

1922.  
NEW ZEALAND.

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# DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT FOR 1921-22.

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

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SIR,— Department of Agriculture, Wellington, 19th August, 1922.

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 the 31st March last.

I have, &c.,

W. NOSWORTHY,

Minister of Agriculture.

His Excellency the Governor-General.

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## REPORT OF THE MINISTER OF AGRICULTURE.

THE agricultural year of 1921-22 may be recorded as, on the whole, a good one in regard to climatic conditions and production. The winter was mild generally, while the summer and autumn were marked by abundant rains, which promoted continued growth of pastures and benefited most crops, although in certain districts unduly prolonged wet periods interfered with the harvesting of cereals. The health of live-stock in general was good, and the Dominion maintained its complete freedom from serious animal-diseases which have been prominent of late in various other parts of the world.

In the pastoral-farming section a high average lambing-percentage was recorded, and lamb-fattening was carried out on an exceptionally extensive scale. The wool-clip as a whole was a good one. The dairy industry had a record year in production, the aggregate quantity of butterfat represented in the official gradings of butter and cheese showing an increase of no less than  $32\frac{1}{2}$  per cent. over that of the preceding season (which had also marked a record). Dairying, indeed, is steadily assuming a dominant position among the primary industries of the Dominion. The feature in arable farming was the heavy production of wheat, the area cropped being the largest since 1898-99, and the average yield some 30 bushels per acre. Good yields were also recorded in other cereals. The fruitgrowing, poultry, and beekeeping industries all demonstrated a marked development. On the other hand, in the hemp (phormium-fibre) industry the output again showed a shrinkage, due partly to depressed market conditions, but also largely to disease in the plants in certain important areas. Some improvement as regards this latter factor has been noted of late, however.

The live-stock position from the statistical aspect shows varied features. The outstanding item is a further decrease of about one million head in sheep, making a total reduction of some four millions in the last four years. The leading factors contributing to this downward movement are largely interdependent, and may be stated as excessive slaughter for freezing and export, the development of the dairy industry, and a decreased carrying-capacity of much sheep-country, hill pastures in particular. An increase of some 335,000 dairy cows has been recorded during the same period of four years (including 125,000 this year), but this does not counter-balance, in grazing equivalent, the decrease in sheep. The full sheep returns of 1922 are not available at date of writing, and thus the present position as regards breeding-ewes, &c., cannot be closely analysed. Last year there was a considerable recovery in the number of breeding-ewes, and the strong demand for ewes this season has been a good sign. It is to be feared, however, that an undue proportion of the season's ewe lambs suitable for reinforcing the flocks has been disposed of by sheep-farmers for freezing, stress of financial conditions being responsible to a great extent. The whole situation demands serious study in all its aspects both by the representative agricultural and pastoral bodies and the Department, with a view to staying this shrinkage in one of our most important sources of wealth. It is satisfactory to note a further increase of some 30,000 in pigs. Horses again show a moderate decline, doubtless corresponding with the continued increase in the use of motor vehicles.

The markets for several of the Dominion's staple primary products experienced remarkable vicissitudes during the period under review. Fat stock slumped heavily towards the end of 1921, corresponding in general with the frozen-meat market in Britain. Fortunately a rapid recovery took place after New Year, and lamb and mutton have since maintained satisfactory values on the average. Beef, however, remains very depressed, and a large number of cattle that would normally have been slaughtered for export during the season remain on the pastures. The markets for butter and cheese, especially the former, have been marked by extreme fluctuations, due largely to post-war and British decontrol factors. The serious crisis in the British market for butter which occurred towards the middle of the past dairying season entailed low advances for milk and cream supplies, with consequent embarrassment for many dairy-farmers. At other periods, however, the market rose to a high level, and in most cases the aggregate return for the whole season should average out at a reasonably satisfactory figure. Fairly good values ruled for dried milk, with special reference to skim-milk powder, the manufacture of which was largely increased. Satisfactory returns were also received for casein. With minor fluctuations the wool-market has continued to rise from the bedrock slump experienced in the previous year. The finer wools have reached very satisfactory figures, and the position of the coarser qualities has also sufficiently improved to enable the minimum prices fixed under the control scheme to be revoked as being no longer necessary. The New Zealand Wool Committee has rendered valuable service in connection with the regulation of the wool-sales and other matters affecting the welfare of the wool industry, and I must express my sincere appreciation of all that it has done. Wheat-growers have received good prices for milling-wheat under the Government guarantee. The disposal of second-quality wheat (of which there is a rather larger quantity than usual this season) is presenting some difficulty, but it is hoped to overcome this by a limited exportation under proper safeguards. The oat-market remains in a somewhat depressed condition. The export of apples to the British market, which was largely increased in volume this year, has, unfortunately, not given satisfactory all-round returns. Prices realized for sound fruit were on the whole good, but some of the shipments opened out in an unsatisfactory condition. It is evident that we have still much to learn as regards the harvesting, cool storage, and carriage of export fruit. The Government guarantee of 1d. per pound net on shipments will be largely drawn on this season.

While the average prices ruling at present for most of our primary products are above the pre-war level, the cost of production and marketing in general remains at a considerably higher comparative ratio. The producing industries are

thus severely handicapped, and in extreme cases, such as that of beef, export trade is actually paralysed. A recent moderate lowering of wages has enabled meat-freezing charges to be slightly reduced, and there has been an appreciable reduction in ocean freight-rates. The fall in land-values from the boom level also has a bearing in the same direction. Much more remains to be done, however, for the restoration of a proper balance between prices and costs. Needless to say the problem is a world-wide one.

The prevailing financial stringency has naturally put a heavy brake on agricultural development as regards both the enterprise of the farming community and the activities of the State. We may now, however, confidently regard the corner as having been turned, and the outlook justifies reasonable optimism. There is an immense field for extended co-operation among the producers, and it is to the interests of the State to encourage any sound self-reliant movements of this description.

A feature of the year has been the enactment of the Meat-export Control Act and establishment of the Meat-producers Board. Very wide powers are conferred on the Board, which is carefully studying the major questions in connection with the meat industry and trade, and has sent its vice-chairman on a similar mission to London. In the meantime the Board has already accomplished good work in connection with freight-rates, freezing-charges, &c., and is continuing its operations on sound, cautious lines. From next year the Board will be constituted on a definite elective system by the meat-producers, and the direct interest and responsibility in the control of the trade thus extended to them cannot fail to be beneficial. It may be mentioned that apart from the meat trade the organization set up by the Board has also been of some service to producing interests in kindred industries.

The Board of Agriculture has carried on its deliberative and advisory work as heretofore. The mature and practical experience of the members, embodied in the recommendations of the Board, has been of considerable value in many matters of policy and administration. The annual report of the Board is, as usual, printed as a separate parliamentary paper.

The accompanying report of the Director-General gives a concise but comprehensive account of the many-sided activities of the Department during the year, and shows that a large volume of valuable work has been carried out. Owing to the lack of funds it has not been possible to extend the various instructional and research services, but plans are well advanced for a forward move as soon as circumstances permit. There is a wide field waiting for general agricultural instruction to farmers, also for the training of youths in practical farming. A comprehensive agricultural survey (including soil) of the Dominion is another of the big undertakings ahead of the Department, to be commenced when present limitations are removed. Two pressing current problems, the rabbit pest and noxious weeds, are dealt with specially by the Director-General in his report, and his remarks have my full endorsement. It is clear that new methods must be introduced, and that a "getting together" in conference of all interests concerned is a necessary preliminary to effective action.

I take the opportunity, in conclusion, to record an expression of appreciation of the good work of the Department's staff in all branches during the year.

W. NOSWORTHY,  
Minister of Agriculture.

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## REPORT OF THE DIRECTOR-GENERAL.

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The Hon. Minister of Agriculture.

Wellington, 15th July, 1922.

DURING the period under review—the official year ended 31st March, 1922—the various branches of the Department were kept very fully employed, the work, in fact, being usually ahead of the staff.

Continued development is taking place in the agricultural and pastoral industries generally, the only retrograde movement being that shown by the further reduction in the number of sheep in the Dominion. This development has necessitated a corresponding expansion of the Department's activities, and this has been shown principally in a greater volume of instructional work, while the administration of the Stock, Slaughtering and Inspection, and Noxious Weeds Acts has been carried on with as great a degree of efficiency as circumstances permitted. The pressing need for economy has been met by a cutting-down of expenditure wherever it could be done without producing inefficiency, while maintaining the instructional services, meat and dairy inspection, grading of dairy produce, hemp, &c., control of disease, and other essential work at a proper standard, seeing that these necessary services constitute an important factor in the financial well-being of the Dominion and the health of the community. The very marked expansion of the dairy industry in particular necessitated an extension of the Dairy Division's work, and a feature of this is that those engaged in the industry have shown their willingness to bear a share of the cost involved, and are doing so.

I have to express my appreciation of the good work done by the Divisional Directors, Section heads, and staff of the Department generally during a strenuous year. Mr. A. H. Cockayne, Biologist, has given valuable assistance in practically undertaking the immediate control of agricultural instruction, field experiments, and work connected with the hemp industry, and in this has shown marked ability.

### THE DEPARTMENT'S FARMS.

The question of the larger State farms operated by this Department demands special consideration at the present time, and has already been gone into by the Board of Agriculture, which has made some valuable recommendations (see report of the Board). These farms were originally established for more or less specific purposes, and it may be accepted as a fact that these original purposes have been fulfilled. For instance, at Ruakura the bringing of what had been regarded as more or less worthless swamp land into a high state of productive fertility has been most successfully demonstrated, and practically the last of the swamp area has now been taken in hand. Equal success attended the operations at Te Kauwhata, where poor refractory land has been converted into a prosperous fruit-growing settlement. Apart from the original objects aimed at, the farms have proved of considerable value from a general educational standpoint, and of late Weraroa, and especially Ruakura, have been largely utilized for the training of returned soldiers in farm and other rural occupations. This phase of educational work has now ceased entirely at Weraroa, and cannot last much longer at Ruakura, hence the necessity for determining the policy to be adopted with these and other farms. As regards the Te Kauwhata farm, the whole of it except the wattle plantations and the small area containing the homestead buildings, vineyard, and orchard has been handed over to the Lands Department for disposal.

