

1940.

NEW ZEALAND.

## DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT FOR 1939-40.

*Presented to both Houses of the General Assembly by Command of His Excellency.*Office of Minister of Agriculture,  
Wellington, New Zealand, 29th May, 1940.

DEAR SIR,—

I have the honour to forward herewith, for Your Excellency's information, the report of the Department of Agriculture for the financial year ended 31st March, 1940.

The report provides a summary of the principal farming activities of the year and outlines the comprehensive and numerous functions of the Department in its work of maintaining and fostering the growth of the rural industries. That work has for its objective the improvement of both the quantity and the quality of the Dominion's agricultural products, and once again there have been achievements in several important directions. The question of live-stock research has become a pressing one in recent years, and, although the health of our animals compares favourably with the health of stock in other countries, there is a substantial wastage through disease and faulty nutrition. To meet this situation the Government embarked on an extensive research scheme, and important investigations are now under way.

In the middle of the year's programme the war made new demands on the staff of the Department. It was imperative that New Zealand, as a substantial supplier of agricultural products to the United Kingdom, should make every effort to maintain, and, if possible, expand production.

In order to advise the Government in its policy of increased production, I set up a National Council of Primary Production, composed of nominees from different organizations representing the farming community and farm workers. The Council has done a great deal of valuable work. Its members have placed their knowledge and experience freely at the disposal of the Government, and their advice has been most helpful to Cabinet.

Immediately on the outbreak of war prearranged plans were put into operation to safeguard farmer's requirements. Surveys were made of a wide range of stocks held by merchants and others, and export trade was regulated in the interests of primary production. In this work my officers received widespread co-operation.

In view of the supreme importance of phosphates in the economy of New Zealand farming, the Government decided to maintain prices of superphosphate at pre-war level. This has been done by paying to manufacturers the increased cost of raw materials used in the manufacture of superphosphate.

Every assistance has been given to importers of essential farm equipment and materials, and under the administration of the Primary Industries Controller and his staff many difficulties arising out of war conditions have been alleviated.

Plans are now being formulated for the approaching production season, and it will be my prime endeavour to give every possible assistance to the farmer in his task of meeting the needs of Great Britain and her Allies.

I have, &c.,  
W. LEE MARTIN,  
Minister of Agriculture.

His Excellency the Governor-General.

## ANNUAL REPORT OF DIRECTOR-GENERAL.

The war has placed a duty on New Zealand's agriculture. That duty does not rest on the farmer alone, but is shared by all those who service the farmer, and, as the Department of State most concerned with agricultural and pastoral production, the Department of Agriculture is called upon to play a big part in the Dominion's war effort.

It is the task of this Department to do everything in its power to foster the maintenance of production, and, if possible, help in the increasing of production, especially in those commodities so vital to the needs of the British Commonwealth of Nations and the other nations allied with us. Such a policy can be carried out only by the fullest co-operation with the farming community, and in the Department's functions I regard this attitude as the basis of all activities. In other words, the farmer's problems are the Department's problems, and through vicissitudes of production there must be mutual goodwill and a common objective.

The planning of agricultural production is not an easy matter in peace-time, and in war-time the difficulties are enhanced. Unlike the factory, the farm is not sheltered from the elements, the cycle of production is longer, and where animals are involved the course of production cannot be quickly changed. Agriculture does not lend itself to shock tactics. It is far better to intensify the sound practices of peace-time than to make spectacular or drastic changes which would surely bring retribution.

I do not imply that production cannot be increased—it can, but not by rash enterprise or the abandonment of fundamental principles.

In New Zealand the overwhelming proportion of our primary production comes from the animal, and that production is limited by our ability to manage our flocks and herds. With the exception of pigs, spectacular increases in stock population cannot be made, but, although our dairy herds and sheep flocks can be built up but slowly, there is room for increased production from these animals by the provision of adequate feed supplies and conscientious management.

When war broke out the New Zealand farmer had just come through an unfavourable year. Reserves of feed were short, and it was a question of maintaining existing stock rather than increasing the numbers. However, when an appeal was made for the saving of heifer calves and increased production of baconers consequent on the requests of the United Kingdom Government there was a response equal to the circumstances. An increased acreage was put into wheat, more special feed crops were sown, and in districts where the weather was kind greater volumes of hay and silage were saved. Unfortunately, some districts, especially in the South Island, suffered a continuation of adverse weather conditions. Feed-supplies in these areas are seriously short, and farmers have been faced with either buying feed or railing stock to other parts of the country. The remainder of the Dominion, however, would appear to be in good heart, and with a realization by farmers and other workers of their place in the present struggle, an increase may be looked for in the coming season.

In New Zealand, where there is a wide variety of farming activities and conditions, it is impossible to lay down a national programme, excepting in the most general terms, but if each farmer studies his own resources and plans an increase in production according to the means at his disposal the aggregate result will be substantial.

