTHY,
Minister of Agriculture.

REPORT OF THE DIRECTOR-GENERAL.

The Hon. Minister of Agriculture.

Wellington, 14th April, 1923.

I BEG to submit the following report on the operations of the Department during the past official year, which has been one of steady work.

The necessity for curtailing expenditure wherever possible naturally prevented that measure of advancement in instruction and development work which the rapidly growing needs of the country demand, but a little progress has been made, and a point has now been reached when an expansion of this phase of the Department's duties, in all branches, is a matter of practical necessity in the best interests of the entire community.

I must express my appreciation of the whole-hearted manner in which the Directors of Divisions and their responsible officers, together with the Head Office staff, have co-operated in the efforts to bring about a further curtailment of expenditure, while still maintaining efficiency and adequately carrying out the definite responsibilities entrusted to the Department.

AGRICULTURAL INSTRUCTION.

This important part of the Department's activities has been carried out as thoroughly as staff conditions permitted, and it is evident that the work of the Instructors is greatly appreciated, the calls upon their services being far in excess of their physical ability to cope with them. At the present time, Instructors are stationed at the following centres—Auckland, Mōmahaki, Wellington, Christchurch, and Dunedin; with assistant Instructors at Auckland, Hawera, Marton, Wellington, Christchurch, Hokitika, and Invercargill. All these officers have had a strenuous year. It is extremely desirable, in the interests of settlers and of increased production, that this instructional staff should be materially strengthened by the appointment of further Instructors of the right type, combining both scientific and practical knowledge.

One feature of the instructional work which is developing and proving of genuine value to farmers lies in the conducting of short courses of instruction at suitable centres. These classes, which usually occupy a week, are held during the winter months, and are largely attended. Officers of the various Divisions of the Department give lectures on various subjects, and these are supplemented by outdoor demonstrations. Arrangements are already in train for a considerable extension of these classes during the coming year. Another phase of instructional and development work lies in the boys and girls' agricultural clubs. The movement formed to establish these clubs is extending, and they are undoubtedly doing good work. While all have been successful, perhaps the most extensive development has been in Taranaki, where great keenness has been shown and excellent work done by the young members of the clubs.

The proposal to establish at Ruakura a permanent farm school for the training of lads in practical farming, supplemented by instruction in scientific agriculture as adapted to farm practice, has been under consideration, and it is hoped that at an early date a commencement may be made. The original object for which the Ruakura Farm was established has been attained, and if it is to continue to be an asset of practical value to the Dominion from an instructional standpoint a new departure such as is proposed in the farm school is necessary. The training of returned soldiers at Ruakura ceased at the end of December, and the farm is at the present time being conducted more on commercial lines than anything else, pending a decision as to its future. There is plenty of scope within the Dominion for the development of intelligent and practical training of youths in farm-work based upon scientific principles, and while it is undoubted that this training cannot be given without a certain amount of special expenditure, it is submitted that such expenditure is amply warranted, and would in due course give results which would be of great practical benefit to the community as a whole.

The necessity which has of late existed for exercising the utmost economy in departmental expenditure has been reflected in the Agricultural Instruction Service as in all other services of the Department, but too long a continuation of measures of drastic economy and consequent arresting of development in this particular work would really be false economy and inimical to the future interests of the Dominion. There has been great development of late years in educational work and expenditure in other directions, and the time is now overdue when the training of youths in rural pursuits should be seriously considered as an essential feature of our educational system.

THE STATE FARMS.

The operations of these farms have been carried out on more pronounced commercial lines than heretofore. As a result their financial position generally shows improvement, and though the measure of instructional work which was carried out has necessarily had an important bearing upon the expenditure involved, the earnings have been distinctly good.

At Ruakura the reduction in expenditure resulting from the decreasing number of soldier trainees during the year, and the final cessation in December of this training-work, combined with other economies, has resulted in the expenditure on this farm being reduced by £3,246 as compared with the previous year. On the other hand, the revenue increased by £652. The aggregate value of the live-stock on the farm at March, 1923, was £7,625 4s., as against £7,705 18s. at the same date in 1922. In addition to soldier training, a large volume of instructional work was carried out in the form of short courses for farmers, teachers, &c. The establishment of the farm school for youths to take place during the present year (1923–24) will involve a certain amount of expenditure which will not give a direct monetary return, but which will nevertheless prove of great value to the Dominion.

At Weraroa a good year's work has been done, and though the actual figures of expenditure and credits at first sight appear to compare unfavourably with those of the previous year, they really come out very well. The season was an abnormal one, due to the plentiful and well-distributed rainfall and the consequent heavy growth of feed. This necessitated a considerable expenditure in excess of

estimated requirements for the purchase of store stock, some of which had not been realized upon when the financial year ended. Thus the expenditure was £1,603 in excess of that of the previous year, while the credits were £109 less. On the other hand, the live-stock on the farm at 31st March was valued at £1,741 more than that in hand on the same date in 1922, the same standards of values being adopted in both years. The Weraroa Farm is eminently adapted for dairying, but its area of 764 acres renders it too unwieldy to be operated as a dairy farm on the best-paying lines, which necessitate more intensive farming than can be carried out on so large an area under one management with hired labour. It is necessary that a new policy be decided upon for this farm.

At Moumahaki a great improvement from a financial standpoint has been brought about, and the place, moreover, has continued to be well farmed. As compared with the previous year the expenditure has been reduced by £1,009, while the credits have increased by £2,176. In addition the value of the live-stock on the farm on 31st March, 1923, was £707 in excess of that at the same date last year, the standards of valuation being the same in both years. This is an excellent showing for the present management. It is desirable that the future of this farm should be settled, and recommendations regarding this have been submitted.

The Te Kauwhata Farm is now much reduced in area, 655 acres having been taken over during the year by the Lands Department for settlement. Apart from the reduction in area and consequent lessened labour required, considerable economies have been effected, and the expenditure has decreased by £1,938, while the revenue has decreased by £338.

At the Waimaunga Farm, in the Grey Valley, further improvement work has been done, but the proposals for the complete establishment have had to be suspended consequent upon the retrenchment policy which has had to be carried out. The expenditure has exceeded the vote by £401, this being the result of the good growth of feed necessitating the purchase of extra stock for grazing purposes. As a result the value of the stock on the farm has increased from £290 at the 31st March, 1922, to £982 10s. at the same date this year; and though the actual credits for the financial year were only £294, these grazing operations are proving payable, quite apart from the fact that the farm is being steadily improved.

EXPERIMENTAL AREAS.

The localized experimental work carried out in special areas—on a co-operative basis as regards the smaller ones, and under direct departmental control on the larger—is directly associated with the Agricultural Instruction Service. Much useful information for farmers in the surrounding districts is obtained from the work done on these areas, and in addition valuable data is being accumulated which, when the results secured in different centres are co-ordinated, will be of great assistance in connection with the further development of rural industries throughout the Dominion. As regards the larger areas the following special points may be noted:—

Puwera (near Whangarei): This area is situated on some of the poorest gum land in the North, and the results so far attained must be looked upon as very satisfactory. The work has been based on an endeavour to ascertain the best method for bringing this type of land into payable use and the most suitable permanent pasture for it. During the year about 27 acres have been laid down, bringing the total area in grass up to approximately 60 acres. Taking all the facts into consideration, these pastures are doing well and showing good promise. The information secured from the work carried out indicates that it would cost £6 to £7 per acre to break in this class of land and lay it down in permanent pasture. When it is considered that in the beginning the land was looked upon as being practically worthless for any purpose, this work will be of great value if the promise shown of the pastures holding out is fulfilled. Both cattle and sheep are being grazed. In addition to pasture, the growing of crops suitable for feeding off, or ploughing under in order to increase the organic content of the soil, has been an important feature of the work for the past few years.