The Ruakura farm has been a centre for a great volume of educational work in addition to what has been done for returned soldiers, of whom over a hundred were trained during the year. Short training courses for teachers and for farmers were held, and a number of parties of farmers visited the farm and gained more or less useful knowledge. Previous to the commencement of soldier training a number of youths were given courses, training varying from one to two years, and ten of these were still in residence on the 31st March, but no others were taken on after the soldier-training reached its height. A new policy is now necessary, and proposals for a training establishment on wider and more comprehensive lines have been framed and are under consideration, particularly from the financial standpoint. Another point for consideration in connection with Ruakura (899 acres) and Weraroa (767 acres) is whether it is necessary to continue such large areas as individual farms. Certainly, as recommended by the Board of Agriculture, the expenditure involved by educational work and experimental work at these and other farms should be differentiated in official statements from that necessitated by the farming operations themselves. Regarding the Weraroa farm, it may be frankly stated that no attempt has been made during the year to carry on any special educational work apart from the training of returned soldiers. For the last three years a great deal has been done in the way of renovation and improvement, and the farm is now in good order. During the year it was conducted largely on commercial farming lines, and the expenditure has been greatly reduced. The results of the year's work at Moumahaki were disappointing, and the working of the farm has been thoroughly reorganized.

Of the smaller farms, those at Arataki and Tauranga, both devoted to the fruit industry, are being disposed of. The experimental portion of the Tauranga farm will be carried on independently by the present manager, provided the negotiations with him are satisfactorily concluded.

More detailed matter regarding the operations of the farms is given under the headings of the Agricultural Instruction and Experimental Farms Branch and of the Horticulture Division.

## THE RABBIT PEST.

The rabbit pest, and the question of the most efficacious methods of coping with it, demand special attention. A review of what has been done for several years past shows a record of hard work on the part of the Department's staff, the expenditure of a considerable sum of money annually, with undoubted good results in some districts; and yet, when it is considered that the extermination of the pest so far as is practically possible is the ultimate object aimed at, it must be realized that greater progress is necessary. Recent legislation has enabled more Rabbit Boards to be formed, and though sufficient time has not yet elapsed to enable the results of the work of these Boards to become apparent, they are, generally speaking, handling their responsibilities on the right lines. Further, in many districts settlers realize the necessity for effective work and are assisting the Department well. It is where trading in rabbits and rabbit-skins has become established that the outlook for anything approaching complete eradication is most discouraging. Rabbit-skins have of late become a quite valuable article of commerce, and their export brings into the country a good deal of money, but this only brings about conditions, resulting from trapping, which appear to keep an ample supply of rabbits available and at the same time cause a heavy slaughter of the trapped natural enemy. Thus, in the districts concerned, a conflict of interests has arisen between those interested in the commercial side of the rabbit trade on the one hand and the Department's officers, together with the settlers who are in earnest in rabbit-destruction, on the other. Hence a position has been reached where a new policy which will cut the present knot of conflicting interests needs to be determined upon. It must be based on bringing about the final eradication of the pest to such a degree as is practically possible, and how best to do this under the present circumstances constitutes a very definite problem. The investigations and experiments concerning pastoral country conducted by the Department in Central Otago indicate that given protection for a time from grazing stock and from rabbits large areas can be regenerated into good grazing-land at very little cost. In this connection the following quotation from an interim report by Dr. L. Cockayne is worthy of note:—

"These experiments are so designed as to show (1) the effect of spelling alone; (2) the effect of spelling together with the sowing of various pasture-plants; (3) the methods and best time for sowing; (4) the behaviour of the different plants sown, or otherwise introduced. The experiment plots, securely fenced from stock and rabbits, are so situated as to include all kinds of soil and aspect, while they extend from the base of the Dunstan Mountains to the line where depletion ceases at about 3,000 ft. altitude. A full account of the methods and results of the experiments after two years' experience of hot dry summers and cold winters is being published in the Department's *Journal*. Here it is gratifying to record that lucerne, cocksfoot, tall fescue, yarrow, and other pasture-plants are now well established and growing with full vigour in the majority of the plots, while even in those of stony, scanty, arid soil, exposed to the full sunshine and to the frequent gales, there is a fair amount of growth. In many cases good results have come about by mere surface-sowing, but there is better germination where, after such sowing, the hard ground was raked with one or two spokes of a garden rake. As many thousands of acres could be readily harrowed, such germination after light raking is an important feature of the experiments. The only water available for the plants has been the low annual rainfall of about 14 in. to 18 in. at the higher levels. For many successive days there were hot dry winds and burning sun, which on more than one occasion reached 102° F. in the shade. The results, so far, are highly satisfactory, and hardly to have been expected. Seeds of other species are to be tried, mostly from abroad, in order to cope with the maxima of drought, heat, and wind, while such as will tolerate excessive grazing are specially desired. Native grasses, almost dead, have quite recovered in the upper plots, but, generally, spelling alone has done little. The results so far are distinctly encouraging, and give strong hope that before long effective measures will be devised not merely for restoring the original tussock-grassland, but for clothing much of the depleted areas of the South Island, which cannot be irrigated, with a pasture of higher food-value than was that of the early days. Obviously, however, without a very great reduction of the rabbit pest, the best methods will be unsuccessful."

This having been done without irrigation, the possibilities of Central Otago, when the extensive irrigation-works now in progress reach their full and proper activity, can be realized. But rabbits must go and farm stock take their place if this extensive area is to attain its true value to the Dominion.

In working out a new policy those representing conflicting interests should be brought together in discussion, and, given a genuine desire on both sides to do the best possible under existing circumstances, such a discussion should bring about good results, and enable a new and more co-operative line of action to be adopted. The main points to be dealt with would appear to be—(1) The adaptation of the present lucrative trade in rabbit-skins to assisting practically and financially in the gradual eradication of the pest so far as is practically possible; (2) stringent control and regulation of rabbit-trapping; (3) the formation, outside Rabbit Board districts, of settlers' rabbit associations for bringing about simultaneous poisoning and concerted action generally; (4) the establishment of a system under which rabbit-netting fences will be utilized with Government co-operation to the fullest extent rendered possible by financial considerations; (5) a readjustment of the departmental system of inspection. A representative conference dealing with the rabbit question on these lines should mark the beginning of a valuable forward step. Under present conditions the Department has to depend upon its powers in enforcing the Rabbit Nuisance Act and its amendments, and very good work has been done, especially where settlers have shown the right spirit of co-operation. I am glad to say that this good spirit has been shown in a very large majority of districts. What is wanted is still more co-operation and less necessity for enforcement.

Rabbits on Crown and Native lands must be accepted as a responsibility resting upon the Government, and it is recommended that a special vote be taken for the purpose of dealing with them, instead of the Department bearing the entire burden of cost.

A summary of the work done in connection with rabbits during the year will be found later under the heading of the Live-stock Division.

#### NOXIOUS WEEDS.

The administration of the Noxious Weeds Act forms an unsatisfactory feature of the Department's work. The officers carrying it out have done their best, and there is no fault to be found as regards them; but with the progress of closer settlement the Act has become unsuitable for the altered conditions which have consequently arisen. It cannot be applied evenly and equitably throughout the Dominion, and no better illustration of this can be given than that which is afforded by Californian thistle. This weed is well established in certain parts of the Dominion: the great majority of the farmers there (who are the people most concerned) are satisfied that it is neither noxious nor a nuisance, and the practical impossibility of enforcing the provisions of the Act regarding it in these districts is so definite that enforcement has been discontinued. It has become a comparatively rare occurrence for any complaint to arise from farmers regarding this weed, and I believe that the general consensus of opinion, among at least a very large majority, is that they can quite well deal with it themselves in their own way without departmental action being necessary. The worst feature of its spread lies in its presence in oat crops and the dissemination of the seed throughout the country in oaten chaff, and, as has happened, with oats used for seed. But as regards this weed I do not consider that the damage done warrants the expenditure involved by inspection, when the extent to which this is practicable—and, in particular, the extent to which it is reasonable to enforce the Act—is thoroughly realized. The same applies to many other weeds, and it is submitted that the really dangerous weed is blackberry.

The experience gained leads to the conclusion that the legislation relating to noxious weeds needs to be recast and brought into line with present-day conditions and requirements. At present its administration involves considerable expense, yet no matter how zealously and thoroughly the inspection-work is carried out, satisfactory results cannot be expected. Blackberry and sweetbrier must be dealt with as thoroughly as is possible, and amending legislation is necessary to enable this to be done. Californian thistle and ragwort should be placed in the Third Schedule, thus enabling local authorities to exercise optional power as to whether these should be treated in their districts as noxious weeds or otherwise. Before amending legislation is drafted, I am of opinion that the whole question should be thoroughly gone into with local authorities, particularly County Councils, seeing that they are so closely associated with the working of the Act.

#### LIVE-STOCK DIVISION.

A wide scope of important work has been carried out by this large Division under the directorship of Mr. A. R. Young, M.R.C.V.S.

*Stock Conditions generally.*—The climatic conditions throughout the Dominion have been generally good for stock during practically the whole of the year under review. Some drawback occurred consequent upon a rather overbountiful rainfall during the whole of the summer, the feed, of which there was an abundance, not being quite as it should be for sheep-fattening purposes, resulting in a somewhat larger percentage of second-quality lambs than is usual going into the works for slaughter. Stock wintered well; the weather at lambing-time was good, and an excellent lambing resulted, the estimated Dominion percentage being 86.59 per cent., equivalent to 10,518,780 lambs, an increase of 904,232 over the number recorded in the previous year. All classes of stock have been maintained in a satisfactory state of health, the entire freedom of the Dominion from such serious animal-diseases as anthrax, foot-and-mouth disease, pleuro-pneumonia, tick-fever, glanders, rabies, &c., being maintained. This may be in part attributed to the stringent regulations under the Stock Act pertaining to the introduction of stock from abroad, and, having regard to the great value to the pastoral industry of this freedom from serious disease, the maintenance of these provisions is well warranted.

*Animal-diseases.*—Blackleg: The inoculation of calves against blackleg was continued within the boundaries of the Taranaki and Auckland districts as defined in the regulations, but the numbers coming forward for inoculation again show a considerable reduction on previous years, being 46,024 for Auckland and 39,725 in Taranaki, this being largely due to the fall in beef-values causing a much greater number of calves than usual being killed at birth. The vaccine used was, as before, all prepared at the Department's laboratory, and the results are entirely satisfactory. A number of alterations have been effected in the way of improving the facilities for preparing and attenuating the muscle used for the purpose, and ensuring an entirely satisfactory vaccine.