The first essential in any plan for a farm where animals are maintained is to organize the feed position. By top-dressing and grazing management pastures should be kept as nutritious and as highly productive as possible. Paddocks which have run out to inferior grasses of low production should, where possible, be resown with the best strains of grasses and clovers, and where a farmer is in need of advice he should avail himself of the services of the nearest Instructor in Agriculture. Good pastures will give the greatest supply of feed in the growing season, and will provide the greatest quantity of hay and silage when the pastures are dormant. However, on most farms hay and silage alone are insufficient to carry a reasonable amount of stock through the year in good condition. There has been widespread evidence in recent years of undernourishment among our flocks and herds, and many of the diseases afflicting farm animals can be traced to faulty or insufficient feeding. Disease is waste, and in war-time should be eliminated.

In pig-keeping supplementary crops are an essential to success, and if every dairy-farmer would plan a cropping programme to carry as many pigs as possible through the winter until dairy by-products are available he would be performing a signal service to the Empire. About 4,000,000 cwt. of bacon are now denied to the people of the United Kingdom from European countries, as a result of enemy activities, and they look to the dominions to replace the shortage. The dairy-farmers of New Zealand have it in their power to make a big contribution to Great Britain's bacon requirements, as comparatively speedy increases in production are possible if the feed is available.

The feed position is also the basis of an immediate increase in dairy produce, and the sheep-farmer who winters his ewes well and has ample feed available in the spring will decrease his lambing losses and swell his killing figures.

If a more intensive top-dressing programme is carried out the resources of manufacturers will be taxed to capacity. The problem of increasing supplies is being studied by the Department and the National Council of Production, and farmers may be assured that the greatest possible volume of fertilizer will be available to them. Fortunately, there are inexhaustible supplies of lime available, and greater quantities of lime could be used in New Zealand with advantage. In some parts of the Dominion liquid manure from the cow-sheds is being used as a top-dressing. This practice might well be extended in all dairying districts. The greater the amount of top-dressing carried out, the more certain will be the increase in production.

Finally, I would appeal to all farmers to make the fullest use of the services of the Department of Agriculture, which are at all times at their disposal. Let us make a combined effort to ensure complete victory on the home front.

A. H. COCKayne, Director-General.

## ACCOUNTS DIVISION.

## REPORT OF L. C. SCOTT, ACCOUNTANT.

The budgeted position for the 1939-40 year provided for a net expenditure of £1,032,954. Some re-organization of budgeted activities was necessary owing to the outbreak of war. This factor, and a saving from the fruit-export guarantee of £16,456, coupled with a buoyancy in credits of £14,391, enabled the year to be cleared with a net expenditure of £970,337. Finance additional to the figures in the appropriations was necessary. This was mainly to provide for increased costs of raw materials for superphosphate-manufacture. £83,924 was involved, of which £81,510 related to superphosphate subsidy.

War exigencies have demanded some measures of restrictive accountancy influence. These have had the usual "limiting" effect in the achievement field of agricultural progress. On the other hand, the liability that such measures would have irritating effects was mitigated, in that all concerned were fully seized of and readily recognized the need for expenditure in aid of production to take precedence over all other agricultural expenditure requirements.

The following is a summary of the vote:

	Expenditure Appropriated, £	Paid out, £	Revenue Appropriated, £	Received, £
Administrative services .. .. .	542,358	509,541	121,345	128,982
Payments under statutes .. .. .	104,000	95,861	2,500	2,390
Miscellaneous advances, &c. .. .. .	523,491	515,921	12,750	19,614
<b>Totals .. .. .</b>	<b>1,169,849</b>	<b>1,121,323</b>	<b>£136,595</b>	<b>£150,986</b>
Less credits-in-aid .. .. .	136,595	150,986		
<b>Net totals .. .. .</b>	<b>£1,032,954</b>	<b>£970,337</b>		

In the examination of receipts (£150,986) and payments (£1,121,323) resulting in the net excess of payments (£970,337), it is interesting to note that "Administrative services" called for payment, totalling £509,541 and yielded £128,982 credits (net being £380,559); that "Payments under statutes" required £95,861 and yielded credits of £2,390 (net being £93,471); and that "Miscellaneous advances grants, subsidies, &c." cost £515,921 with credits of £19,614 (net being £496,307). As usual, the vote outgoings have been, comparatively, much more substantial than incomings. There are, however, other receipts (£104,935) not covered by vote figures (Nauru and Ocean Islands, £35,344; Slaughtering and Inspection Act, £57,388; Dairy Industry Act, £2,147; Orchard and Garden Diseases Act, £6,477; Sundry, £3,579).

*Administrative Services.*—The major expenditure factor is remuneration for personal services (£338,869) and for the efficient functioning of those personal services locomotion (£63,610) is essential. Other working-expenses (£107,032) have not been excessive for the proper maintenance of operations embracing three large farms and many small areas, two extensive laboratories, a seed-testing station, a publications section, numerous grading services, and a number of research and demonstrational services, together with provision of office accommodation, telephones, stationery, and staff transfers necessary in connection with a staff of 1,055 persons (exclusive of casual labour).

*Payments under Statutes.*—Compensation for diseased live-stock (£36,694), subsidies for destruction of rabbits (£28,317), subsidies to encourage production of "remounts" (£3,850), and grants for educational purposes (£27,000) give a total of £95,861. The contrast between this figure and £107,032 for the working-expenses of the administrative services merits quiet consideration.