Albany (near Auckland): This area is also situated on gum land, though not of so poor a character as at Puwera. The object for which it was started has been largely attained; and, though the best use possible under the circumstances has been made of it, it is a question whether its continuation is warranted.

Marton: Wheat variety trials and feeding-tests with various forages formed the principal work at this area. Various experiments with lucerne were also carried out.

Ashburton: The Experimental Farm at Ashburton has continued to serve a good purpose, the farmers of the surrounding district realizing the fact that the farm is there for their benefit. Field trials of wheat, oats, barley, and rye have been continued, and it is hoped that many of the better varieties will be placed with reliable farmers in the ensuing season. Manurial tests on lucerne, pastures, rape, and turnips have been made, and many interesting and valuable results noted. Extensive grazing trials have been carried out on the lucerne-fields, indicating that the crop is admirably adapted to this purpose, when properly managed.

Galloway: This area, situated in Central Otago, is devoted specially to experimental and demonstration work in the best methods of applying irrigation for general farm purposes, and much has already been done to demonstrate the most efficacious methods of carrying this out, in addition to showing what are suitable and unsuitable crops for growing upon typical Central Otago land under the climatic conditions existing.

Gore: The work undertaken on this area embraces pasture-establishment, top-dressing experiments, ensilage-making, lucerne-culture, investigation of root-diseases, &c.

Winton: The work during the year was mainly a continuation of the experiments initiated during the previous year, and some interesting particulars have been recorded. The main features are pasture-establishment and maintenance, liming, and the raising and feeding of fodder crops.

REORGANIZATION.

A new Division of the Department has been authorized, and is now in process of organization. This will comprise the following services: Agricultural instruction, experimental areas, the laying-out of experimental work on State farms, advice regarding crops and pastures, biological work, hemp-

grading, and grain-grading. These services, with their established staffs, have hitherto been controlled by myself with the direct assistance of Mr. A. H. Cockayne, who will now become the Director of this branch, which will be designated the Fields Division. With the efficient staff under Mr. Cockayne's control, together with his personal energy and high attainments, one may confidently predict a further advancement in the efficiency of these services and a resulting increased value from them to the Dominion.

NAURU AND OCEAN ISLAND PHOSPHATES.

A good volume of business was done in the importation of high-grade phosphate rock from these islands, the actual quantity brought into New Zealand during the financial year being 51,430 tons. The accounts of the Commissioners controlling the business are made up for a different period, their trading-year ending on 30th June. For the ten months ending 30th April, 1923, the importations into New Zealand comprised 16·96 per cent. of the total output, and thus our quota of 16 per cent. is already slightly exceeded.

Consequent upon the falling freight market, contracts for sea carriage were, up to 30th June last, made for six-monthly periods only, and successive reductions in freight rates were secured, which, with a reduction made during the year in the f.o.b. price, enabled the selling-price of the raw material in the Dominion to be correspondingly reduced from time to time. These reductions, however, could not be immediately reflected in the prices of the manufactured fertilizers, consequent upon the overcarrying of stocks of raw material bought at the previous higher rate. Material reductions in selling-prices to farmers came about in due course, and the prices now charged compare satisfactorily with those ruling in Australia, when the relative conditions applying to the two countries are considered.

The Government's commercial agents handled their business well, and their intimate knowledge of every phase of it has proved of great value in enabling all details to be carried out satisfactorily. The shipping contractors have also rendered good service at reasonable rates. All administrative charges of the Department have been met out of the business, and the margin which necessarily had to be allowed for unforeseen contingencies proved not to be needed, a small profit to that extent resulting.

The New Zealand representative on the British Phosphate Commission, Mr. A. F. Ellis, has done excellent work throughout, and I must express my sincere appreciation of the keen interest he has shown and the complete manner in which he has co-operated with the Department.

The business having now been well established, with the Dominion absorbing its full quota, arrangements have been made for its conduct to be placed in the hands of the Commissioners as from 30th June next. The arrangement between the Government and the commercial agents terminates at the same time, the agents thenceforward acting for the Commissioners only. Continued success may be confidently anticipated.

LIVE-STOCK DIVISION.

The Live-stock Division, under the control of Mr. A. R. Young, M.R.C.V.S., with its extensive and varied responsibilities, has had a year of solid work, and the results must be looked upon as highly creditable to the staff.

Stock Conditions generally.—The more or less unsettled and unseasonable weather conditions which were experienced throughout the Dominion during practically the whole of the year under review militated somewhat against the condition of sheep and lambs intended for slaughter. Nevertheless, stock wintered well, thanks to a somewhat mild winter generally, and a good lambing resulted, the estimated Dominion percentage being 86·77 per cent., equal to 10,843,005 lambs, an increase of 575,095 over the previous year's actual results.

All classes of stock have, on the whole, continued in a satisfactory state of health, but it is regrettable to have to report that, as the result of an investigation into some deaths which took place on one farm in the Waikato district, the Dominion's long freedom from anthrax among its stock can no longer be asserted. While certain very peculiar circumstances have attached to the history of the cases in question, casting some doubt as to anthrax being the cause, the bacteriological examination seemed to be sufficiently conclusive to have the cause of death officially recorded as anthrax. Fortunately, the experience is an isolated one, and the Dominion has otherwise remained remarkably free from serious diseases. The maintenance of strict regulations ruling the entry of cattle from countries where these diseases are known to exist should enable this satisfactory state of affairs to continue.

Animal-diseases.—Blackleg: During the year an alteration was made in the districts comprised in the quarantine area in the Auckland District by putting Area A into Area B. This was done after very careful consideration of the question, and it was considered that the position as regards blackleg-control warranted this action. The results so far bear out the anticipation that control can be quite as well maintained under these new conditions as under those existing in the past, and with less inconvenience to the settlers and less cost to the Department. The inoculation of calves against the disease was continued within the boundaries of the areas in Taranaki and Auckland districts defined in the regulations. The vaccine used was, as in previous years, prepared in the Department's Veterinary Laboratory, and the results were entirely satisfactory.

Contagious mammitis: This disease is still giving considerable trouble in dairy herds throughout the Dominion, and the advice and assistance of the Department's officers has been much sought after. Unfortunately, however, before the cases are reported they are, in a large number of instances, in an advanced stage of the disease, and little help can be given. The District Superintendent, Dunedin, advises that he has met with some encouragement from outward applications of iodine and he proposes to further continue this treatment. Of 1,051 samples of milk received at the Veterinary Laboratory from cases of suspected contagious mammitis, 404, or 38 per cent., proved on examination to be of the contagious form; 218 were from cases of the non-contagious type; and the remainder (429) were normal. As previously reported, wrong handling of milking-machines is often responsible for setting up udder troubles, and also for the spread of contagious-mammitis infection. The necessity for the exercise of every care cannot be too strongly emphasized.

Contagious abortion: Although this disease has been very prevalent in some districts, the reports of the District Superintendents seem to indicate that on the whole there has been a diminution. This has been particularly the case in Otago and Southland, where in the previous year the trouble appeared to be on the increase. The vaccine treatment carried out in some herds in Otago where a large percentage of the herd had aborted has given some encouraging results.

Vaginal catarrh, or vaginitis: A very appreciable number of cows have been found to be suffering from a form of sterility, and on investigation vaginitis has been found to be responsible for a considerable proportion of the cases.

Tuberculosis: An examination of the statistics showing the results of the examination of stock on slaughter at meat-export works and abattoirs indicates very little change, there being a slight increase as regards cows found affected, while other classes of cattle show a very slight decrease when compared with the previous year. Swine show an increase on last year's figures of 1.70 per cent., which indicates a position not satisfactory, although the returns show the greatest increase as being among those only slightly affected with the disease. In the matter of the condemnation of cattle by Stock Inspectors in the field for tubercular infection on clinical examination, and on account of the application of the tuberculin test, the total of such condemnations during the past year was 4,448, as against 3,703 for the previous year, thus showing an increase of 745, equal to 20.11 per cent. Some of this increase is attributable to the fact of a greater use of the tuberculin test among the herds, but the situation cannot be regarded as altogether satisfactory, even after making full allowance for the increased number of cattle in the Dominion.