Contagious mammitis: This disease is still more or less prevalent throughout the Dominion, but at the same time in a very large number of cases of udder trouble, suspected of being due to this disease, examination of the milk-specimens has not confirmed the presence of the contagious form of mammitis. Of 1,094 samples of milk received at the Department's laboratory, generally from suspected cases, only 294 proved on examination to confirm the suspicion. This prevalence of inflammatory udder trouble of other origin is probably due to some extent to carelessness in the use of milking-machines. The milking-machine is a valuable and in many cases necessary adjunct to the dairy farm, but, improperly operated or carelessly used, it may become a factor in causing inflammatory trouble or in spreading contagious mammitis from cow to cow. Hence it is in the interests of dairymen to watch their machines carefully, and see that the utmost care is practised in having the parts thoroughly cleaned and regularly sterilized.

**Contagious abortion:** This disease continues to give trouble in many districts, and, as is not unusual, after apparently disappearing for a time it often reappears. It is reported by the District Superintendent, Auckland, to be present in all parts where dairying is carried on, and any general decline is not noticeable. Wellington reports it to be more prevalent than in the preceding season. In both districts the spread is no doubt accounted for largely by the increased dairying activity and the fact that in a number of cases the new milkers are inexperienced. Canterbury reports isolated cases of the disease in a number of districts, and the District Superintendent, Dunedin, reports that the trouble appears to be on the increase. The examination of the blood of cows as a means of ascertaining whether the disease is present or not has been undertaken at the Veterinary Laboratory, and a number of specimens were examined during the year. This should be of assistance in dealing with this trouble. But still more effective methods—of prevention, especially—are needed, and the search for these is being continued.

**Vaginal catarrh:** This trouble is still prevalent in a number of districts, and owing to its persistency entails considerable loss to owners through producing temporary sterility if not early recognized and put under suitable treatment.

**Tuberculosis:** An analysis of the statistics showing the result of the examination of stock on slaughter indicates a continuance of the position recorded during the previous two years, though the percentages of all classes of cattle (except calves) found on examination on slaughter to be affected in any degree with tuberculosis shows a slight increase on those of the previous year. This should not, however, be taken to infer that tuberculosis is on the increase among the classes of animals concerned, as it must be pointed out that owing to the low price offering for beef for export, large numbers of cattle of a class usually showing a very low percentage of tubercular animals were withheld from slaughter, thus tending to increase the percentage figures, but not indicating the true position as would this return in a normal year. The condemnations of cattle by Stock Inspectors in the field for tubercular infection on clinical examination and on account of a reaction to the tuberculin test indicates a great activity on their part, an increase of 452 in the numbers condemned throughout the Dominion for this disease being recorded. Our present methods of combating this disease have been effective up to a point, but they evidently are not resulting in bringing about the steady decrease which had been hoped for, and the question of a change of policy demands consideration. Such a change would need to be on instructional and business-like lines rather than in the direction of greater repressive measures, and it is on these lines that it is being thought out.

**Actinomycosis:** This disease is still responsible for a considerable number of cases being reported, the figures being as follows: Auckland, 193; Wellington, 162; Canterbury, 85; Otago-Southland, 97.

**Parasitic gastritis:** A good many cases came under notice, and it is evident that this troublesome affection is still responsible for loss in districts where wet conditions of weather and soil prevail. At the same time stockowners are now much better informed as to the preventive and curative methods needed in order to combat this trouble.

**Fluke:** Some cases of disease (distomiasis) resulting from the presence of this parasite came under notice in the Hawke's Bay district, where the existence of these parasites has been observed for many years past, though they had hitherto caused no apparent trouble.

**Cattle-tick:** Amended regulations under the Stock Act for the prevention of the spread of ticks among cattle were gazetted in February last, and immediately came into force. As is often the case with measures of this kind, their initial operation has brought to light local difficulties which have caused complaint from settlers, but every endeavour is being made to meet these to the best advantage for all concerned. It is hoped that in their own interests, and the interests of clean districts and of the Dominion as a whole, settlers will co-operate with the Department in effectively and reasonably grappling with the pest. During the year a further nineteen dips were completed, making a total of thirty-eight dips in all for which the Government subsidy has been paid. It is satisfactory to note that, generally speaking, stockowners, auctioneering firms, &c., are doing their best to comply with the regulations, and that on the whole they are working as satisfactorily as could be expected.

**Slaughter of Stock for Food Purposes.**—The following table summarizes the number of stock slaughtered at specified classes of establishments throughout the Dominion during the year under review:—

| —              | Abattoirs. | Meat-export<br>Slaughter-<br>houses. | Bacon-<br>factories. | Ordinary<br>Slaughter-<br>houses. | Totals.   |
|----------------|------------|--------------------------------------|----------------------|-----------------------------------|-----------|
| Cattle .. .. . | 107,180    | 97,907                               | ..                   | 56,631                            | 261,718   |
| Calves .. .. . | 21,035     | 9,585                                | ..                   | 1,672                             | 32,292    |
| Sheep .. .. .  | 763,177    | 3,071,255                            | ..                   | 292,794                           | 4,127,226 |
| Lambs .. .. .  | 175,506    | 4,876,555                            | ..                   | 33,208                            | 5,085,269 |
| Swine .. .. .  | 84,198     | 61,001                               | 31,696               | 17,752                            | 194,647   |

In addition to the above, the examination of 35,799 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. This examination of pigs killed by farmers is unsatisfactory in some ways, and somewhat costly, but with the Act as it stands it is the best that can be done.

**Inspection of Meat.**—Inspection of the carcasses of animals slaughtered at meat-export works, abattoirs, and bacon-factories was carried out satisfactorily during the year. The following are the numbers of each class of stock slaughtered under direct inspection during the year ended 31st March, 1922: Cattle, 205,087; sheep, 3,834,432; swine, 176,895; calves, 30,620; lambs, 5,052,063.

*Compensation paid for Stock condemned.*—During the year compensation to the extent of £12,726 became payable for 4,282 animals condemned under the Stock Act, and in addition the sum of £9,009 was paid for carcasses or parts of carcasses condemned on inspection at time of slaughter under the provisions of the Slaughtering and Inspection Act, making a total amount for which the Consolidated Fund became liable during the year under the Acts named of £21,735, of which sum £21,323 was actually paid out. Against the expenditure of £12,726 under the Stock Act must be set credits amounting in all to £1,005 15s. 7d.

*Importation of Stud Stock from Abroad.*—During the year some importations of valuable stud stock took place, particularly in dairying-cattle. The following are particulars: Cattle, 22 (5 Short-horn, 14 Jersey, 3 Ayrshire); sheep, 10 (7 Hampshire, 3 English Leicester); swine 13 (8 Berkshire, 2 Tamworth, 3 Yorkshire); horses, 16; goats, 11 (10 Anglo-Nubian, 1 Toggenburg). The freight rates on imported stock are still very high, and it is sincerely to be hoped that the shipping companies will soon see their way to reduce them.\*

*Destruction of the Kea.*—The subsidy of 5s. per beak offered by the Government in 1920 to encourage the destruction of the kea was continued throughout the year 1921-22, and resulted in 6,315 beaks being brought forward as evidence for claiming the subsidy. This wholesale slaughter should result in a considerable reduction in the loss of sheep attributed to this bird, particularly in certain parts of Canterbury and Otago.

*Inspection of Dairies supplying Milk to Towns.*—The inspection and registration of all dairies and herds supplying milk for town consumption has been continued during the year, and with few exceptions the premises have been maintained, so far as possible, in a satisfactory condition. In some cases it has been difficult for the occupiers to maintain the premises in a wholly satisfactory condition owing to the buildings having been originally erected on unsuitable sites, and also to faulty construction, &c., but reasonably clean conditions are insisted upon, and on the whole licensees are always willing to comply with requirements.

*Importation of Animal-manures.*—The importation of animal-manures from Australia showed a well-marked decrease on the previous year's total, and, as has happened previously, a considerable quantity of manure prepared according to our regulations and intended for export to New Zealand found a market elsewhere. This is unfortunate, as, in addition to the Dominion losing a valuable manure, the Department is put to the expense of supervising its preparation under New Zealand requirements; but owing to it not being shipped to the Dominion no inspection fees are payable. The decrease in the shipments was apparently caused by a falling-off in the demand from New Zealand, due largely to financial stringency. The quantity of bonedust imported from India, where we also have inspection, amounted to 2,135 tons only.

*Sheep-dipping.*—Lice and ticks on sheep and lambs exposed for sale are still frequently met with, largely, no doubt, as a result of insufficient care in dipping.

*Wallaceville Laboratory.*—Much of the work at this laboratory consists of the examination of pathological and other specimens, and the bacteriological examination of water-supplies, milk, and other products. A large number of samples of milk were from cases of suspected contagious mastitis. Observations on abortion disease were continued, and a number of doses of vaccine (living cultures) distributed. Contagious mastitis has received further attention from the point of view of curative treatment. Articles on both of the latter diseases and the investigational work were prepared by the officer in charge of the laboratory (Mr. H. A. Reid, F.R.C.V.S.) and published in the Department's *Journal*. A large quantity of blackleg vaccine was prepared and sent out. Experimental treatment for gastric worms in sheep was conducted with very satisfactory results.

*Wool Instructional Work.*—The Wool Instructor was kept very busy during the year giving advice, lectures, and demonstrations to farmers on wool growing and handling. It is satisfactory to note that a greater number of wool-producers are paying attention to the proper preparation of their clips for market. There is, however, still room for a great deal of improvement in this respect, and a further advance in this direction is anticipated.

*Instruction in Swine Husbandry.*—A steady demand for the services of the Instructor in Swine Husbandry was experienced, and there is evidence that this work is having good results. The latest enumeration of pigs showed another substantial increase, and altogether this line of farming is getting on to a better footing than for some time past, in spite of the erratic values ruling during the year.

*Poultry.*—A great development has been experienced in the poultry industry, and the confidence of producers has been greatly strengthened. Although large poultry plants are increasing, the bulk of the production still comes from the small settlers. In view of the possible development of an export trade in eggs in the near future the question of framing export regulations therefor will need to be considered. The Chief Poultry Instructor and his assistants have found it difficult to cope with the large amount of work and the calls for their services. The poultry-station which the Department has so long conducted at Milton, Otago, was closed down at the end of the year. This farm had done excellent work in the dissemination of proved utility stock at reasonable prices throughout the Dominion, but it had got entirely out of date in its general lay-out, buildings, &c., and its closure was decided upon owing to the economy rendered necessary by the financial position. The poultry plant in connection with the Avonhead Demonstration Farm, which was established by the Repatriation Department for training soldiers, has now been taken over by the Department of Agriculture. This farm is laid out on up-to-date lines, while the stock, consisting of White Leghorns, is of high utility and breed quality. This, together with the modern methods of management adopted, makes the farm an important centre for demonstration purposes, and it is hoped to make it pay its way.