*Miscellaneous Advances, Grants, Subsidies, &c.*—The payments under this section have, as usual, been wide in their distributive incidence. Carriage of lime, fertilizers, and farm produce absorbed £415,434; assistance to fruit industry, £8,544; noxious weeds eradication, £58,615; assistance to cow-testing organizations, £10,545; assistance to pig industry, £8,282; other items, £11,501.

The normal expectation is that the main volume of work of the Accounts Division will be in direct relationship to the actual monetary requirements of the Department, but in recent years there has been a steadily increasing volume of problems of statistical and investigational significance for attention. The probable, and latterly the actual, effects of war have emphasized how necessary it is to have readily available all types of more or less specialized statistical information. Thus demands on the activities of the Investigational and Statistical Section have been constant and varied. The Publications Section, which works under the Accounts Division, has experienced the usual steady demand for bulletins and leaflets. The greatly increased circulation of the *Journal of Agriculture*, to which I referred last year, has been maintained. Revenue from the advertising pages of the *Journal* appeared to falter, firstly, from import restrictions and, secondly, from war effects, but recovered very satisfactorily, a most gratifying indication of the merits of the publication as a publicity medium.

My staff and officers associated with general accountancy matters throughout the Dominion have again accorded me a year of hearty support and co-operation.

## LIVE-STOCK DIVISION.

## REPORT OF W. C. BARRY, DIRECTOR.

The work of the Live-stock Division during the year has been carried out under more satisfactory circumstances than during the previous year. It is pleasing to record that no serious epidemic took place during the year and that the so-called "facial eczema" disease was not prevalent.

During the year the resignations of two veterinarians and the loss through death of Mr. W. D. Blair, District Superintendent, Christchurch, brought about vacancies which were filled by the return of graduates who had been studying abroad under the system of veterinary bursaries now in operation.

The season over the year was a difficult one for dairy farmers. In many districts, owing to a severe winter, there was a general scarcity of feed and many dairy cows calved in very low condition. This was accentuated in the North Auckland districts, where a considerable number of cows died. In other districts losses also occurred from want of feed, and some losses continued into the spring months, when the poor condition of the animals appeared to be a factor in increasing the amount of bloat experienced. The position gradually improved throughout the year, and dairy cattle have produced well in the later part of the season and are now in good condition, with the prospects for the coming winter more favourable.

The sheep farmer had a more favourable season as regards lambing percentages and the absence of mortalities. Owing to a rankness of feed in several districts some difficulty in finishing off lambs has been experienced. Generally speaking, a heavier lamb has been the rule at many of the freezing-works.

The operation of the Stallions Act and the administration of the Regulations under the Remounts Encouragement Act have added to the work of the veterinary staff during the year. These two acts should increase the interest of horse owners in producing a greater number of horses in the Dominion.

## HEALTH OF LIVE-STOCK.

## HORSES.

The health of horses has remained in a very satisfactory position, no serious disease or losses of an epidemic nature having been recorded during the year. As usual, a number of cases of strangles have occurred and also a number of cases of joint-ill in foals. During the recent dry-spell of weather in Canterbury cases of so-called "Australian strigball" in horses were seen in this district.

*Horse-breeding.*—Prices for draught horses are still considered low, and consequently there is not the incentive to encourage more breeding of heavy horses. It is hopeful, however, that prices for draught horses are improving in Australia and this will improve the prospects in this country. The restriction on the use of mechanical power owing to war conditions is also another hopeful sign for the breeder of heavy horses.

During the year the Stallions Act was in operation. This Act was introduced with a view to ensuring the soundness of draught stallions used for breeding purposes. Although compulsory examination applied only to rising two-year-old stallions in the first year of operation of the Act, it is gratifying to record that a total of thirty-six stallions of the older age group were actually examined for certificates of soundness. Altogether a total of forty-two stallions were examined for soundness, thirty-seven of these being passed by the examiners.

The application of the Act will gradually eliminate the unsound stallions, at the same time not seriously interfering with the number of sires required for breeding purposes.

In regard to the breeding of light horses, the Remounts Encouragement Act of 1914 was in operation again last year. Under this Act a subsidy was paid to owners of selected and approved stallions stationed at several centres over both Islands. This subsidy enabled the owners of approved mares to obtain the services of these stallions at reduced fees. Altogether a total of thirty-nine stallions were subsidized, as compared with thirty-two in the previous year. The total number of mares approved for service was 1,339, so that the scheme may be said to be well established and well patronized. It should do much to encourage the breeding of light horses and instil an interest in this aspect of live-stock production.

It may be possible to exercise a more rigid selection in the type of mare submitted for approval as time goes on, so that a more uniform or more suitable progeny may be obtained. So far, however, the scheme is definitely in the right direction in encouraging the breeding of a type of horse which was being seriously neglected.

The assistance given by the New Zealand Racing Conference, the New Zealand Trotting Conference, and other kindred bodies is much appreciated. Special thanks are due to the members of the District Remount Committees, who supervise the operation of the remount scheme in their districts.