Actinomycosis: The number of animals found affected by this disease is still considerable, although a small decrease in the South Island is indicated.

Cattle-tick: The regulations under the Stock Act designed to prevent the spread of ticks among cattle have been administered in tick-infested districts. The Department's energy has been specially concentrated on the provisions regarding the protection of clean districts, and as complete arrangements as are reasonably possible to meet requirements have been made and are being carried out, including the stationing of watchmen at the various exits from the affected areas. During the year a further eleven dips were completed, making a total of forty-nine dips for which the Government subsidy has been paid.

The Mamaku Farm and "Bush-sick" Area.—Experiments carried out during the past season at the Mamaku Farm have given promise of good results, and the Department is now in a position to carry out the original idea of determining whether or not dairy-farming can be profitably undertaken on "bush-sick" country. With this object in view a number of cows will be bought whose milk-production has been previously observed. These will be placed under ordinary farming conditions, and a correct account kept of everything in connection with the dairying operations. Favourable results are looked for.

Slaughter of Stock for Export.—The following table shows the position as regards the numbers of cattle, sheep, and lambs slaughtered at meat-export works during the year ended 31st March, 1923, compared with the previous twelve months' slaughtering:—

	31st March, 1923.	31st March, 1922.	Increase.	Decrease.
Cattle	155,881	97,907	57,974	..
Sheep	1,927,317	3,071,255	..	1,143,938
Lambs	4,410,895	4,876,555	..	465,660

Three of the freezing-works did not open for operations during the season, and another, after opening for a short period, ceased operations for the remainder of the season. The above figures show a decrease in the sheep-killings, which was only to be expected seeing the largely increased slaughtering that had taken place in sheep and lambs during the previous two seasons. A decrease has also been shown in the number of lambs slaughtered, but it should be pointed out that for the period under review part of two slaughtering seasons is included, and the figures may show differences according to whether the seasons are early or late. So that the position may be the better understood for comparison, the killings of sheep and lambs for the two periods from October to March, 1921-22 and 1922-23, are given, as follows:—

	1st October, 1921, to 31st March, 1922.	1st October, 1922, to 31st March, 1923.
Sheep	2,091,840	1,244,490
Lambs	3,011,695	3,128,415

These figures, it will be noted, indicate a small increase in this season's lambs slaughtered up to the 31st March, as compared with the same period of the previous year, but do not materially alter the position as regards sheep.

Inspection of Meat.—The inspection of all carcasses of animals slaughtered at meat-export works, abattoirs, and bacon-factories was carried out satisfactorily during the year. The following are the total numbers of each class of stock slaughtered under direct inspection during the year ended 31st March, 1923: Cattle, 281,364; calves, 32,124; sheep, 2,617,614; lambs, 4,520,151; swine, 221,773.

The following table indicates the respective class of premises at which these animals were slaughtered, those killed at abattoirs being almost wholly for local consumption, and those slaughtered at meat-export slaughterhouses being intended (except in the case of cattle and swine) principally for export :—

	Abattoirs.	Meat-export Slaughterhouses.	Bacon-factories.
Cattle	125,483	155,881	..
Calves	24,620	7,504	..
Sheep	690,297	1,927,317	..
Lambs	109,256	4,410,895	..
Swine	112,761	86,351	22,661

At ordinary slaughterhouses the stock slaughtered was as follows : Cattle, 67,035 ; calves, 1,843 ; sheep, 295,964 ; lambs, 25,642 ; swine, 22,089. In addition the examination of 40,717 carcasses of pigs killed and dressed by farmers and sent in to butchers' shops and small bacon-factories was carried out by officers of the Division, 1,267 being condemned, including 1,061 for tuberculosis.

Compensation paid for Stock condemned.—During the year compensation to the amount of £12,986 was paid out for 5,183 animals condemned in the field under the Stock Act; and in addition the sum of £12,657 was paid for carcasses or part of carcasses condemned on inspection at time of slaughter under the provisions of the Slaughtering and Inspection Act, making the total amount for which the Consolidated Fund became liable £25,643.

Importation of Stud Stock from Abroad.—The importation into New Zealand of cattle and sheep from the United Kingdom was prohibited throughout the year on account of the numerous outbreaks of foot-and-mouth disease which had occurred there over widely scattered districts, and as a consequence the importation of stud stock was seriously curtailed. At time of writing, however, the prohibition has been partially lifted. In this connection it is satisfactory to note that the shipping companies have rendered great assistance to importers by recently agreeing to carry stud stock to New Zealand freight-free.

Inspection of Dairies supplying Milk to Towns.—A close inspection of the premises registered for the supply of milk for town consumption has been maintained, and the premises have on the whole been kept in as reasonable a state of cleanliness as the various circumstances have permitted. It is, however, extremely difficult to get a number of the old premises replaced by modern structures, owing to the land being held under short tenure, and there is also the circumstance of land held adjacent to cities with a view to cutting up for residential purposes. The dairymen in these cases are not disposed to go to any expense, and the only alternative has been to have them kept in as good condition as possible and to close those not up to requirements, as opportunity allowed. Continued close inspection of the cows comprising the herds has been carried out, and all cows with any suspicion of disease have been effectively dealt with. The tuberculin test has also been largely availed of, and many composite samples of milk have been sent to the Veterinary Laboratory or examination.

Importation of Animal-manures.—The inspection of the sterilization of animal-manures from New South Wales (where the only Australian mills licensed by the Department now are) and from Calcutta was continued during the year. The importation of bonedust from Sydney showed an increase of 359 tons on the previous year, while that from India showed a considerable decrease.

Veterinary Laboratory.—At the Wallaceville Veterinary Laboratory, in the course of the year, 1,632 specimens were received for examination. These included milk-samples, pathological exhibits, blood for serological tests; water for bacteriological analysis, &c. 1,051 samples of milk from cases of suspected contagious mastitis were dealt with, and 231 samples of blood were examined by the agglutination method for the detection of contagious abortion. In addition, 106 composite samples of milk were received for test inoculations for the presence of tubercle bacilli; only one sample proved to be tubercular. Every effort has been made to curtail expenditure, and the prosecution of research work has consequently been restricted. The curative treatment of contagious mammitis has received attention. Whenever available, subjects in the locality affected with this disease have been secured for experimental treatment. Parasitic gastritis occurring among sheep and imported pedigree goats at the laboratory provided an opportunity to test the method advocated by the South African Veterinary Service of dosing with a mixture of arsenite of soda and sulphate of copper. This treatment in our hands proved most effective. A number of feeding experiments to test the toxicity of certain materials have been carried out. Among these may be mentioned the effects of basic-slag absorption by sheep, the effects of feeding salt to swine, the feeding of clover raised upon soil from "bush-sick" areas; also tests with samples of calf-meal, honey, and mangold-liquor. The breeding of ferrets for disposal to settlers has been continued, and a small herd of pedigree goats is now maintained on the laboratory farm for disposal in the same manner. 78,200 doses of blackleg vaccine have been supplied. Abortion vaccine in the shape of living cultures of the specific organism has been supplied on request. 1,612 c.c. of tuberculin has been sent out, and sixty-three doses of mallein were supplied.

Poultry.—The chief work of the Poultry Instructors during the year has been to visit the many poultry-keepers applying for assistance. Much advice and assistance has also been given by letter, and through the medium of our poultry pamphlet and the monthly notes by the Chief Poultry Instructor published in the *Journal*. In addition many lectures and demonstrations were given in various parts of the Dominion. In view of the large number of inexperienced persons who have recently taken up poultry-keeping, it has been found impossible for the Instructors to comply with all the requests made for their services.