\* Information is just to hand that the shipping companies will carry stud stock to the Dominion from Great Britain free of charge. This is most highly appreciated.

*Rabbit Nuisance.*—The control of the rabbit pest by the Department was the subject of considerable agitation in a number of rabbit-infested districts in Otago during the year, and, although some very good work has been done in this and other districts, the results in some cases have been disappointing. Very good results have been obtained in the rabbit-infested districts south of Auckland, where the pest had gained a considerable hold. Special investigations were made as to the extent of the spread of the pest in the North Auckland district, and while rabbits are fairly well established in some of the localities, the position is now being taken in hand. The practice of supplying phosphorized pollard and oats, and also phosphorus, strychnine, and carbon bisulphide, has been continued, and very considerable increases have taken place in the quantities sold. The selling-price of phosphorized pollard was increased during the year by 1d. per pound. The increase was rendered necessary as the selling-price had been considerably below the actual manufactured cost, and a substantial loss was being incurred yearly at the Department's depots in consequence. It is not anticipated that the present price will do more than allow the accounts to balance. An amendment to the Rabbit Nuisance Act passed during the 1921–22 session removed from section 2 of the Amendment Act of 1918 the words "to the satisfaction of the Inspector" and "in the opinion of the Inspector," to which great objection has been taken in some parts. It was found necessary during the year to institute sixty-three prosecutions for failure to comply with the provisions of the Act.

#### DAIRY DIVISION.

The Dairy Division, in charge of Mr. W. M. Singleton, Director, has dealt with a largely increased volume of work.

*The Season and Production.*—Every dairy district in the Dominion experienced a season particularly favourable to an abundant growth of feed for dairy cattle. In most districts the winter of 1921 was mild, and a comparatively plentiful supply of feed during that period ensured the cows coming into profit in good condition in the spring. Owing to copious rains throughout the summer, the succulence of the pasture was unusually well maintained, and the cows thus received a good chance to maintain their yield.

The production as represented by the grading figures shows an increase of 31·25 per cent. for butter and a decrease of 1·94 per cent. for cheese. The slight decrease on cheese is merely due to market fluctuations, and the consequent changing over in a number of districts from the manufacture of cheese to butter. The following table shows the respective gradings for the years ended the 31st March, 1922 and 1921 :—

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

| Port.                | Year 1921–22. |           | Year 1920–21. |           |
|----------------------|---------------|-----------|---------------|-----------|
|                      | Butter.       | Cheese.   | Butter.       | Cheese.   |
|                      | Cwt.          | Cwt.      | Cwt.          | Cwt.      |
| Auckland .. .. .     | 490,646       | 176,180   | 360,686       | 256,227   |
| Gisborne .. .. .     | 11,172        | ..        | 5,868         | ..        |
| New Plymouth .. .. . | 90,301        | 197,008   | 71,038        | 201,394   |
| Patea .. .. .        | 26,838        | 254,346   | 36,830        | 223,783   |
| Wanganui .. .. .     | 22,188        | 15,540    | 18,633        | 15,880    |
| Wellington .. .. .   | 157,119       | 300,447   | 110,995       | 309,098   |
| Lyttelton .. .. .    | 42,557        | 36,001    | 40,634        | 40,884    |
| Timaru .. .. .       | 1,748         | 7,759     | ..            | ..        |
| Dunedin .. .. .      | 24,812        | 43,113    | 20,362        | 49,656    |
| Bluff .. .. .        | 14,972        | 175,947   | 7,012         | 133,376   |
| Totals .. .. .       | 882,353       | 1,206,341 | 672,058       | 1,230,298 |

*Butter.*—The quality of creamery butter has been well maintained, and in a number of districts has actually improved. Of the 1,554,932 boxes of creamery butter exported to Britain, 1,463,881 boxes were first grade, 90,905 second grade, and 146 third grade.

*Water-content:* Butters coming from well-equipped and well-managed factories as a rule show a suitable percentage and uniformity of water-content. There are however, a number of managers who have too little regard for their responsibilities. Their butter may be found containing too little water one day and too much the next. Such management is costly to the dairy factory and a menace to the industry. The Graders have found it necessary to exert the greatest care in not passing butters containing moisture in excess of the legal limit. It would appear that provision will shortly have to be made to enable a greater number of samples to be tested, and severe penalties inflicted in cases where butter forwarded for grading and export is found to contain more than the legal limit of 16 per cent. of water.

*Cheese.*—The cheese which came forward for grading during the season 1921–22 in most districts showed some improvement in quality over that of preceding seasons. Of a total of 955,729 crates of cheese exported to Britain during the year ended 31st March, 1922, 898,607 were first grade, 56,813 second grade, and 309 third grade. There is still room for considerable improvement in the dressing of the cheese. Much cheese showed evidence of insufficient pressing before dressing, and also of

hurried and apparently careless work at this time, which resulted in an inferior finish. Lack of attention to these details may mean a doubling-in of the bandage, which leads to cracks that permit mould-growth to penetrate into the cheese, necessitating the discarding of portions when the cheese is cut. It is hoped that factory-managers will take greater interest in this phase of the work, which, although generally regarded as a detail, is nevertheless of very great importance.

**Heated cheese:** There was some delay in shipping from New Zealand the cheese made towards the latter end of the 1920-21 season. Some of this cheese arrived in Britain during their 1921 summer months, and some as late as September. There was probably more dissatisfaction and loss respecting these shipments than had previously been connected with New Zealand cheese exports during the last two decades. The complaint was mostly to the effect that the cheese was overheated and damaged at the ends. As soon as advice was received efforts were made to locate the cause of the trouble. It was known that some cheese had deteriorated to some extent in store while awaiting shipment, and had got overheated before going on board the overseas steamer. It was also known that cheese in apparently good condition had been shipped and had opened up at the other end in an unsatisfactory condition. There was evidently room for improvement in the whole chain of handlings to which some of our cheese was subjected. The matter was taken up with the shipping companies and the factory-managers concerned. The companies storing the cheese prior to shipment have also given the matter earnest attention. It is fortunate that the cheese of the 1921-22 make is arriving on the British market in a condition which, up to the time of writing, has produced no complaints.

**Cheese from part-skimmed milk:** One dairy company during the past season has been manufacturing at one of its branch factories cheese from milk a portion of which had been skimmed. If the monetary returns be such as to induce an extension of this innovation in New Zealand cheese-manufacture, and a greater proportion of part-skimmed-milk cheese be made, the question of determining on a different grading-standard and method of branding may require further consideration. According to the present regulations under the Dairy Industry Act, it is quite legal for cheese from part-skimmed milk to be exported, provided the branding be in conformity with the requirements. It is advisable, however, that dairy companies should not be precipitate in diverting their cheese-manufacture from that of whole milk.

**Casein.**—The manufacture of casein has been carried on at quite a number of centres during the past season. The choice has largely been in favour of the manufacture of the lactic-acid variety. Some improvement in quality has been noted, and it is considered that more care has been given to the manufacture. The manufacture of rennet casein has been given a good deal of attention with a view to improving the quality. It is now considered that New Zealand can (from certain factories) turn out a rennet casein which will compare favourably with the product of France, which is considered by the trade as setting the standard of quality.

**Milk-powder.**—A large quantity of powder from both whole and skimmed milk was manufactured during the spring and summer months, and it is reported that the quality has been good. Climatic conditions have been especially favourable in the districts in which milk-powder factories are located. This fact, together with the supply from a large number of additional cows, caused a considerable increase in the aggregate output. The latter was rather beyond immediate requirements, and most of the factories discontinued in February or March the manufacture of milk-powder and diverted to cheese, or butter and casein. It is understood that the manufacture of milk-powder is likely to be resumed next spring as usual.

**Testing of Purebred Dairy Cows.**—During the year 309 breeders have been testing under the certificate-of-record system, which represents an increase of twenty-nine in number, or 10 per cent., as compared with the previous year. The number of purebred cows tested by these 309 breeders was 811, a decrease of 129 cows, or 16 per cent. The fee of five guineas per cow charged from the 1st January, 1921, shows its influence on the new season's entries, as it will be noticed that, although the membership was increased, the number of cows entered evidenced a slight decrease, pointing to the fact that the increase from three to five guineas per cow has increased the proportion of breeders testing only one or two cows. The increase in fee has thus not decreased the Department's loss in connection with this service as much as was desired, and it has therefore been found necessary to increase the fee for testing one cow. For cows tested on one farm, and starting test during the year commencing 1st April, 1922, it is proposed to charge ten guineas for the first cow or heifer and three guineas for each subsequent cow or heifer. During the year a change in the C.O.R. sampling system was instituted. The spring brought an increased membership, which made it impossible for the staff of testing officers to handle the work, while owing to the financial stringency it was deemed inadvisable to appoint further testers. It was therefore found necessary to reduce the time spent at each farm per month, and from the 1st September last testing officers have visited for three milkings only, instead of four as previously, for cows milked twice a day.

**Association Testing of Dairy Herds.**—The popularity of the association method of testing dairy cows still increases. As in the past, officers engaged in the testing of purebred cows have extended their duties to the association testing of ordinary grade and crossbred herds. The staff, however, has not been able to cope with all associations calling for assistance along this line. Officers have this season tested cows for some fifty associations, as compared with forty associations for the previous year. The charge for this association testing is 2s. per cow. The herds numbered 1,080 and the cows 25,912, as compared with 713 herds and 19,799 cows in 1920-21, representing increases of 51 per cent. and 30 per cent. respectively. In addition, some 19,652 cows have been tested by dairy companies to whom the owners were suppliers—an increase of 15,958 cows—and it is hoped that the future will bring a still further development of the association testing-work. The total number of cows systematically tested last year was 45,564, which is not a satisfactory proportion of the Dominion's milking-stock. One would like to see herd-testing a definite part of every dairy company's organization, the cost to be borne by the company. This would result in more systematic herd-development, with a resultant benefit to the revenue of the individual, the dairy company, and the country as a whole.

## HORTICULTURE DIVISION.

During the year Mr. T. W. Kirk, who had been Director of this Division since its establishment, retired on superannuation. He was succeeded by Mr. J. A. Campbell, Assistant Director, and Mr. W. T. Goodwin, a member of the orchard instructional staff, was appointed to the assistant directorship. Mr. Kirk has been connected with the Department of Agriculture almost from its inception, and this opportunity is taken to record a hearty appreciation of his valuable services.