## CATTLE.

*Diseases scheduled under the Stock Act.*

*Tuberculosis.*—The number of cattle condemned under the Stock Act for tuberculosis during the year amounted to 6,569 head, being 5,619 condemned on clinical symptoms and 950 reactors to the tuberculin test. In each case compensation was paid in accordance with the provisions of the Act. The tuberculin test was applied to 17,877 cattle, of which number 950 reacted, giving a percentage of 5.3.

The total number of cattle, exclusive of calves, examined at the various abattoirs and meat-export slaughterhouses was 518,201, an increase of 13,595 on last year's figures. Of these, 39,812, or 7.68 per cent., were found to be affected with tuberculosis in varying degree, a large percentage being only slightly affected. This indicates an increase of 0.11 per cent. infection amongst cattle slaughtered in these premises.

So far as the tuberculin testing of herds is concerned, the position is a voluntary one. It is, however, interesting to note that 14,158 cattle were tested at the owner's request.

Although a system of clinical examination of the dairy herds supplying milk for human consumption is combined with the biological test of composite milk samples from dairy herds, it still appears desirable to have all herds supplying milk subjected to the tuberculin test at regular intervals.

*Actinomycosis (and Actinobacillosis).* During the year 628 animals were condemned for this disease. Many animals were successfully treated for the disease during the year by the regular dosing with potassium iodide. Those field officers who have treated cases by the intravenous use of sodium iodide claim to have obtained good results. This method of treatment might be used in the case of run cattle, where dosing is impracticable, though the intravenous injection in many such cases would prove difficult to carry out.

*Malignant Growth.*—The number of animals condemned was 346, compensation being paid in accordance with the Stock Act.

*Anthrax.* During the year the death of one dairy cow was confirmed as being due to anthrax. This occurred on a farm in the North Auckland district and may be considered to be a recrudescence of infection following the occurrence of anthrax in the same location six years ago.

*Blackleg.* The numbers of calves vaccinated against this disease in the affected areas were Taranaki, 10,632, and Auckland, 22,004, making a total of 32,636. This shows an increase of 1,787 on last year's figure and would suggest that the total number of outbreaks has increased. Control by vaccination continues to give good results, and the reports for the season are very satisfactory, the actual number of outbreaks in the Auckland district being 200, compared with 222 the previous year, and the number of deaths 395, compared with 498 the previous year.

*Cattle-tick (Haemaphysalis bispinosa).* There has been no spread of the cattle tick to clean areas, the position being similar to that reported last year.

*Johne's Disease.*—The position in regard to the control of this disease is not satisfactory from several points of view. Owing to conflicting results in the use of Johnin as a diagnostic agent, systematic testing of herds has been to an extent discontinued, and affected animals are removed from herds on a clinical diagnosis of the disease. Forty animals have been condemned on Taranaki farms during the year, cases being recorded from some new farms in this district. Fortunately, the majority of the herds in which the disease has been found are grade herds, so that the cull cows are sold to the works.

The greatest danger of spread of the disease is through the sale of pedigree stock in the early stages of infection. No doubt the disease was introduced in imported pedigree stock in the first place.

In place of the half-yearly tests of herds a systematic clinical inspection of the herds in Taranaki is being carried out.

In the Auckland district a total of forty-two head of stock have been condemned for Johne's disease during the year. It is satisfactory to record that all animals which passed the test prior to a recent dispersal sale of an infected herd have remained healthy.

#### *Non-scheduled Diseases.*

*Mastitis.*—This disease of dairy cattle continues to be a cause of much loss of production not only in infected animals, but also from a culling or replacement point of view. The withdrawal of comparatively young cows on account of mastitis, combined possibly with some other factor such as low production or irregular breeding, means a heavy replacement of producing-stock every year.

The field officers continue to give all assistance possible to owners who experience serious trouble in their herds. The prevention and control of the disease through herd and shed management must continue to be given first consideration.

*Contagious Abortion.*—This disease is still prevalent in many dairy herds. The application of the agglutination test to blood samples taken from individual herds gives a true incidence of the disease in these herds. The main trouble in many cases appears to be confined to the young two-year-old heifers, where at times the rate of abortion is very high. Several apparent epidemics affecting this age group have been noted during the year. In each case advice has been given in regard to the nature of the disease, and methods of control have been recommended.

In the older age group of animals, owners, as a rule, do not give sufficient attention to the isolation of aborting animals, and thus a fresh source of infection for the young stock is spread about. Strict attention to isolation and disinfection of all aborting animals must be enforced if a comparative immunity from storms of the disease is to be ensured. Much advice concerning the disease has been disseminated during the year.

*Temporary Sterility.*—Temporary sterility or delayed conception in dairy herds has again to be reported in several districts. It was particularly prevalent in the North Auckland district this last breeding season. This was not surprising in view of previous opinions expressed that the disease appears more serious following severe winters or heavy production seasons. In this district the cattle were subject to a severe shortage of food during the previous winter, several thousand animals dying from inadequate feeding. In such circumstances there must have been large numbers of animals which

survived which required a long period of building up before the normal body functions were fully restored. The District Veterinarian, Whangarei, describes the feed position in the following words:

"Growth last year was very poor and cattle went into the winter in low condition. Hay was scarce, and as calving-time approached both run and dairy cows died in large numbers. Fortunately, the winter was comparatively dry, otherwise losses would have been heavier. It has been estimated that at least fifteen thousand dairy cows died in North Auckland during the winter and spring, besides which the condition of many of those that survived was so poor that butterfat-production was seriously affected early in the season."