Since the Avonhead Poultry Demonstration Farm was taken over from the Repatriation Department, about a year ago, it has been conducted on more or less commercial lines. This plant was designed for the special purpose of training returned soldiers in poultry-work, and for this it fulfilled its purpose. During the year a large portion of the buildings and appliances was destroyed by fire, and has not yet been renewed.

The poultry industry has made good progress. As was expected, the restriction placed on the importations of Asiatic egg-pulp had a gratifying effect. It gave the producer confidence in the industry, with the result that the poultry-stock of the Dominion has increased to an extent that the local demand for eggs has been well met (except during the winter months) at a reasonable price to the consumer. In view of the ample wheat-supply available, and in anticipation of a greater increase of eggs during the next main producing season, it is proposed by the various poultry organizations to make a good-sized shipment to the London market early next spring. Last spring a small consignment of eggs in shell and egg-pulp was sent to London by the Auckland Co-operative Egg Circle. The egg-pulp in particular arrived in good condition, and the returns to hand justify the proposal to further test this market. While it is not desired in any way to deprecate the opening-up of an overseas trade, probably much more could be done yet in the direction of building up the local trade for guaranteed fresh eggs.

Wool Instructional Work.—A steady demand was experienced for the services of the Wool Instructor, who has lost no opportunity of impressing upon sheep-farmers, by advice and demonstration, the advantage to be gained by the proper skirting and classing of their wool.

Instruction in Swine Husbandry.—The Instructor in Swine Husbandry was kept busy during the year giving advice and lectures, &c., to farmers in various parts of the Dominion. A special bulletin on pig-management was prepared and distributed in considerable numbers.

Rabbit Nuisance.—The exceptional weather conditions experienced during the year throughout the Dominion rendered the control of the rabbit pest especially difficult, with the result that in some districts rabbits became more numerous than they have been for some time past. The high price of winter skins ruling continues to militate largely against the work of destruction of the pest in some districts, where settlers cannot be induced to carry out thoroughly effective work except under compulsion, and this state of things is very unsatisfactory. While a reduction of the pest cannot be reported in all localities, very good work has been done, and in a number of districts a greatly improved position is reported. Before the coming winter is far advanced a decided improvement should have taken place throughout. It is intended to push for efficient following-up work after the general poisoning and other work at present in progress is completed, and if weather conditions are favourable next season it is safe to predict a greatly improved position.

Noxious Weeds.—The administration of the Noxious Weeds Act has again been attended with considerable difficulty, and the necessity for amending the Act is increasingly apparent. A special illustration of this was furnished by the fact that in some parts of the North Island the prevalence of ragwort gave rise to much concern and uneasiness to settlers, while in parts of the South Island the presence of this weed was, and is still, looked upon by settlers with equanimity. In last year's report the advisableness of bringing County Councils in closer association with the operation of the Act was stated, and it is of interest to note that six County Councils have already, by arrangement with the Department, appointed their own Inspectors to deal with noxious weeds within the area under each Council's jurisdiction, while others are moving in this direction. The Counties Act gives the Councils a considerable amount of power to deal with noxious weeds, but there seems to be some doubt as to the extent of the powers conferred by the Act in the direction of providing the necessary funds for noxious-weeds inspection. It may therefore be found necessary to make some amendment to the existing legislation in order to define these powers more clearly. Quite apart from this, the necessity for readjusting the schedules so that local authorities can have power to determine whether Californian thistle, ragwort, and possibly sweetbrier, shall or shall not be treated as noxious weeds within their district is still more apparent, and it is sincerely to be hoped that legislation providing for this, at any rate, will be passed as soon as possible.

The eradication of noxious weeds on Crown and Native lands is a big problem, and one that very greatly retards the work of the Inspectors in dealing with private lands. As previously pointed out, some system of granting leases of these lands rent-free for a period of years, subject to strict conditions as regards the eradication of noxious weeds, is one that deserves very serious consideration by the Departments concerned, in the interests of the lands themselves and also of the country adjoining.

It was unfortunately necessary to institute a large number of prosecutions under the Noxious Weeds Act during the year, 230 applications for authority to prosecute being approved, as against eighty for the corresponding period of last year.

DAIRY DIVISION.

The Dairy Division, under the control of Mr. W. M. Singleton, Director, ably assisted by Mr. W. E. Gwillim, Assistant Director, has had to cope with an especially busy season, and has met all calls made upon it with efficiency and thoroughness.

The Season and Production.—The season under review has probably been unsurpassed for many years past as one eminently suited to maximum growth of grass and maximum production of milk. An increased number of cows grazed under the most favourable conditions has enabled the Dominion to manufacture for export roundly 66,000 tons of butter and 60,000 tons of cheese, and this export gives New Zealand pride of place as the greatest exporter of butterfat in the world.

The unprecedented increase in supply of milk and cream has taxed the resources of many dairy factories. The tendency for some years has been to handle the increased supply in large factories rather than in more factories, and, as a result, during the period between the financial years ending 31st March, 1917, and 1923, the output of the average butter-factory increased 142·4 per cent., and the output of the average cheese-factory increased 43·2 per cent.

Quantities of Butter and Cheese forwarded to Grading-stores for grading.

Port.	Year 1922-23.		Year 1921-22.	
	Butter.	Cheese.	Butter.	Cheese.
	Cwt.	Cwt.	Cwt.	Cwt.
Auckland.. ..	707,146	168,127	490,646	176,180
Gisborne	19,045	..	11,172	..
New Plymouth	132,303	188,927	90,301	197,008
Patea	58,381	238,166	26,838	254,346
Wanganui	41,815	19,416	22,188	15,540
Wellington	252,429	312,350	157,119	300,447
Lyttelton.. ..	54,079	28,673	42,557	36,001
Timaru	12,301	11,358	1,748	7,759
Dunedin	38,397	43,426	24,812	43,113
Bluff	27,250	190,886	14,972	175,947
Totals	1,343,146	1,201,329	882,353	1,206,341

Value of Exports.—The Customs statistics of the value of exports of dairy-produce indicate a very satisfactory position. It may be accepted that the export of dairy cattle has largely come about through the advertising which the Division's testing of purebred dairy cattle has made possible. Including the value of these exported dairy cattle (£10,140) with that of butter, cheese, dried milk, casein, condensed milk, milk-sugar, and butterfat, the value of New Zealand's exports relating to the dairy has attained the splendid total of £16,217,193 for the year ended 31st March.

Butter.—Butter-quality has been satisfactory throughout the season as regards flavour and make. Some districts report improvement, and at all ports the quality has been well maintained. Reports from the United Kingdom and United States of America have been very satisfactory. The grading of cream and the farm-dairy instruction have been responsible for considerable improvement in the product of a number of factories.

A good deal of difficulty has been occasioned by dairy companies manufacturing butter which occasionally contains a water content above the legal limit of 16 per cent. When it became known that some New Zealand butters were being found to contain a water content above the legal limit in the United Kingdom arrangements were made to do more testing at the grading-ports. This prevented a number of boxes from being exported which might otherwise have caused trouble. Considerable quantities of butter have been returned to the dairy companies for reworking; other butters have been reworked at the owners' expense but under the supervision of our staff; and in three instances legal proceedings have been taken, with resultant fines ranging from £10 to £25.

The engagement of additional assistance for the purpose of checking more samples of butter for moisture has to a limited extent afforded the opportunity to increase the number of samples tested for content of salt and fat. The range in the percentage of salt in our salted butters is too wide, and in many cases too low. For the general trade not less than $1\frac{1}{2}$ or more than 2 per cent. of salt should be incorporated. With the moisture and salt content more even a more uniform fat content is assured.