*The Fruitgrowing Industry.*—Generally speaking, the apple and pear crop of the past season was on the light side. In most localities the unfavourable weather conditions experienced during the setting-period militated against heavy crops being obtained, but good average crops of all fruits were harvested in the Otago District. The stone-fruit crop in the Canterbury and Nelson districts was satisfactory. In other districts the yield was medium to light. A further large area was planted out in strawberries and tomatoes in the Auckland District, and the returns were above the average. In other localities the tomato crop was not so good, continuous wet weather during the fruiting season being favourable to the development of fungus disease. The citrus crop this year was a good average one. A pooling system for the marketing of lemons has been adopted by the Tauranga growers. The fruit is packed in the green state and forwarded to a depot in Auckland, where it is properly cured and then packed for the market under approved brands. These brands have already a favourable reputation, and there is every prospect of the venture proving successful. The estimated area planted in commercial orchards during the year is 203 acres. This brings the total area of registered commercial orchards for the whole of the Dominion to approximately 30,000 acres.

*Export of Fruit.*—During the 1921 export season a total of 48,912 cases of apples and 3,112 cases of pears was exported from the Dominion. Of these, 45,154 cases apples and 3,012 cases pears were shipped to London, and 3,758 cases apples and 100 cases pears to Honolulu. The fruit for the Home market was consigned through the New Zealand Fruitgrowers' Federation, and as the prices obtained were satisfactory there was no claim on the Government guarantee of 1d. per pound. It is expected that the total quantity shipped in the 1922 season will be in the vicinity of 120,000 cases, which will constitute a record for New Zealand since exporting commenced. The bulk of the fruit sent forward for examination prior to export has been quite up to the standard required by the regulations, and very little trouble has arisen with regard to the grading and packing. There is still room, however, for improvement in the method of branding and marking cases, and it is hoped that with a little further experience there will be more uniformity in this respect. A satisfactory feature is the wiring of cases at each end. This was one of the stipulations made under the guarantee, and has proved of great benefit in preventing breakages, &c., during handling.

*Orchard Diseases.*—The majority of commercial orchardists are doing satisfactory work in the control of diseases and pests. It was, however, found necessary to take proceedings against a number of growers in various districts for failing to comply with the requirements of the Orchard and Garden Diseases Act. The outbreak of fireblight in the Auckland District towards the end of 1919 has demanded close supervision in order to keep it within bounds. It is gratifying to report that this disease did not make its appearance in commercial areas during the past season, although infection was fairly general in other areas bordering commercial orchards. The cutting-down of hawthorn and the systematic destruction of hold-over cankers contributed to a large degree in preventing reinfection in the commercial areas. Good work has been performed by the Department's officers and by the temporary men engaged in fireblight-inspection duties, many of whom worked long hours in order that the hawthorn work should be completed before the blossoming-period. A slight outbreak of fireblight occurred in the Patea district at the end of December last, but prompt measures were taken, and, as far as it is possible to judge, every known source of infection has been eliminated in this locality. An outbreak of citrus bark-blotch occurred during the year, and steps are being taken for its control. It is at present confined to citrus areas in the Auckland District. The pear-leaf-rolling midge, which has gained a hold in one or two districts, is proving somewhat difficult to deal with. The Division is co-operating with the Biology Section in carrying out experiments for its control. Brown-rot of stone-fruits was again in evidence. In some localities the infection was more pronounced than during the previous season.

*Spraying and other Experiments.*—Tests with spraying compounds—new preparations in particular—were continued at the horticultural stations, &c. Experiments in orchard cover-crops, and in strawberry, tomato, and tobacco culture, were also continued during the year.

*Demonstrations, Lectures, and Classes.*—The usual demonstrations and lectures on matters relating to orchard-management were given by the Orchard Instructors in their respective districts during the winter months. The increasing demand for practical advice in pruning, spraying, &c., is a good indication that these demonstrations are appreciated by persons interested in fruitgrowing.

*Certificates of Proficiency.*—Every facility is offered to those desirous of qualifying for the Department's certificate of proficiency in apple grading and packing. Classes were again conducted in the main commercial centres, and examinations held at the end of the season. The usual examinations of persons desiring to qualify for the Department's certificate in pruning and spraying were also conducted.

*Co-operative Fruit-testing Areas.*—The bulk of these test plots have now fulfilled the purpose for which they were established, and have been handed over to their respective owners. Some eight still remain under supervision, the period for which they were taken having not yet expired. Arrangements have been made to plant an area at Mongonui, North Auckland.

*Sale of New-Zealand-grown Fruit for Local Consumption.*—The requirements of the regulations governing fruit for the local markets are now becoming generally known, and the majority of the growers are carrying out their obligations in a satisfactory manner. The system as a whole is proving very useful to all concerned in the fruit trade, and is of great assistance to our officers in the inspec-

tion work at the markets and elsewhere. Some little difficulty is being experienced where a grower sends fruit to the market in second-hand cases bearing another grower's registered number. This is, of course, a breach of the regulations, and where not rectified after due warning by the Department further action will require to be taken against the offenders.

¶ *Orchard Registration and Orchard-tax.*—The operations of the Orchard-tax Act have been renewed for another five years, the original Act having expired on 31st December, 1921. During the year under review 7,121 commercial orchards were registered, and tax-demand notices to the same number sent out from this office. The total amount collected in tax was £2,216. Considerable difficulty is experienced in a number of instances in collecting the tax owing to frequent changes in ownership, &c. All moneys received under the Act are paid over to the New Zealand Fruitgrowers' Federation (Limited), less cost of collection, and are utilized by that body, subject to the approval of the Minister of Agriculture, in organizing and improving the fruit industry of the Dominion as a whole.

*Registration and Inspection of Nurseries.*—This work is proceeding satisfactorily, and considerable improvement is noticeable in the quality and cleanliness of nursery stock since the regulations came into force in 1916. A total of 255 nurseries was registered and inspected, and a corresponding number of certificates issued during the year, an increase of thirty-four as compared with the previous year. Nursery fees collected amounted to £531.

*Horticultural Stations and Experimental Orchards.*—In view of the need for economy no new experimental work was undertaken at these stations. It was decided to close the Arataki and Tauranga stations, and final arrangements are now in hand for their disposal, with the exception of a small area at Tauranga which will be retained until the experimental work now in progress in connection with citrus-culture has been finally completed.

Te Kauwhata (Lower Waikato): In spite of inclement weather the fruit crop was fair. The grape crop, however, was a light one; some varieties set well, but others were very poor. On the fruit-farms area of the station the young trees have made good growth, and so far no fireblight has been detected in any of the five blocks. There was a considerable falling-off in the sales of wines from the station, due no doubt to the general financial depression.

Arataki: The fruit crop generally was a satisfactory one—apricots and plums bearing heavy crops. The bulk of the grape crop was sold for winemaking purposes. Some fifteen thousand vine cuttings on resistant stocks were rooted during the spring, the weather being exceptionally good for this purpose. All the grafted vines were disposed of, the demand for these being in excess of the quantity available. Spraying experiments were continued.

Tauranga (Bay of Plenty): All fruit-crops were light. The citrus-trees in the experimental area are now well established, and some are commencing to bear fruit. Tests were carried out with different varieties of citrus-stocks. The avocado pears and pomegranates have made good growth, and a number blossomed. So far, however, they have set no fruit. Tests were conducted with a few varieties of tomatoes, and further trials made with kumeras, maize, and melons.

Papanui Experimental Orchard, Christchurch: A large number of tests were carried out for the control of codlin-moth, powdery mildew, red mite, woolly aphis, and black-spot, and several largely attended field-days were held in the orchard under the auspices of the Canterbury Fruitgrowers' Association and the fruitgrowers' instruction classes.

*Inspection of Imported Fruit, Plants, and Vegetables.*—There was a considerable increase in the quantity of fruit and plants imported as compared with the previous year. The Fruit Inspectors report that the majority of consignments came to hand in good condition. Coconuts from Fiji and Samoa were found to be infected with the fruit-fly maggot. It was also found necessary to condemn and destroy a number of lines of citrus-fruit for fly-infection. Fumigation before delivery had to be carried out in connection with a few consignments affected with scale and mealy bug, and several lots of maize, wheat, and rice infected with weevil had to undergo the same treatment. There was a considerable increase in the number of packages received through the parcels-post. Bulb-mite and narcissus-fly infection were found in a number of packages, and the contents had to be condemned and destroyed.

*Vineyards and Vinehouses.*—Notwithstanding adverse climatic conditions there has been an increase in the production of table-grapes and in the quantity of wine manufactured, the increases being due to newly planted vines coming into bearing. Good prices have been obtained for table-grapes on the wholesale markets, though they did not reach the exceptional prices ruling last year. It is estimated the season's yield of wine will be 80,000 gallons, which, at a reasonable estimate of 8s. per gallon, represents a value of £32,000. There are approximately 880 glasshouses in the Dominion at the present time. The total yield of grapes under glass is estimated at 552,000 lb., which, at this season's average wholesale price of 1s. 3d. per pound, has a value of £34,500.

*Beekeeping Industry.*—This industry continues to make steady progress. The number of registered apiaries is now 7,386, representing a total of 96,051 hives. A pleasing feature is the number of returned soldiers who have taken up beekeeping as a means of livelihood after having received a course of practical instruction in this subject at the training-farms before launching out. The past season has unfortunately not been a favourable one from the beekeepers' standpoint. The honey-market has, however, remained firm, and prices have been fairly satisfactory. The inspection of apiaries has been carried out as systematically as the large districts allotted to the Inspectors will allow. Lectures and demonstrations in the modern methods of beekeeping have been continued by the Apiary Instructors and Inspectors in their respective districts. It is intended to extend the value of the winter lectures by means of lantern-slides dealing with up-to-date beekeeping subjects.

Export of honey.—The following quantities of honey were graded for export at the different grading-stores during the year: Auckland, 6,678 cases; Wanganui, 163 cases; Wellington, 527 cases; Timaru, 662 cases; Dunedin, 465 cases; Bluff, 220 cases: total, 8,715 cases—an increase of 1,598 cases as compared with last year's figures. Practically the whole of the exportable honey from Canterbury was shipped to Auckland for the purpose of meeting the increased local demand and for

blending purposes. The Graders report that beekeepers are maintaining a high standard of packing and branding. The use of petrol-tins has practically ceased, and little fermented honey was in evidence. During the year the honey-grading regulations were revised and new colour-standards adopted in connection with the different grades of honey. Experimental work is being undertaken in conjunction with the Biology Section in regard to fermentation in honey.