The many reports received and opinions given indicate nutritional factors of varying types as characteristic features in the history of many of these cases of breeding irregularity. Whatever other factors may be involved in certain specific cases, it is common-sense to see that an animal is fed according to her production, and that a greater general effort should be made for the adequate feeding of all animals at all seasons of the year.

*Grass Staggers in Cows (Grass Tetany).* Last spring a comparative immunity from this disease was experienced in the Waikato district, where, hitherto, it has been most prevalent. Commenting on this disease and also on the prevalence of milk-fever, the District Veterinarian, Hamilton, writes:—

"Neither of these seemed as prevalent as in previous years, this being particularly noticeable in the case of grass staggers. Probably the late spring and shortage of feed has a bearing on the unusual freedom from these diseases."

Enlarging upon this, the District Superintendent, Auckland, writes:—

"This observation is interesting: in previous years, when the cattle wintered well and spring growth came away early, cases of grass staggers gave a considerable amount of work and worry, as treatment cannot be looked upon as being at all satisfactory. The position with regard to these diseases next spring will be very interesting, as the general conditions with regard to feed this coming winter promise to be the reverse of what they were last year."

As the conditions vary from season to season the dairy-farmer requires to adapt his feeding programme to suit the conditions met with. It is particularly important to follow a rational line of supplementary feeding of stock with hay or ensilage in order to balance the diet in a spring noted for an early flush of growth. Such a feeding programme over the critical period will also tend to lessen the incidence of cases of milk-fever.

*Milk-fever.*—As with grass staggers, this disease was not prevalent last spring. Isolated cases were seen in the later calving cows which had been on spring feed for some time before calving. The majority of farmers can deal with this disease in its regular form. To those not conversant with the disease advice has been given during the year.

*Parasitic Disease in Young Cattle.* Many young cattle have been affected with both stomach and lung worms during the autumn. Much advice has been given as to the feeding and drenching of the affected stock. The bluestone-nicotine drench continues to give good results in both dairy and run cattle, but the importance of adequate feeding is not overlooked.

*Bloat.* Bloating in dairy cattle, especially during the spring months, was very prevalent in a number of districts and accounted for losses of valuable dairy stock. The cattle being in poor condition and all winter feed being used up, it was difficult to suggest measures to prevent losses. In such cases a ration of hay has proved of distinct value, but none was available. It was also difficult to control the grazing of the animals, feed being eaten out during the winter. Cattle in low condition appear to be more susceptible than the better-fed animals. Much advice in regard to the individual treatment of affected animals has been given.

#### SHEEP.

It is pleasing to report that, with the exception of a few minor outbreaks, no serious epidemic of photosensitization (facial eczema) affected sheep or cattle during the year. The year has been a much better one for the sheep farmers. The lambing percentages were much better than in the previous year, and both the quantity and price of wool improved on last season's return.

The killing season for lambs was rather erratic in most districts, as many lambs were held back to produce heavier weights. In the North the lambs put through the works have been prime quality although somewhat heavier than usual.

As regards the numbers of lambs put through the works, there is a general increase over last year's figures, which were lower on account of the epidemic of facial eczema the previous autumn. In the South Island a very severe winter caused losses in the ewe flocks. This was followed by a poor fattening season in some districts owing to climatic and feed conditions. Generally speaking, dry conditions are more favourable to fat-lamb production, provided there is a reasonable amount of feed. Rank feed following a heavy and excessive rainfall has prevented lambs from being finished off in several districts.

*Infectious Enterotoxaemia (Pulpy Kidney).*—The method of vaccination of ewe flocks where losses in lambs from pulpy-kidney disease occur has been continued and a larger number of ewes have been vaccinated in the districts concerned. Generally speaking, the results have been satisfactory, but some discrimination in the choice of the vaccine will require to be exercised if the best results are to be obtained. The immunity conferred on the young lamb through the colostrum of the ewe is not of a lasting nature and further vaccination of the lambs to protect them through the hogget stage in some districts is necessary. If such lambs are being fattened for export it is important that the vaccination should leave no blemishes in the dressed carcass. Inquiries have been made into this aspect of the vaccination of lambs, and field officers have been advised on the matter.

The District Superintendent, Dunedin writing on the subject of lesions at the site of inoculation, states:

"This has been a subject of general complaint throughout the district following the use of alum-precipitated vaccine. The strongest complaints came from the Strath Taieri, where one owner was so alarmed at the reaction to the first inoculation that the second injection was abandoned. Further very strong complaints were received from the Oamaru district regarding these lesions. The percentage affected in different flocks varies from nil *i.e.*, none noticeable to as high as 80 per cent. of the inoculated ewes; figures of 10 per cent. to 20 per cent. are commonly quoted. The lesions take the form of a sterile abscess and vary in size from a pea-like nodule to the size of a walnut. One owner, however, reported lesions of about the size of a 5s. piece. The commonest lesion appears to be a scabby formation on the skin covering a subcutaneous abscess about the size of a bean.