Cheese.—The comparatively cool season has been in the interests of better quality in cheese as well as butter. Cool nights mean better milk, and this causes fewer difficulties to arise in connection with manufacture of milk into cheese. Cheese from practically all districts has evidenced improvement. There has been some difficulty experienced in connection with the colour in coloured cheese. It was at first considered that the colouring was faulty, and in some instances the trouble disappeared when the colouring-material was changed. In other instances colouring-material which when used at one factory produced inferior-coloured cheese was used without any trouble at an adjoining factory. It would appear that some milks have a reducing effect on colour which does not obtain with other milks. Some bacteriological work has been done at the Wallaceville Laboratory in connection with this trouble.

This season several factories situated in districts where the temperature of insulated curing-rooms runs to over 65° F. during the summer months have installed mechanical refrigerating-machines to reduce and control the temperature. The effect on the flavour, the body, and the condition of the cheese has been beneficial, and an undue loss of weight has been avoided.

The process of pasteurizing milk for cheesemaking continues to extend, and the factories which adopted the process this season have had the satisfaction of turning out cheese far superior in quality to those hitherto made by them from raw milk.

Packages.—Some complaint has been received respecting breakages in butter and cheese packages prior to delivery into the importers' warehouses in London. Some of these packages have been made of timber which was too thin to ensure satisfactory nailing. The regulation stipulating the size for butter-boxes provides for timber $\frac{1}{2}$ in. in thickness; the ends should be at least $\frac{5}{8}$ in. thick. Considerable improvement has been effected in the boxes for a number of factories this season. There is still room for considerable improvement in the packing of cheese, many crates being filled too full, while others show too much unoccupied space. A number of companies use centre boards and battens which are too thin for the purpose. In some districts certain factories are using boxes made of boards $\frac{3}{8}$ in. and in others $\frac{5}{8}$ in. in thickness. A number of the latter were in use before the war, and the trade would probably be highly pleased if they again came into use. A number of cheese-factories have adopted the method of wire-binding the centre of the cheese-crate as well as the ends. This strengthens the case very considerably, and it is to be hoped that the method will sooner or later be general.

New and Improved Dairy Factories.—The great increase in the output of butter and cheese per factory has in many instances called for extension or rebuilding. In most instances officers of the Division have been called in to devise the form the alteration should take, and in a number of cases the entire lay-out has been left in their hands. Three factories were destroyed by fire during the season. Most of the new structures are to be of a permanent character, and in brick or concrete. Dairy companies generally are to be congratulated on the quality of the factories they are erecting. The new factories which have this season replaced old ones, and those in hand and to be taken in hand for next season are distinctly creditable to the industry.

Casein.—The manufacture of casein has extended during the year under review. Some 2,100 tons, most of which was lactic casein, was graded for export. The quality of lactic casein evidences improvement, and the quality of some 100 tons of rennet casein which was manufactured was of a very high standard. It is expected that the manufacture of casein will continue to be popular where whole milk is being delivered at factories or skimming-stations for the manufacture of butter.

Farm-dairy Instruction.—The work of farm-dairy instruction has increased in popularity during the past season. Five new appointments have been made, four of which were for the South Island. The officers appointed have carried out their duties in a manner which has been acceptable to those concerned. To do this work efficiently and without causing friction it is necessary that a man should have a degree of tact greater than the average. Much improvement has been made, and this has been effected by the co-operation of the dairy-farmer and not by compulsion.

Inspection in London.—At the request of the National Dairy Association the position of Inspector of New Zealand Dairy-produce, London—which had become vacant during the war—was again filled, and Mr. W. Wright, who previously carried out this work, was reappointed. Mr. Wright left for London in September last and commenced his duties there early in November.

Legislation.—During the year a Dairy Industry Amendment Act was passed. This makes it a duty of the owner of a dairy factory—co-operative or proprietary—to advise suppliers of the yield of cheese or butter obtained per pound of butterfat received during the financial year. Authority for the check-testing of milk and cream samples for butterfat was also provided.

Advertising New Zealand Butter.—The disparity in prices between Danish and New Zealand butters was very marked during the latter part of the previous financial year. The dissatisfaction which this was causing induced the importers to start an advertising campaign in the interests of our butters. A fund was subscribed by the importers amounting to £500, which was supplemented by our Government, through the High Commissioner's Office, to the extent of £250. When the campaign started the price of Danish butter was some 45s. ahead of that of New Zealand. In three months after the advertising started there was practically no difference between the prices of the two. It would be rash to state that the change was entirely due to the advertising, but the need of the comprehensive continuous advertising of New Zealand dairy-products has been evidenced.

Association Testing of Ordinary Herd Cows.—The increase in this branch of cow-testing is little short of phenomenal. Statistics received show that for the season under review some 85,000 cows have been tested under this system, as compared with 45,564 for the previous season. The number tested this year represents over 7 per cent. of the dairy cows in the Dominion. Of the 85,000 cows under test 34,558 were tested and figured by officers of the Dairy Division. It is yet early to forecast the next season, but already the Division has received requests for assistance from dairy companies anxious to commence cow-testing associations, and a considerable further development may be expected.

Testing of Purebred Dairy Cows.—The number of purebred dairy cows entered for certificate-of-record (semi official) testing evidences an upward trend from year to year. A year ago the fee for testing was changed from a flat rate of five guineas per cow to ten guineas for the first and three guineas for each subsequent entry. It was thus hoped to make the revenue from this work more nearly meet expenditure by increasing the number of cows per breeder. The desired effect was attained to a marked degree. During the season under review the average number of cows tested per testing breeder was 3.83, as compared with 2.69 for 1921-22. This year some 1,060 cows are, or have been, under C.O.R. test, as against 810 last year. The number of proven purebred sires with butterfat-record backing drafted out into grade herds increases, and it is gratifying to report that some of our most outlying districts are included in the movement. Thus the C.O.R. testing is attaining one of its most important objects. The average yield of cows tested has improved, and many outstanding individual records have been authenticated, two cows having passed the 1,000 lb. butterfat mark.

Staff.—The phenomenal increase in the production of dairy-produce for export has caused the work this season to be very exacting on the staff, which is numerically too small for the work. A particularly heavy season's work has been well carried out, this applying to officers in all branches of the Division.

HORTICULTURE DIVISION.

The work of the Horticulture Division covers a varied field, and it has been well carried out by the Director, Mr. J. A. Campbell, the Assistant Director, Mr. W. T. Goodwin, and the divisional staff.

The Fruiting Industry.—The total area in commercial orchards throughout the Dominion stands at approximately 30,000 acres. As far as the fruit crop is concerned the season under review (1922-23) has been a satisfactory one generally. Prices realized by growers from the sale of apples and pears have not come up to those ruling last year, however. This has been brought about to a great extent through the large quantity of low-grade fruit placed on the markets, which has had the tendency of keeping down the returns for the higher-grade article. With a view of improving the position a scheme of voluntary standardization is at present under consideration, whereby it is hoped a more specific method of selling standardized fruit in the markets than has existed in the past will be brought about. For other varieties of fruit the prices realized have been fairly satisfactory. The area planted during the year in new orchards was practically the same as that of the previous season—namely, 204 acres. At the same time it is estimated a similar area has either been cut out or

abandoned—the owners not being able to carry on, chiefly through financial reasons. The Government, through the State Advances Department, agreed under certain conditions to assist the fruitgrowers of the Mouere Hills district, Nelson, to carry out a specific orchard-manuring scheme.

Orchard Diseases.—Considerable improvement is noticeable in the control of orchard pests and diseases by the majority of commercial growers. There are, however, in the various districts persons (chiefly smaller growers) who, although given every opportunity by the Inspectors to comply with the regulations, will not take the necessary steps to keep their orchards clean, and it has unfortunately been found necessary to take proceedings against a number of these delinquents during the past season. Fireblight disease has spread to a slight extent in the Auckland district, although every effort was made to confine it to the areas already infected. The majority of orchardists fully realize the seriousness of the disease, and are giving every assistance to the Department in our endeavour to keep it under control. In some districts a considerable amount of damage has been done by mealy-bug and pear-midge. These pests are somewhat difficult to keep in check, and further experimental work will require to be carried out during the next season with the view of arriving at a satisfactory means of control.