Queen-rearing apiary at Tauranga : Orders for queens were considerably in excess of those received the previous year, the sales being more than doubled. The apiary is being disposed of in conjunction with the closing of the Horticultural Station.

Certificates in beekeeping : Some thirty persons attended the annual course of instruction in beekeeping at the Ruakura farm apiary. Eighteen passed the examination held at the end of the term and gained the Department's certificate of proficiency.

#### AGRICULTURAL INSTRUCTION AND EXPERIMENTAL FARMS BRANCH.

This branch has remained in my charge, no appointment to the Directorship having yet been made. The active supervision of the Agricultural Instruction Service was carried out by Mr. A. H. Cockayne, while Mr. J. L. Bruce has superintended the larger experimental farms.

##### AGRICULTURAL INSTRUCTION SERVICE.

The Agricultural Instruction Service, in supplying reliable and practical advice on all phases of the agricultural side of farming, is steadily becoming a potent factor in the adoption of rational methods of farm-management. It is unfortunate that during the year the financial position necessitated an extremely conservative policy with regard to increasing the staff, but it is hoped that in the near future expansion in this respect may be carried out. At the present time certain important districts, such as Hawke's Bay and Poverty Bay, are without the services of a resident Instructor, while all the other districts contain too large a territory to enable the requests of farmers for advice to be adequately satisfied. During the year no fresh appointments were made, and Mr. W. Dibble, who was located in the Auckland District, was retired on superannuation after a lengthy and useful service in the Department. The present staff consists of four Instructors in Agriculture, two Assistant Instructors in Agriculture, and six Fields Instructors. In addition three junior officers are being trained, and are completing their science course at the University.

The work of the Instructors consists both in the giving of sound practical advice based on the accumulated experience of farming practice, and the elucidation of the many local farming problems on which reliable advice can only follow accurate observation and investigation. There are in New Zealand many men on the land whose agricultural knowledge in certain directions is inadequate, and who are in need of advice on many matters that come within the scope of well-established practice. To such men the work of the Instructors is of immediate value. The methods adopted for disseminating instruction are mainly direct correspondence, personal visits, practical demonstrations, and illustrated addresses. During the year very large numbers of letters have been despatched, many hundreds of farms visited, and addresses given in all parts of the country. The requests for addresses have been so many that only a portion could be dealt with. The investigation-work is carried out partly on the Department's farms, partly on the experimental areas under the control of the Instructors, and partly by means of co-operative experiments with farmers themselves. Farmers' field competitions and boys' and girls' agricultural clubs have also been promoted or assisted, notably in the Taranaki and north-west Wellington districts, where both these movements are increasing with great rapidity. Among other miscellaneous work performed by the Agricultural Instruction staff must be mentioned the taking of soil-samples, also assistance in carrying out the provisions of the Fertilizers Act.

In July of last year a very successful farm-school for farmers was held at the Ruakura Farm of Instruction, the entries being so numerous that two courses of a week's duration each had to be conducted. Since the close of the period under review a similar school has been held at the Central Development Farm, Weraroa, with equal success and appreciation by the farming community. The time is now ripe for the establishment by the Department of a permanent institution for training lads to become practical farmers. Ruakura (as have one or two of the other departmental farms in the past) is now providing such facilities on a very limited scale, but what is intended is a specialized establishment with accommodation for a much larger number of trainees. The Ruakura farm is a suitable place for such an institution, and it is hoped to make a start with the project during the present year (1922-23). The gradual reduction in the number of returned-soldier trainees on the farm is making available excellent accommodation for the purpose in question. Details of much of the field investigation and demonstration work are given publicity in the Department's *Journal* by means of articles and reports. It is therefore not necessary to more than briefly mention the more important operations in the several instructorates, as follows :—

Auckland : The gum lands experimental areas at Puwera and Albany have been further developed, and the Puwera operations in particular are giving good results, and are being keenly followed by the local agricultural interests. Co-operative trials were conducted and are in progress at Aria (supplementary forage crops), Cambridge and Te Awamutu (lucerne), Putaruru (roots, pasture, &c.), Pukekohe (top-dressing and seed potatoes), Oranga (paspalum), Te Kumi (top-dressing and liming), and Parakai (top-dressing).

North-west Wellington, Taranaki, Hawke's Bay, and Poverty Bay : A good season's programme of cropping, &c., was carried out at the Marton experimental area. The work of the subsidized demonstration farms at Stratford and Waimate West was supervised as in previous years. In Hawke's Bay co-operative work was carried out at Rawhiti (pasture-establishment), Putorino (top-dressing, &c.), and Takapau (lucerne).

Wellington, Marlborough, and Nelson : Co-operative trials were conducted at Alfredton (fiorin top-dressing and liming), Pori (liming), Carterton (Nauru phosphate, &c., with wheat), Martinborough (manuring and liming with rape), and Greytown, Carterton, and Karori (lucerne). The Instructor in this district has also supervised development operations at the Wi Tako Prison farm.

Canterbury and North Otago : A comprehensive scheme of work was carried out at the Ashburton experimental farm, in connection with which an advisory committee was set up consisting of representatives of the local High School Board, County Council, Agricultural and Pastoral Association, and Farmers' Union. The lucerne demonstration areas at Templeton, Bankside, Ashburton, and Darfield were continued. Co-operative experiments included tests at Waiau (lucerne), the Waimakariri scrub lands, Oxford (forage crops and grassing), and Mackenzie country (regrassing).

Middle and South Otago and Southland : The main centres of general field experimentation work in the districts are the Gore and Winton experimental areas. A full programme of cropping, ensilage-making, lucerne-culture, &c., was carried out at Gore, while at Winton the main features of the work were pasture establishment and management, and liming. Operations were commenced at the Galloway experimental area, in Central Otago, which establishment will specialize in irrigation practice and cropping. Co-operative tests were conducted at Tisbury and Gorge Road with forage crops for dairying.

West Coast of South Island : The experimental areas at Hokitika (racecourse), Poerua, Rotomanu, Moana, Westport, and Murchison have been continued, operations being mainly connected with problems of permanent pasture for various types of country in the district. Co-operative experiments comprised tests with swedes at Koiterangi, Totara Flat, and Westport ; a pasture top-dressing trial near Kumara ; and the growing of green feed for show stock in conjunction with the Buller Agricultural and Pastoral Association.

#### EXPERIMENTAL FARMS.

*Ruakura Farm of Instruction, Hamilton.*—This farm has been maintained at a high all-round level of excellence. During the year the trainees consisted of 101 returned soldiers, eight returned army nurses, fifteen farm learners (youths), and ten other persons. In addition, two farmers' schools of a week's duration were conducted, also various short-course classes for technical and high-school students. The general farm operations were of substantially the same character as in previous recent years. A further area of 38 acres of rough swamp land was reclaimed and brought under the plough. The two breeds of cattle kept—Jerseys and Milking Shorthorns—have been well maintained, and the demand for young stock has been greater than the supply. The Southdown stud flock was increased on the female side ; all available surplus rams were sold at satisfactory prices. The demand for pigs from the Berkshire stud kept fairly steady in spite of the depressed conditions of the market during the period. The annual sale of surplus pedigree cattle and pigs was held with satisfactory results. The apiary and poultry sections were largely availed of by the returned-soldier trainees. An up-to-date and commodious honey-house was erected during the year, greatly adding to the efficiency of the apiary plant. These sections, together with that of horticulture, continue very popular with visitors to the farm, which continues to increase in numbers.

*Central Development Farm, Weraroa.*—Further general improvements were effected at this farm during the year. Many worn-out pastures have given place to splendid fields of approved grass-mixtures, mostly of a permanent nature. The sowing and management of grasslands in general is receiving special attention. Cereal, root, forage, and hay crops were grown as usual. A study is being made in connection with the tendency of oat crops on this farm to become badly laid. The lucerne stand received various forms of cultivation, with a view to ascertaining the most efficient method of renovation. Top-dressing experiments in connection with meadow-hay production were continued. The Friesian herd has maintained its high standard, and the average butterfat yield is now some 450 lb. on twice-a-day milking. The Red Poll herd has increased considerably, and culling will now be practicable. The average yield during the past year was 330 lb. butterfat. The herd continues to demonstrate the wonderful constitution possessed by this breed. At the annual sale both Friesian and Red Poll bulls realized satisfactory prices. The Berkshire herd of pigs was improved, and experiments were carried out in feeding. The usual flock of crossbred sheep was grazed, the lambing being 125 per cent. A number of farmers' field-days was held at the farm, and visitors generally were numerous. The returned-soldiers training scheme came to a close during the winter as regards Weraroa, and the quarters occupied by these men are now vacant.

*Moumahaki Experimental Farm, Waverley.*—As mentioned in last year's report, Mr. T. W. Lonsdale, after years of good service, retired from the management of this farm (and from the Department) in May, 1921. The acting-managership was held by Mr. J. Stevenson until November, at which date the supervision of the farm was taken over by Mr. J. W. Deem, who is in charge of the agricultural instruction work in the north-west Wellington and Taranaki districts. Owing to somewhat unsettled conditions only a limited experimental programme was carried out, including variety and manurial tests, trials in the feeding of calves and lambs, lucerne-establishment, and top-dressing of grassland. The Ayrshire herd was maintained, and the Guernsey herd was transferred here from the Weraroa farm. The stud flock of Ryeland sheep was further built up in numbers, and all available rams were disposed of at fair prices. The herd of Berkshire pigs has been given a fresh start with new blood. As usual, a considerable flock of crossbred sheep and a number of beef cattle were grazed on the farm.

#### GENERAL.

*Experimental Farm for West Coast of South Island.*—Owing to the financial stringency and the excessive cost that would have been involved in buildings, the development of the property acquired at Waimaunga (Grey Valley) has had to be retarded. Cultural operations are proceeding on a limited scale, however, and when conditions become more favourable further plans of action will be undertaken.

*Exhibits at Agricultural Shows, &c.*—This work was continued on a considerable scale during the winter of 1921, but had then to be suspended for reasons of economy.

*Farm Supervision for other Departments.*—As previously, a great deal of the time of the Superintendent of Experimental Farms (Mr. J. L. Bruce) has been devoted, by arrangement, to supervising the operations of farms constituting or forming part of institutions administered by other public Departments—including Repatriation, Health, Defence, and Public Trust. Economy and co-ordination have thus been promoted.