"The lesions persisted till shearing, but by that time had resolved to a varying degree. Many still contained a quantity of greenish semi-fluid pus. At the present time, seven to eight months after inoculation, ewes are coming to the freezing-works still bearing the lesions in this state. It would appear generally that the lesions resulting from the inoculation are not sufficient to cause rejection of carcasses for export. However, in the case of lambs a number had to be rejected for export, and in one case nearly the whole of about two hundred and fifty lambs were graded "second" on account of the excision of the abscesses. Owners have passed adverse comments about the lesions, and such complaints are liable in some places to bring the vaccination into dispute."

In view of this, the importance of owners using a type of vaccine not liable to produce these results, on lambs intended for export, has been stressed by the Department. In addition to this, however, the technique of vaccination must be carried out in a clean manner, no matter what type of vaccine is used.

*Lymphadenitis.* The position in regard to this disease has not changed during the year. In the meat-works it is necessary to incise the carcass lymphatic glands of all mutton carcasses, and this gives a fairly accurate picture of the true incidence of the disease in the various districts. It has been recognized for many years that the North Island sheep are comparatively free from the disease, but the constant attention of flockowners is necessary to maintain this position in the North and to improve the present position in the case of South Island owners.

Bulletins on the disease have been distributed to property-owners in the South whose stock have shown infection to be present.

*Pregnancy Toxaemia (Ante-partum Paralysis) in Ewes.*—The District Superintendent, Wellington, writes:

"Conditions set up by the dry summer and rather hard winter appeared to lead to ewes being in excellent health at lambing-time, as the mortality from both bearing trouble and ante-partum paralysis was the lightest for many years. Regarding ante-partum paralysis, ewes were apparently not so fat prior to lambing, and though outbreaks appeared to be threatened in some parts, notably Marlborough, a certain amount of feed came away in time to prevent much trouble. Many of the losses there were due to pure weakness and debility. Ewes were not so fat, they took exercise looking for food, and what was available was short, green, and nutritious."

In the South Island it is recognized that it is more difficult to adequately feed the ewe flock during the last few weeks before lambing. However, it is becoming increasingly evident that sound management and winter feeding of the ewe flock in the later stages of pregnancy are effective measures in the control of ante-partum paralysis.

*Parasitic Gastroenteritis.* The same serious hogget mortality experienced in some former years has not been recorded during last year. Though losses do occur, they are not nearly so heavy as in former seasons. This was probably due to the dry feeding-conditions in the South, associated with more artificial feeding and a more regular dosing of flocks. The problem of the control of parasites in all young stock, and in some cases in the ewe flocks as well, is one requiring all the attention and assistance that can be provided. The matter is so closely associated with seasonal feed conditions and stocking that a slight variation in these from season to season requires to be met in the best possible way. The nicotine-bluestone drench is being widely used, and provided it is given early in the season and at regular intervals throughout the season, and at the same time the best possible feed is provided for the young stock, the farmer may be satisfied that he has done his best to prevent losses.

Under the severe winter conditions in some parts of the South Island an investigation of losses in ewes showed that these sheep were heavily parasitized. This condition, acting together with insufficiency of winter feed and the severe climatic conditions, caused some severe losses.

Much information concerning the control of parasitic diseases continues to be given by the field officers.

*Contagious Ecthyma (Sore Mouth).* This continues to give trouble in many flocks from time to time. Owners are strongly advised to vaccinate their sheep against the disease if trouble is being experienced from year to year. The vaccine is very effective in conferring an immunity which lasts several months. It is comparatively easy to carry out, and a demonstration of the method of vaccination may be arranged. The vaccine is supplied from the Animal Research Station, Wallaceville.

*Contagious Ophthalmia (Pink-eye).*—This disease of the eyes of sheep has been the subject of several inquiries from flockowners. Information is available from all field officers as to the best methods of treatment and prevention. The subject has been dealt with in the *Journal of Agriculture* from time to time.

*Hydatid Disease.*—An examination of the viscera of stock killed at abattoirs is carried out to enable a correct estimate of the percentage of the organs infected with hydatid cysts to be determined. Although an effective worm medicine has been supplied to all dog-owners under the Dogs Registration (Prevention of Hydatid Disease) Regulations 1938, and in force from the beginning of last year, it is regrettable that better progress in the control of the spread of the disease has not eventuated. Much publicity has been and continues to be given to the subject, and all owners of sheep-dogs have the responsibility of seeing that their dogs are regularly treated for worms with the remedy provided. Reinfestation of the dogs will be prevented if the use of raw offal in the feeding of the dogs is prohibited. It is particularly important that all owners of dogs on farms should do their utmost to stamp out this scourge in their stock and reduce the risk of the disease in the human. In the meantime, a voluntary co-operative effort is being called for from all dog-owners.

*Liver-fluke and Black Disease.*—The losses from black disease in the liver-fluke district of Hawke's Bay are now controlled by the regular use of black-disease vaccine.

The treatment of sheep for the liver-fluke parasite is dealt with in the bulletin on parasitic diseases issued by this Department.