Colonies of *Aphelinus mali*—a natural enemy of the woolly aphis—were received from the Cawthron Institute and distributed to the chief fruitgrowing districts. In the Hawke's Bay district this insect is reported to have become firmly established on the trees specially set aside, and is doing good work in controlling the aphis. Reports from other districts are not so satisfactory. The operations of the parasite will be watched with interest, but it will take a season or two to determine whether it will be successful in combating the aphis to any appreciable extent.

Export of Fruit.—The total quantity of fruit exported during the 1922 export season was 112,345 cases of apples and 8,148 cases of pears. Of these, 107,330 cases apples and 8,133 cases pears were shipped to England, 3,515 cases apples and 15 cases pears to Honolulu, and 1,500 cases apples to South America. This constitutes a season's record in the quantity of fruit exported from the Dominion since exporting commenced. Unfortunately, in a number of instances the fruit arrived in England in a more or less deteriorated condition, and this, together with the fact that the market was heavily supplied by shipments from Australia, resulted in low prices being too often obtained. As a consequence claims to a considerable extent had to be made on the Government guarantee of 1d. per pound net return to growers. Inspection and grading of the fruit prior to shipment was carried out efficiently by officers of the Division under the export regulations.

Experimental and Instructional Work.—The practice of carrying out experiments with spray compounds for the control of orchard pests and diseases has been continued. Manurial and cover-crop experiments in orchards were also conducted. Experimental work in connection with the cool storage of fruit was carried out in co-operation with the Biological Laboratory. Following the usual practice the Orchard Instructors have during the winter months given practical demonstrations and lectures in their respective districts on matters relative to orchard-management generally. In most of the fruitgrowing centres apple grading and packing classes have again been conducted.

Satisfactory work is being done on the remaining co-operative fruit-testing areas. The areas still in operation are situated at Mangonui, Kumeu, Tanekaha, Henderson, Matatoki, and Hillersden. Among these the citrus-testing area established at Henderson in 1919 should provide both valuable and interesting information when the trials are complete. Co-operative areas for the testing of different varieties of vines have also been planted at Te Mata (Hawke's Bay) and Whakatu (Nelson).

Cool Storage of Fruit.—The fruit cool stores established in the chief districts have been kept running to their full capacity, a large quantity of fruit being placed in cool storage for use in the off-season. While in some stores the fruit has kept in a satisfactory condition, in others considerable trouble has been experienced by the fruit developing what is known as flesh-collapse or brown-heart. The cause of this trouble is somewhat obscure, and thorough investigations are being carried out by the Biological Laboratory in conjunction with the Horticulture Division with the object of arriving at a remedy for the trouble.

Sale of New-Zealand-grown Fruit for Local Consumption.—The Fruit Inspectors report that the bulk of the fruit coming on to the market is clean and of good quality. Some, however, is badly affected with disease, such as codlin-moth, black-spot, &c., and condemnations on this account have been necessary. The proper use of registered numbers is now being more satisfactorily adhered to by the majority of growers, and this facilitates the work of the Inspectors.

Orchard Registration and Orchard-tax.—The number of orchards registered during the year was 7,044, representing a total of some 30,000 acres. Tax-demand notices were sent out to all registered orchardists, and the amount of £1,982 collected.

Registration and Inspection of Nurseries.—The inspection of all nurseries has been satisfactorily carried out, and reports to hand indicate that the prospects of the nursery trade are now considerably brighter than they have been for some years past. A total of 560 nurseries were registered and inspected, and certificates issued, an increase of thirty-five as compared with the previous year. £560 was collected in registration fees.

Horticultural Stations.—Owing to the financial situation it was decided during the year to close down the horticultural stations at Tauranga and Arataki. These stations had done good service in carrying out valuable experimental work. At Tauranga arrangements were made with the Manager to take over a portion of the farm on his own account, to complete the tests in citrus-culture, and to supply the Department with full particulars of the results when the work was completed. At Te Kauwhata the grape crop was very good, and the crop was harvested under favourable conditions. It is expected that the quantity of wine manufactured will exceed that of the previous vintage. The sales of wine for the year were 4,378 gallons, valued at £3,490. On account of the wet season only about half the quantity of wattle-bark required could be stripped in the wattle plantations, but this was disposed of at good prices.

Papanui Experimental Orchard: Fruitgrowers generally have expressed themselves as being well satisfied with the results already obtained here, and with their concurrence it was decided to carry out the work during the remaining period of the lease on the most economical lines possible, with the idea of making the orchard more of a paying proposition.

Imported Fruit, Plants, &c.—The Fruit Inspectors report that the bulk of the fruit, plants, &c., imported during the year arrived in good condition. A very satisfactory feature lies in the fact that a continued improvement in the quality and packing of island fruit is noticeable. Consignments were free of fruit-fly maggot, no condemnations having to be made on this account. This is no doubt due to the method now adopted of holding the fruit for several days prior to shipment, and to careful inspection prior to packing for export. The following table shows the quantities of fruit, plants, &c., which arrived at the different ports of entry during the year (1922-23):—

Port of Entry.	Fruit.				Plants, Vegetables, &c.				G. and Total.
	Total.	Destroyed.	Fumigated.	Reshipped.	Total.	Destroyed.	Fumigated.	Reshipped.	
Auckland ..	389,019	56	144	270	21,662	93	..	18	410,681
Wellington ..	188,856	203	361	..	34,127	22	..	..	222,983
Christchurch ..	49,582	30	150	..	5,663	39	..	1	55,245
Dunedin ..	29,790	..	..	..	3,357	7	..	..	33,147
Bluff ..	6,015	..	..	..	2,299	3	..	..	8,314

Hops.—The hop crop was a fair average one. According to the Customs returns, 1,959 cwt. of hops, valued at £17,797, was exported during the year.

Viticulture and Winemaking.—The past season has been a satisfactory one to growers of grapes, both outdoor and under glass, and good prices have been obtained for well-grown fruit. It is anticipated that the crop of wine grapes will slightly exceed that of last year, when a good return was experienced. The yield of wine in the Dominion is estimated at 85,000 gallons. At a reasonable estimate of 8s. per gallon this represents a value of £34,000.

Cider-making.—A number of inquiries have been received during the year for information and advice on cider-making, and such assistance has been afforded. As a means of profitably utilizing the large quantities of suitable apples available, a small company has established a cider-making plant in the Nelson District, and there is no reason why the venture, if properly managed, should not prove successful.

Beekeeping Industry.—Generally speaking, the past season has not been a favourable one for the beekeeper, the inclement weather experienced in most of the districts interfering to a great extent with the secretion of nectar. It is satisfactory to be able to report, however, that the beekeeping industry is still forging steadily ahead, and future prospects appear bright. The demand for information and advice on the many phases connected with bee-culture is increasing each year, and the Apiary Instructors have been kept fully occupied attending to these matters as well as carrying out inspection duties. As mentioned, however, in previous reports, the districts allotted to the Instructors are much too large to admit of anything like a systematic inspection being carried out, even with the aid of honorary Inspectors, who are doing useful work, and whose assistance is greatly appreciated.

A series of experiments is being carried out for the purpose of ascertaining some satisfactory method of dealing with moisture in honey. With the object of ascertaining to what extent the disease *Nosema apis* is prevalent in the Dominion, bees have been collected by the Instructors from different localities and forwarded to the Biological Laboratory for examination.

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

Registration: The total number of registered apiaries stands at present at 8,007, representing a total of 111,100 hives.

CHEMISTRY SECTION.