*Regrassing Experiments in Central Otago.*—Since February, 1920, a series of important experiments concerning the possibility of regrassing by payable methods the depleted area of Central Otago has been carried out by the Department on lines suggested by Dr. L. Cockayne, F.R.S., in whose hands the investigations is placed. A brief account of this work has been given earlier in dealing with the rabbit question.

#### CHEMISTRY SECTION.

This section, under Mr. B. C. Aston, has put a varied amount of useful work to its credit.

*Soils and Lime-requirement.*—Interesting evidence on the lime-requirement of New Zealand soils is steadily accumulating, and there should be available in a few years' time some important data which will help to decide the lime-requirement of each area and correlate climate with soil. The following table shows the number of soil-samples received from the various districts through officers of the Agricultural Instruction Service, and the average lime-requirement (as determined by the Hutchinson-MacLennan method) expressed as a percentage of carbonate of lime: North Auckland (6 samples), 0.31 per cent.; South Auckland (39 samples), 0.38 per cent.; Taranaki (9 samples), 0.42 per cent.; Hawke's Bay (8 samples), 0.15 per cent.; Manawatu (6 samples), 0.33 per cent.; Wairarapa (19 samples), 0.26 per cent.; Marlborough (17 samples), 0.27 per cent.; Nelson (3 samples), 0.42 per cent.; Canterbury (27 samples), 0.19 per cent.; West Coast, South Island (17 samples), 0.32 per cent.; Otago (8 samples), 0.18 per cent.; Southland (4 samples), 0.46 per cent.

*Estuarial soils:* These and similar littoral soils near towns are often of high potential value owing to their capacity for growing market-garden crops. Analysis of soil from Park Island, Napier, subject to periodical submersion by sea-water, showed that could the land be reclaimed a very rich soil would result.

*Lime.*—The Lime Committee, of which our Chemist is convener, has continued to confer when necessary, and to advise groups of farmers and others on matters relating to the development of limestone deposits. The following general policy with regard to lime-supply development was formulated, and approved by the Minister of Agriculture: (1.) That every application for assistance in supplying lime to a district should be considered on its merits. (2.) Where possible, without incurring unusual expense, the district and deposits should be inspected by officers of the Agriculture and Public Works Departments, and advice given as to the best method of increasing the supply. (3.) Only under very exceptional circumstances and after full inquiry should the Government subsidize by a money grant any organization for supplying lime to a district for agricultural purposes. (4.) All limestone deposits on Crown lands should be reserved to the Crown. (5.) Further legislation with the intention of giving power to the Government to take land from time to time for lime-quarries appears to be unnecessary, as such power is given by the Public Works Act Consolidated, 1908. Areas taken under this Act can be leased to private individuals to work as lime quarries or works, and, provided the necessary money is voted by Parliament, the work automatically becomes a "public work" under the Act. (6.) Finally, the Committee would broadly advise that the policy of allowing lime-development to proceed by private enterprise, assisted merely by Government advice, should be the keynote of the Government's policy, exceptional cases to be met by exceptional methods. The Committee is collecting evidence as to lime deposits suitable for agricultural use occurring on Crown lands, with a view to the reservation of those which are suitable and necessary for the district.

There is no doubt that the cost of ground limestone in general is too high, and the remedy for this is the establishment of more works. The requirements of each district should be determined, with a knowledge of its limestone and power resources. There is room for much diversity of treatment when the differing factors—soil, power-supply, quality of stone, and weather of each district—are considered. It was largely in order to sort this evidence and decide and advise what is necessary in each case that the Lime Committee was called into existence. A large number of specimens of limestone and reputed limestone has been received for examination. It is satisfactory to learn that soft deposits of high-grade limestone continue to reward the searcher, and thus enable cheap sources of carbonate of lime for agricultural purposes to be utilized.

*Fertilizers Control.*—The registration of fertilizers, which, as the law now stands, consists merely of depositing the name and brand of the fertilizer to be sold, together with its guaranteed minimum composition, with the Department, has been supervised by this Section. It has not been found possible to publish the particulars of the registration, as was done in a previous year, neither have any official analyses been published side by side with the maker's name. During the past year thirty samples taken under the Fertilizers Act, and forty-eight unofficial samples, were submitted by the Inspectors under the Act. A notice was published in the *Journal* for September, 1921, inviting farmers to forward for analysis samples of commercial fertilizers purchased by them. The response, however, was disappointing, only some half-dozen samples having been received. Of the thirty samples taken under the Fertilizers Act, nine were from Auckland, nine from Taranaki, and twelve from Wellington. In none of these samples was there found any deficiency to the prejudice of the purchaser, but such a small number of samples is inadequate in deciding whether or not the Act is being complied with. Of the forty-eight unofficial samples examined, five (or 10 per cent.) were found

to be deficient to the prejudice of the purchaser. The position as regards fertilizer-control is not likely to be quite satisfactory until special officers are appointed to carry out the work of inspection under the Act. A considerable amount of time has been devoted to an endeavour to draft an amended Fertilizer Act which will be acceptable to all parties and at the same time prove more efficient than the existing measure.

It has been stated that owing to the scarcity of high-grade basic slag some makers have adopted the practice of "grading up" their products by the addition of finely ground rock phosphate. So far no evidence has been obtained of the adulteration of basic slag on the New Zealand market, the samples examined being generally of satisfactory quality. A small proportion of low-grade slag (9 to 10 per cent. phosphoric anhydride) has been imported, but as it is sold under its correct analysis it is open to consumers to refuse to purchase such inferior fertilizer.

It is noted that a well-known firm of fertilizer vendors has recently announced its decision to market its fertilizer mixtures without the addition of any "filler." This is in sympathy with the American fertilizer movement to increase the quality of artificial fertilizers, thereby saving freight, bagging, hauling, handling, and distribution expenses generally.

*Top-dressing Experiments* at the Wallaceville Laboratory farm have been continued under the supervision of the Chemist, who also supplied a further account of the work for the *Journal*.

*Milling Tests of Wheat*.—The investigation of flour-producing qualities of wheat by grinding samples in the model mill has been proceeded with. The samples received for testing last season were mainly new varieties from the experimental plots at the Ashburton Experimental Farm and the Marton Experimental Area. This year it is hoped to obtain samples of all standard varieties, grown under varying conditions of locality, climate, &c. It is especially desirable that samples of wheat grown in New Zealand districts whose climate approaches that of the best wheat-growing districts in Australia should be tested, in order to ascertain whether wheats approaching in quality those of Australia can be grown here.

*Dips, Insecticides, &c.*—In order that the cattle-dips in the tick-infested areas may be kept at standard strength, simple testing outfits have been provided whereby the officers of the Live-stock Division are enabled to check the strength of the various baths at the dip-side. A number of samples of proprietary insecticides, fungicides, and dips have been submitted for examination, but until suitable legislation is provided little can be done to control the sale of preparations of doubtful efficacy.

*Deficiency Diseases in Stock*.—Deficiency diseases developing on pasture (cocksfoot and clovers) growing on light sandy or gravelly soils have continued to receive attention. A series of pot experiments has been commenced in which it is hoped to obtain confirmation of evidence previously accumulated as to the cause of these obscure diseases, which have been observed only to affect ruminants. The analysis of the samples is now in progress. One of the drugs most successful in combating one of the deficiency diseases is double citrate of iron and ammonium. The price of this has soared to something far beyond the purse of the farmer. The preparation of the drug on a fairly large scale was successfully accomplished in the Chemical Laboratory from lemons grown in New Zealand, and also from limes which grow wild on some of our Pacific Island dependencies. Fortunately, the price of the drug now shows signs of returning to normal.

*Poisonous Plants*.—The work on poisonous and medicinal plants is being continued. Many introduced plants which are poisonous are spreading, especially in the warmer northern parts of the Dominion. Domestic animals do not as a rule eat these unless starved into so doing, but this sometimes takes place in the winter months. It is intended to proceed with the publication of articles on the subject in the *Journal* from time to time.

*Miscellaneous*.—Analysis of several proprietary stock foods (pig and calf meals, &c.) provided further evidence of the necessity for legislation dealing with such commodities. It is satisfactory to note, however, that linseed cake of suitable quality is now being manufactured in the Dominion, a sample analysed being quite satisfactory.

A large number of sugar-beets from experimental plots conducted by the Department were received and examined for sugar-content with satisfactory results.

Examination of samples of butter, cheese, milk, and casein was carried out as in previous years. The analysis of samples of condensed milk for export has also been undertaken.

At the request of the Director of the Dairy Division an investigation has been commenced to determine the cause of excessive corrosion in some kinds of metal teat-cups used in milking-machines.

Endeavour to obtain a cheaper source of strychnine for rabbit-poison than the pure alkaloid resulted in negative results so far as the strychnos-seed—the nux vomica bean—was concerned. The general use of such a powerful poison as pure strychnine is fraught with danger to the community, and it is extremely desirable that, if strychnine is fixed upon as the most suitable poison to use, it may be sold coloured or diluted in order to minimize the risk.

Several cases of poisoning in live-stock have been investigated in conjunction with the Live-stock Division.

A large number of different samples not otherwise referred to has been analysed, and a great deal of general advisory work carried out.

#### BIOLOGY SECTION.

Much valuable work has been carried out by this Section under the direction of Mr. A. H. Cockayne, Biologist, and the various branches are now more fully organized and staffed.

*Seed-testing*.—During the year 9,400 samples of agricultural seeds were tested. As in the past, nearly all of these samples were received from merchants. The system whereby merchants submit the majority of the seeds they sell to the seed-testing station for analysis is proving very satisfactory in improving the quality of the seed sold in the Dominion, and farmers are able to buy on what is virtually a guarantee of germination and purity. It is true that in certain quarters agricultural seeds of extremely poor quality are offered for sale, but the farmer can easily safeguard himself from such purchases by demanding from the seller a certificate of analysis.

*Agricultural Botany.*—Large numbers of grasses, clovers, weeds, and other agricultural plants have been received for identification and report. This identification work is not confined to the mere naming of the specimens, but in all cases details concerning their utility or otherwise are supplied. Investigations on the grasslands of New Zealand have been continued, and many points on the care and maintenance of pastures have been studied. The information that has been accumulating for many years past on this subject is now in a form that admits of publication.