*Black-leg in Sheep.*—A rather serious loss of sheep was found on investigation to be due to the black-leg organism. The results obtained from the vaccination of the flock against black-leg have been very satisfactory. The vaccine used was prepared and supplied by the Animal Research Station, Wallaceville.

*Cutaneous Myiasis (Sheep Blow-fly).*—A small outbreak of fly trouble was experienced in unshorn, uncrutched lambs following warm, humid weather. This accounted for some mortality of lambs, and advice on the matter of prevention was broadcast in a lecturette from 2YA station. The fly was rather prevalent in Marlborough on account of warm, humid weather. It would appear that less trouble was experienced in Canterbury than in the previous season.

*Foot-rot.*—This disease continues to give a good deal of trouble to sheep-farmers, particularly in the South Island. This last season was more favourable to sheep in Canterbury and fewer outbreaks were seen. Outbreaks on flat country were noted farther south. The control of foot-rot on any farm can be effected if the measures advocated by the Department are put into operation. These measures are fully outlined in the departmental leaflet on the subject.

*Lice and Ticks.*—On the whole, dipping appeared to be carried out in a fairly satisfactory manner. Many dairy-farmers who run small numbers of sheep have no facilities for dipping them, and consequently an inspection of sheep in saleyards resulted in some prosecutions under the Stock Act.

Two flocks of sheep in one district were found to be affected with leg lice, a rather unusual experience.

#### PIGS.

The number of pigs slaughtered for the season 1939-40 at registered premises was 799,759. Those slaughtered on holdings and examined at butchers' shops numbered 19,332, making a total of 819,091, a decrease of 212,696 on last year's figures.

Of 771,544 coming under inspection, 134,977 carcasses were found to be affected in varying degree with tuberculosis, the percentage of infection being 17.49 per cent., a decrease of 1.97 per cent. as compared with last year. Meat-export works, 624,038; abattoirs, 147,506; ordinary slaughterhouses, 28,215; shops, 19,332: total, 819,091.

*Swinepestifer Infection.*—This disease continues to be responsible for a considerable mortality in pigs in several districts. It would appear as if the organism became more virulent on some properties, the mortality rate being so high. Losses in young pigs due to the disease are heavy, but on occasions the mortality in older pigs is quite a feature of an outbreak. A higher standard of hygiene in the piggery, including better and cleaner feeding, will assist in preventing outbreaks of the disease.

Experiments are being conducted by field officers with regard to a special treatment of affected pigs. Although only limited trials have been so far completed, there is some room for optimism. Further trials are being arranged.

*Sarcopic Mange.*—An outbreak of this disease was associated with a considerable death-rate in one district. The disease can be effectively eradicated through thoroughly spraying or dipping, according to the methods recommended by officers of the field staff.

*Swine Erysipelas.*—No cases of this disease were recorded during the year.

*Necrotic Ulceration of the Skin.*—Although so much advice has been given in regard to this disease in every possible way, by lectures, demonstrations, and repeatedly in the pages of the Department's *Journal*, it is surprising how many owners still do not seem to be able to treat the disease or eradicate it from their pig sections.

A system of improved drainage in and about piggeries and including all pig sections, together with reasonable care to prevent unnecessary injuries to the skin to allow the entrance of infection, will do much to prevent the disease. Large numbers of pigs are kept on small farms where town garbage is available for feeding, and on such places, as a result of proper drainage and housing, no cases of the disease are met with.

*Stephanurus Dentatus (Kidney Worm of the Pig).*—A few pigs have been found affected with this parasite at one of the killing plants. This parasite is prevalent in pigs in some of the Australian States, and its possible introduction to New Zealand from Australia in imported animals is being given consideration. It appears necessary to take some steps in the direction of control of the importation of all pigs from Australia.

*Swine Husbandry.*

The report of Mr. M. J. Scott, Superintendent of the Pig Industry, is submitted herewith:—

“*Reduced Output.*—On account of having to export an increased percentage of bacon, pig-producers have felt the consequences of recent world events more acutely than the producers of other classes of live-stock. Men who kept many sows, who produced pork, and sold store pigs were the backbone of the industry. The restriction on the amount of pork exported gave them no option but to reduce their sow numbers, and their doing so has resulted in a considerable reduction in the number of pigs that will be available for fattening. This will not be evident until the spring of this year, when a shortage of heavy baconers is most likely to occur. There is evidence that the bacon-producer and the buyer of stores have anticipated this shortage and have increased their breeding-sows in such a way that from January, 1941, pig-production should again begin to increase. The present drop in pig-production, although serious, cannot be attributed to war conditions. A reduction in killings was first evident in May, 1939, and, since it takes approximately one year from the time sows are mated till pigs are killed, farmers must have withheld sows from service in May, 1938. At that time the prospects of war did not justify such action. A decision to reduce the number of pigs had been made for reasons other than war upsets. From a survey of the monthly killings since May, 1939, it is evident that that decision has been acted on continuously since May, 1938.

“In the undermentioned table the annual killings of pigs for the last six years are set out. In previous reports the killing season was taken as ending on 30th September each year; in this one the year ends on 31st March. Figures for 1940 for pigs killed on farms and those slaughtered in ordinary licensed slaughterhouses during the last quarter are not yet available. Both these figures are fairly constant and inconsiderable and have been estimated on those of previous years. Similarly, in arriving at the number of baconers killed an estimate of those killed for local consumption based on previous years has been used.