The Chemistry Section, under the control and direction of Mr. B. C. Aston, F.I.C., F.N.Z.Inst., has carried out a large volume of good work during the year.

The number of samples dealt with in this Laboratory during the year shows a great increase, 1,823 having been received, as against 885 in the previous year. The increase is due to the number of butter-samples and wheat for milling tests which have been received. The staff, however, has energetically met all demands made upon it.

Soils.—A number of samples for lime-requirement determination have been received from the agricultural-instruction officers. This testing is done free of charge when the samples are properly authenticated, but when a full soil-analysis for any purpose is required it has been found necessary to make a charge of £5 5s. per sample, as the analysis of soils is a very lengthy and costly work.

Lime and Limestone.—Assistance has been given to farmers who in combination desire to establish or to see established new lime-works in districts not suitably supplied at present. The Lime Committee, through Mr. F. W. Furkert, Engineer-in-Chief, Public Works Department, has prepared a full report on the lime-supplies for the Waikēkei (Whangarei) district, which has been communicated to those interested.

A number of high-grade samples of limestone have been received from Kamo, giving 81 to 85 per cent. of carbonate of lime on analysis, which is a high percentage for the North Auckland District. From Hokianga also some good samples of soft easily ground limestone were received, analysing 79 to 81 per cent. of carbonate of lime. Several samples of excellent soft limestone have been sent in from

Hawke's Bay, notably from Wanstead (91 per cent.) and Dannevirke (87 and 96 per cent.). That such material is available to the farmer without the expense of erecting costly grinding plants is extremely satisfactory, and no doubt many other localities in Hawke's Bay and the Wairarapa could be served with similar cheaply produced material. It is satisfactory to notice that the utilization of soft calcareous deposits, first recommended by this Section of the Department, is gaining ground, seeing that such material gives practically as good results in field trials as the manufactured article.

Toxicological.—A number of poisoning cases in domestic stock have been submitted for investigation. Lead poisoning in cattle was established in a case at Wanganui. Poisoning of pigs fed on refuse containing salt was suspected in two cases. Plant poisons continue to claim victims. Introduced buttercups (*Ranunculus*) are again objects of suspicion. Two cases afforded instances of *Ranunculus parviflorus* seeds being found in the stomachs of poisoned animals with characteristic symptoms of buttercup poisoning. In one of these cases *R. scleratus* was also suspected. These are both naturalized plants. In native plants *Hydrocotyle asiatica* (Asiatic pennywort) has been strongly suspected of poisoning sheep, while *Lobelia anceps* (native lobelia) is also under some suspicion. These matters will be thoroughly investigated as opportunity offers.

Fertilizers.—Phosphate rock in New Zealand: A new locality for the occurrence of phosphate rock in New Zealand apparently exists in the North Auckland District. Mr. H. Parsons, of Rawene, forwarded to the Laboratory in May, 1922, a specimen of rock which contained 11.12 per cent. phosphoric acid, equal to 24.4 per cent. tricalcic phosphate. A specimen of greensand received from Mr. L. W. Kempthorne, of St. Andrew's, near Timaru, was found to contain 4.1 per cent. phosphoric acid, equal to 8.95 per cent. tricalcic phosphate. Spent oxide from gasworks: An inquiry regarding the spent iron oxide from gasworks reminds one that this material, which can usually be had for the cartage, is rich in sulphur and also in nitrogenous compounds, which when allowed to oxidize on the surface of the pasture are transferred into useful nitrogenous fertilizers. The sulphur is also of value on some soils.

Fertilizers Act.—Forty-six samples have been examined, as against thirty for the previous year. Of these, one sample was found to be seriously below the vendor's guarantee, the deficiency in water-soluble phosphoric anhydride being equivalent in value to about £2 per ton. In this case suitable action was taken. Of the samples received, seventeen were from the Auckland District, fourteen from Wellington, and fifteen from Taranaki. The Instructors in Agriculture and other officers of the Department forwarded sixty-seven samples of fertilizers for analysis, mostly in connection with field experimental work. These were all of good quality, as were also twelve samples submitted by farmers, which were all within the guaranteed composition. The registration of fertilizers has been carried on as in past years.

Wheat Investigations.—Milling and other tests and analyses are now being carried out, the receipt of a large number of samples from the wheat-growing districts affording plenty of material to work on. It is anticipated that interesting and valuable data will result from this work when completed.

Obscure or Deficiency Diseases of Stock.—This work has been continued as in previous years. Visits have been paid to the Mamaku Farm, where useful results are being obtained. It is interesting to record that one of the organic compounds of iron used in the treatment of stock (the double citrate of iron and ammonium) has been successfully made in quantity in this Laboratory from locally grown limes and lemons, and that this preparation gives even better results than the imported article.

Dipping Preparations.—Several sheep-dips have been examined. In one case it would appear that the efficacy of a sheep-dip sold in powder form, which has been reported by a user as ineffective in destroying sheep-ticks, is somewhat dependent on the length of time it stands after mixing with water. Laboratory experiments showed a constant strength for two days after mixing. The inference is that some powder dips may require mixing about forty-eight hours previous to use in order to reach the effective strength. The matter is worth further investigation. Work in connection with the testing of cattle-dips has been continued.

Dairy-products.—Various dairy-products have been analysed. An endeavour is being made to ascertain if the work of testing butter for water content in the grading-stores can be accelerated by the adoption of new methods of analysis. Potable waters for factories have been analysed and reported on for their suitability in buttermaking, &c.

BIOLOGY SECTION.

A large and varied amount of useful work has been carried out by this Section, under the direction of Mr. A. H. Cockayne, Biologist.

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

This season's Chewings fescue has threshed out well, and is higher in germination than it has been for many years. Akaroa cocksfoot has been very disappointing, and consequently has been unable to compete successfully with Danish seed, large quantities of which have been imported during the year.

Research work upon the cause of and overcoming the loss of vitality in Chewings-fescue seed during and after shipment is still being continued. With the data attained from experiments carried out in co-operation with the United States Department of Agriculture, together with that from a series of experiments now being commenced, it is hoped that the Department will very soon be in a position to advise merchants, so that they may ship Chewings fescue with confidence. Various other researches in matters relating to seed work generally have been carried out as follows: Increasing germination of rye-grass by drying process; storage of Chewings fescue under cool storage and subsequently at higher temperatures; improved methods of testing peas and beans; co-operation with English seed firms in research into the loss of vitality of seeds during import and export;

standardization of source-indicators of agricultural seeds (in co-operation with the Seed Control Station, Zurich, Switzerland); standardization of methods of seed-analysis (in co-operation with the Royal Seed Control Station, Copenhagen, Denmark); statistical study of seed impurities and germination behaviour of New-Zealand-grown agricultural seeds.

Agrostology.—Research work into the establishment and maintenance of pastures has been followed up. The accurate determination of just which pasture species will thrive and persist on each soil type has received special treatment, and the various phases in the pasture cycle leading up to a permanent grassland sward are being closely studied. Investigations have been initiated into the state and causes of deterioration of hill country in the Whangamomona County, covering which a report is in course of preparation. Research work on our hill country is each year becoming more and more insistent if the apparent tendency to bracken-fern and other secondary growth is to be stopped. Already in New Zealand there are just on 4,000,000 acres now in scrub, fern, and other secondary growth, and each year additional areas are being added.

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

Entomology.—In comparison with last year the number of correspondents seeking advice regarding the control of destructive insects has almost doubled. The parasites liberated against the sheep-maggot flies are to be found in certain districts, but there is no evidence as yet to show that they are reducing the pests to any appreciable extent. The gum-tree scale since its establishment in the North Island has spread rapidly, and caused considerable damage to eucalypt plantations. Large consignments of the ladybird beetles which attack this scale were liberated shortly after the first outbreak of the pest was reported, and the beetles have bred so rapidly that they are now making a decided reduction in the infestation at many points. Further consignments of the ladybird are to be liberated this spring and summer. It is hoped to secure consignments of parasites for the pear-midge from England this year. The Imperial Bureau of Entomology, London, has undertaken to secure these insects on behalf of the Department. An investigation into the life-history of the cattle-tick in the North Auckland District has been undertaken by Mr. J. G. Myers, and a great deal of information of value has resulted.