*Entomology.*—The amount of correspondence dealing with insects increased considerably, and dealt with insects infesting live-stock, orchards, gardens, forest-trees and forest products, and field-crops. From this information, combined with field-work, it has been possible to bring the data regarding insect pests in New Zealand up to date. A number of additional species have recently become prominent as being destructive. Several investigations were carried out, the more important being those dealing with sheep-maggot flies, apple mealy bug, and wood-boring and other insects infesting forest-trees and forest products. A special feature in the control of injurious insects has been inaugurated by which beneficial insects are bred out in large numbers in the laboratory for distribution each year in districts where required. A start has been made with the steel-blue ladybird beetle for the control of the golden-oak scale. The parasite of the sheep-maggot flies, consignments of which were received from Mr. W. W. Froggatt, of Sydney, was distributed in the Marlborough District. Another ladybird beetle is being collected, and further consignments introduced for the control of the apple mealy bug. It is hoped to successfully introduce from America the parasite for the pear-midge, and also another species for the golden-oak scale. This work is at present limited owing to the lack of facilities, but as soon as a suitable insectary can be established operations will be greatly extended, and it is hoped to deal not only with live-stock and orchard pests but also with those infesting forests and field-crops. The insect collections have rapidly extended, and it will not be long before a very representative collection is established.

*Plant Pathology.*—A large number of specimens of plants infected with fungous and bacterial diseases was received to be dealt with. These included fruit-trees and fruits, vegetables, hedge-plants, agricultural crops, cereals, forest-tree specimens, and various diseased agricultural weeds. A marked falling-off in the amount of fireblight material would appear to indicate that the virulence of this organism is decreasing considerably. As a result of publications on the part of the staff large quantities of fungi have been sent or brought in for determination. A survey of the diseases infecting fruit-trees has been made, and the subject brought up to date for publication purposes. Vegetable-diseases have received considerable attention, and those of hedge-plants and shelter and forest trees are now being worked up. In collaboration with the State Forest Service a systematic survey of the fungous diseases of indigenous trees is being made, and numerous specimens are being forwarded for identification by the forest rangers. The diseases of cereals, root crops, and grasses are being systematically worked over. During the past season the cereal-rusts were carefully studied, and their distribution and economic importance determined. The fungous diseases of agricultural weeds have been studied with a view to determining whether any may be utilized in control. The specimens in the herbarium have increased to such an extent that an extension had to be built to contain them, and the increased area provided should suffice for two or three seasons. Considerable space will then be required for further extension.

*Cool Storage of Apples.*—A considerable amount of research work into the cause of "flesh-collapse" in cool-stored apples has been undertaken, and numerous suspected causes have been negatived. The line that at present holds out some promise is that of the determination of the optimum minimum temperature at which to store New Zealand apples, and experiments have been established in cool store to ascertain whether flesh-collapse is due to a too low minimum temperature in view of the lengthy hours of working that are customary in certain stores and ships.

*Bee-diseases.*—The recent work of Dr. Rennie bearing on Isle of Wight disease called for a pronouncement as to whether *Nosema apis* existed in New Zealand. The stomachs of some five or six hundred bees from various parts of the Dominion have now been examined, and the presence of this protozoon has been determined in the Auckland, Bay of Plenty, Taranaki, and Wairarapa districts.

*Fermentation of Honey in Store.*—An inspection and report was made with a view to bettering the conditions under which New Zealand honey was being stored prior to export. A yeast has been isolated from honey, and its power to ferment under various circumstances is under test. With regard to the exposure of honey to the air for the purpose of increasing its specific gravity, experiments have now shown that honey acquired more moisture from a damp atmosphere than it could dispose of in the same time under absolutely dry conditions. Specific gravity, ash constituents, and temperature in relation to fermentation, reaction and temperature in relation to granulation, heating as affecting colour, and other matters are being studied.

*Yellow-leaf Disease of Phormium Tenax.*—The remedy suggested for this trouble is the selection of resistant types. The seeds of what are believed to be respectively resistant and non-resistant varieties have been collected, and seedlings raised therefrom. A number of these have been handed over to the Flax-millers' Association experimentalist for test in the field. Others have been planted out at Plimmerton under varying conditions. The distribution of the disease has been further worked out in the North Island, and further inoculations have been made. An improvement in the general position is noted.

*Dairy "Starters."*—Further work has been completed in the selection and regeneration of certain organisms employed in the production of wet starters for cheese and butter making.

*Lectures and Publications.*—Apart from routine and investigational work generally great demands have been made on the Laboratory for extensional services, and many lectures have been given by the Biologist and staff during the year in all parts of the Dominion. A large amount of matter dealing with various branches of the work has been contributed to the *Journal* by different members of the staff.

## PUBLICATIONS SECTION.

The activities of this Section (Mr. R. H. Hooper, Editor) have been continued steadily. It is satisfactory to note an appreciable reduction in the cost of printing, due mainly to a fall in the price of paper, and the prospects for an extended output of publications (when the general financial position has further improved) are thus more promising than for some years past.

The Department's monthly organ, the *New Zealand Journal of Agriculture*, has been maintained at a high standard, a special feature being the semi-popular scientific treatment of subjects relating to the various branches of agriculture in the Dominion. It is of great importance that easily available permanent records of this character should be made, and such an undertaking is clearly the function of the Department. The necessity of devoting a due share of space to simple instructional farming-matter has not been lost sight of, however. It may be mentioned that the *Journal* foreign list includes scientific and educational institutions in every part of the world, and evidence of the attention and appreciation the publication receives abroad is frequently received. Special thanks are due to the contributors of matter to the *Journal*. In many cases this valuable work is done out of regular hours, and the greater part of it is of a more or less volunteer order.

A number of bulletins have been issued during the year, some being new and others brought up to date. Various other departmental publications have also been handled by the Section.

## HEMP-GRADING SERVICE.

The hemp industry has passed through a difficult year. Overseas market prices have been on a low basis, and as competitive fibres, which have shown an improvement in quality, have been selling also at low values, the New Zealand article has suffered. The position was realized by flax-millers, and endeavours were made to improve the output, especially on lines of better standardization of quality, an improvement which was urgently needed. Previous experience has shown that on a low market the grading of the product undergoes criticism, and this happened last year. It cannot be said that the grading has been in every way satisfactory, but the methods of packing adopted rendered this almost impossible. The whole question has been thoroughly gone into, and joint action taken by millers and the Department has brought about much better conditions. Millers were undoubtedly hampered in certain areas by the effect upon the general standard of quality of the raw material and of the manufactured article resulting from the prevalence of the so-called "yellow-leaf" disease of *Phormium tenax*, and this further created difficulties for the graders. It is most satisfactory to note that this disease shows signs of dying out, and this, combined with the fact that some of the most affected areas have been converted from phormium swamps into good pasture-land, must have a great effect in bringing about a markedly higher standard of quality in the output.

The necessity for producing fibre of higher quality—and it can be done—is well illustrated by a report given to the Department (and very highly appreciated) by a prominent flax-miller who visited America during the year. He stated that improvement in quality was necessary and more careful scutching required in order to attract American buying. London information indicates similar requirements there. The new order of things established here, which it is to be trusted will continue, should result in giving greater satisfaction and confidence to overseas buyers.

During the year 58,000 bales passed through the grading-stores, a decrease of 24,836 bales compared with the previous twelve months. Tow graded amounted to 12,831 bales, a decrease of 4,788 bales; and stripper-slips to 654 bales, a decrease of 1,378 bales. The gradings of hemp showed the following percentages for the various grades: Superior, 0.12; fine, 1.17; good-fair, 25.86; high-fair, 52.34; low-fair, 15.88; common, 2.78; rejected, 1.81; condemned, 0.02. Of the tow graded 42.9 per cent. scored first grade, 47.94 per cent. second grade, 6.97 per cent. third grade, and 2.17 per cent. was condemned. Of the stripper-slips 9.6 per cent. scored first grade, 90.1 per cent. second grade, and 0.3 per cent. was condemned.

While prices remain at a level at which small plants cannot be operated on a payable basis the Dominion's annual output should remain at approximately 60,000 bales. With any decided increase in price, however, many of the smaller mills which have suspended operations will resume, and the total quantity of fibre produced will be considerably increased. Until such time as the actual planting and cultivation of phormium has been shown to be an economic proposition, our output will not reach the high figures of the war period.

## GRAIN-GRADING SERVICE.

During the year the Chief Grain-grader (Mr. A. W. Smith) has continued to occupy the position of Assistant Wheat Controller, but has also exercised a general supervision over the grain-grading service.

Wheat of the 1921-22 crop commenced to come on the market in February last, and the total production is estimated at some 10,000,000 bushels, a portion of which it has been decided by the Government to export. The grading of this export wheat is being carried out by Messrs. Ferrier and Co., Government Graders at Lyttelton, and by Messrs. George Wills and Co., who act in that capacity at Timaru. Under the Wheat Trade Regulations it is permissible to appeal to the Chief Grain-grader should any dispute arise as to kind, quality, or condition, and a fairly large number of these disputes have been referred to him for settlement.

During the year inquiries for type samples of New Zealand grain came from the London and Liverpool Corn Exchanges, and it is understood that these are being forwarded by the various local Chambers of Commerce. The samples are to be sealed samples, which means that they must be deposited with a body such as the Corn Exchange or Chamber of Commerce for reference, and the fact that they go through the local Chambers of Commerce makes them acceptable by the trade associations abroad. The Wheat Controller has adopted this method of circulating f.a.q. samples of this season's wheat.

The work of those firms holding grading licenses appears to have given general satisfaction. As a measure of economy it was decided to withdraw the subsidy that was being paid to the Grader at Dunedin. Since then the Dunedin grain-merchants have appointed a grader and are paying the subsidy themselves. This grader does not hold a Government license, but his certificates are accepted by the grain trade.

#### DEPARTMENTAL LIBRARY.

During the year the Department's central library has been installed in more ample space at the new headquarters of the Department in the Dominion Farmers' Institute Building. The arrangement and general system have been greatly improved (under Mr. B. C. Aston's supervision), and facilities for prompt reference much increased. Cataloguing of the books according to the Dewey system is being proceeded with, and cards are being prepared of all books in the branch libraries of the Department throughout the Dominion, a complete record being thus kept at the central library. Cards are also being prepared of important articles appearing in the world's agricultural press. Technical and other agricultural journals are circulated among the Department's expert officers as they come to hand. Members of this and other Departments are making increased use of the library, and much of the time of the officer in charge is given to looking up various information pertaining to agricultural matters. The library is also consulted by scientists, farmers, agricultural writers, &c., who find information here that is not obtainable elsewhere. As time goes on and the financial stress ceases it is hoped to be able to obtain a greater number of the most up-to-date books on agriculture and the allied sciences more promptly as issued.

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

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