Agricultural Botany.—Among routine work may be mentioned the identification of large numbers of weed specimens, advice as to the best control methods being given in each case. Many other plants of importance in agriculture have also been dealt with. There has been a further demand for weed-, grass-, and clover-seed identification cards, and a quantity of these were prepared and distributed. One of the most important undertakings during the past year has been the establishment of a herbarium of economic plants, which is of very great importance for the efficiency of this branch.

Mycology and Plant Pathology.—A survey of the agricultural and horticultural diseases caused by fungi and bacteria has now been completed. Especial attention has been paid to the diseases affecting fruit-trees, and the manuscript of a book dealing with these is now nearing completion. The mycological herbarium has been steadily added to, and now contains collections of all the fungous and bacterial diseases attacking plants in New Zealand.

Forest pathology: In collaboration with the State Forest Service a study of the diseases attacking forest-trees and timbers is being undertaken. A serious disease of willow-trees made its appearance in the North Island, in many cases these trees having been killed outright. Information regarding the checking of the spread of the causative organism has been widely disseminated among those who are employing this tree on river-margins. Certain soil fungi have proved troublesome to nursery stock.

Diseases of agricultural crops: A commencement has been made with the study of the smuts of cereals and grasses, together with their remedial treatment, and it is hoped shortly to be able to publish the information gathered. Potato-diseases are now being investigated, and a bulletin dealing with these diseases is in course of preparation.

Fungi attacking agricultural weeds, particularly blackberry and gorse, are being experimented with in the Laboratory, with a view of ascertaining whether such fungi may be practically useful in checking the spread of these weeds.

Utilization of Phosphate.—Preliminary investigations in connection with soil-bacteria are worthy of comment. A study is being made of a bacillus recently isolated by Dr. Joffe, of the New Jersey Experiment Station. The discoverer claims that in the presence of sulphur it is capable of converting 80 per cent. insoluble phosphate into soluble phosphate. There are great possibilities in this. A series of laboratory experiments with the organism is in progress, and the Chemist to the Department is making the chemical analysis of the soils under test.

Apple Shipment and Local Cool Storage.—Data covering last year (1921-22) show that apple flesh-collapse or brown-heart caused much loss; 30 per cent. of our exported apples were sold in England as damaged, involving an estimated loss of £7,500; and a loss of some £25,000 was sustained in our land cool stores. Investigation into the causes have since met with much success, and have resulted in considerable modification in storage methods both on land and sea. Recent reports from London and from the local stores already indicate a considerable improvement this season.

Bee-diseases.—Nosema apis, the protozoon occupying the epithelial cells of the chyle stomach of bees, has been traced to many parts of the Dominion, and it would appear to be almost universal. Its presence in bees, however, cannot be associated with any acute disorder in New Zealand, though minor troubles occasionally were present in bees harbouring the organism.

Agricultural Instruction and Investigation Work.—The duties involved in the organization and supervision of this work greatly increased. Special investigations are being made into the following, among other matters: Economics of crop-production in meat, wool, and milk; influence of turnips on the tainting of milk; farm-management methods in the control of root-crop diseases; influence of phosphates on soil-fertility; factors influencing succession in New Zealand grasslands (representing a large series of connected researches in applied ecology); critical study of succession dominants in grassland associations; and management of low tussock-grassland in New Zealand.

Lectures, Publications, and Photography.—In connection with the increasing demand for agricultural instruction and for special instruction to various farming organizations throughout New Zealand, the members of the Biological Laboratory staff have contributed a full share of lectures based upon their own original work. A large amount of matter dealing with various branches of the work has been contributed to the *Journal* by different members of the staff. Photographic and other illustrational work also merits special mention.

Staff.—Praise is due to the staff for the manner in which they have co-operated to meet the many and varied demands upon their services under retrenchment conditions.

PUBLICATIONS SECTION.

The Publications Section, with Mr. R. H. Hooper as Editor, has put a steady year's work to its credit.

The *New Zealand Journal of Agriculture* has been well maintained as the Department's foremost means of publicity, and much valuable original matter has been placed on permanent record in its pages. The aim, so far as circumstances will allow, is to blend the more practical instructional side with a popular scientific element in relation to the various branches of New Zealand agriculture. Apart from its Dominion circulation, the *Journal* has continued in request by agricultural and other scientific institutions in all parts of the world, and in this way it may be regarded as an effective means of publicity for New Zealand abroad.

During the year it was found necessary to increase the subscription of the *Journal* from 4s. to 6s. per annum (or £1 for four years), in order to comply with the general policy laid down that official services of this nature should be as far as possible self-supporting.

There has been a steady output of bulletins and other instructional printed matter during the year. The Section has also prepared and issued various other publications connected with the Department's activities.

HEMP-GRADING SERVICE.

The production of hemp (phormium-fibre) during the year was about on a par with that of 1921-22, while tow showed a considerable increase. Since October last there has been a general improvement in the quality of hemp forwarded for grading. During the last few years the quality of tow generally has been good, it being in most cases free from dust and rubbish, while prices have also been satisfactory, this no doubt being partly due to the better quality produced. Judging by the negligible quantity of stripper-slips forwarded for grading during the year, there was practically no demand for this by-product.

During the year 57,958 bales of hemp passed through the grading-stores, a decrease of 42 bales as compared with the previous twelve months. Tow graded amounted to 14,974 bales, an increase of 2,143 bales; and stripper-slips to 129 bales, a decrease of 525 bales. The gradings of hemp showed the following percentages for the various grades: Fine, 0.51; good-fair, 24.32; high-fair, 56.18; fair, 15.05; common, 2.55; rejected, 1.35; condemned, 0.01. Of the tow graded 44.63 per cent. scored first grade, 47.52 per cent. second grade, 6.47 per cent. third grade, and 1.36 per cent. was condemned. Of the stripper-slips 44.34 per cent. scored first grade, and 55.66 per cent. second grade.

Wellington shows a decrease of 5,192 bales of hemp graded, this being due, firstly, to the ravages of the yellow-leaf disease, and, secondly, to the number of floods in the Manawatu district during the early part of the season, which delayed milling operations. Foxton shows an increase of 4,304 bales. At Auckland there was an increase of 2,829 bales, and the outlook for the output generally in the Auckland District is very promising. Blenheim shows an increase of 213 bales. At Picton there was a decrease of 531 bales. Dunedin and Bluff show a decrease of 1,007 bales, but the general quality of hemp produced has been good.

A charge for grading hemp and tow, at the rate of 1d. per hundredweight or part thereof, was brought into force as from 1st August last.

Large areas of phormium in the Manawatu district have been destroyed or seriously deteriorated by the ravages of yellow-leaf disease. Some satisfactory results have been obtained from extensive experiments carried out at Messrs. A. and L. Seifert's Miranui Mill with a view to overcoming the disease and discovering immune varieties of phormium. Improved methods of cutting the green leaf are also being tested, and the results, as far as yield is concerned, are very promising.

During the year Mr. W. Petrie was appointed to the position of Chief Hemp Grader.

DEPARTMENTAL LIBRARY.

The general supervision of the Department's central library has been continued by Mr. B. C. Aston, with Mr. E. McCarthy in immediate charge. The expenditure of a considerable sum of money on binding is urgently required as soon as financial conditions permit, if the library is to supply a very pressing need in the Department's activities, as the difficulty of keeping in order and preventing loss is very much greater in a library when serials are unbound.

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

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