Year.	Number of Breeding-sows at 31st January.	Total Pigs killed,* Year ended 31st March.	As Baconers.	As Porkers.
1935 .. .. .	111,793	899,820	309,136	590,684
1936 .. .. .	116,058	979,200	419,253	559,947
1937 .. .. .	112,921	1,037,841	452,378	585,463
1938 .. .. .	104,803	1,115,226	442,379	672,847
1939 .. .. .	96,754	1,039,767	413,757	626,010
1940 .. .. .	..	828,858	453,064	375,794

\* Covers pigs killed in export slaughterhouses, abattoirs, rural slaughterhouses, and on farms.

“It will be seen that there is a decrease of 210,909 in this year’s killings from those of last year. This represents approximately 20·2 per cent. numerically. When the numbers and weights of baconers and porkers are taken into consideration the decrease is only 10·1 per cent. on last year’s weight of pig-meat.

“Although this reduction in output has taken place, the conditions under which pigs are kept, the quality of pigs produced, the efficiency with which dairy by-products are used, and the incidence of disease on farms are all showing steady improvement. Mr. H. M. Peirson, Supervisors of District Pig Councils, and officers of the Department, without exception, report improved facilities and attention to pigs. The reduction in output is accounted for in the main by men, chiefly pork-producers, who went rapidly into pig-production without proper facilities, finding that under those circumstances pig-keeping entailed many disappointments and disagreeable employment, deciding to get out of pigs just as rapidly as they went into them.

“The stimulus given to margarine-production as a result of the war would alone warrant bringing to the notice of dairy-farmers the need for increased pig-production, but when to this is added the virtual disappearance of Denmark as a supplier of both butter and bacon the necessity for our rapid expansion as a supplier of pig-meats to Great Britain should be evident to all. Sound development of the industry can be made only on the basis of home-produced crops. There is danger in becoming a factory for the conversion of imported grain into pig-meat.

“*Instructional and Advisory Service.*—Pedigree-sow Recording: This service continues to receive support mainly from pig clubs. Provided originally at the request of pig-breeders, these men have failed to make use of it. As the fountain-head of improved stock, they are placing themselves in the position of being unable to supply recorded stock, and must continue to sell on pedigree and appearance, instead of these combined with performance. This is most unfortunate and cannot be in the best interests of the industry. For the year ended 31st March, 425 sows have been entered for test, 409 have completed records, and 267 of the litters have been heavier than 70 lb. and 210 lb. at three weeks and eight weeks respectively. Results are published quarterly in the *Journal of Agriculture*.

“Performance-record Scheme: This was introduced in August, 1939. Under this scheme pigs of a recorded litter are tattooed and fed to bacon weights on the owner’s farm. After slaughter, the carcass is examined for quality by an officer of the Department of Agriculture. The owner then

receives a report showing first the measurements of his pigs for length, back fat, belly thickness, growth rate, &c., and second, the points awarded for litter growth, carcass quality, and growth rate based on standards adopted from those in use by the Bacon Development Board of Great Britain. The service costs the owner 5s. per litter. To date very few have availed themselves of it.

"Pig Census: The collection of information has continued under this scheme. Approximately five hundred farmers all over New Zealand give details of their pig-production, and the information so obtained is proving invaluable as a basis of sound instruction and as a means of establishing standards of production for individual producers. Summaries dealing with the economics of using meal at different rates, of producing two litters per year, of wintering pigs, of using meat-meal, of growing crops, &c., have been published in the *Journal* of the Department.

"*Carcass-quality Scheme for Baconers* (all Classes of Pigs): With the support of the Supervisors of the District Pig Councils a number of commercial baconers have been tattooed and the carcasses have been examined by graders in the various killing-works all over New Zealand. Approximately one thousand five hundred pigs have been so examined this year, and when this number has been increased by ten times it will be possible to give an answer to which is the best type of baconer. This aim may be achieved within the next two years.

"National Instructional Service: The nine District Pig Councils continue to provide a technical advisory service that appears to be leaving its mark in the form of improved methods of pig-production. New layouts, improved conditions under which pigs are kept, and increased interest on the part of that 10 per cent. of enthusiastic pig-producers who demonstrate these improvements to the rank and file in their immediate neighbourhood are in evidence in all districts.

"Grading of Baconers: This has now entered on its second year of operation. Amendments to the regulations have been made to include 100 lb. pigs as baconers, to have all pigs backed down prior to measurement, and No. 3 Prime grade deleted. Reports from all killing-points indicate a marked improvement in the quality of baconers. The killings for the year ended 31st March, 1940, graded out as follows: 70 per cent. No. 1 Prime, 22 per cent. No. 2 Prime, 1 per cent. No. 3 Prime, and 7 per cent. Second Quality.

"*General Activities of Field Officers.* Field officers of the Department continue to serve the industry in the specific directions of pedigree-sow recording, census collection, and performance-record scheme. Requests for advice on housing, feed, and general management continue to increase.

"*Housing of Pigs.*—The bulletin mentioned in last year's report has now been issued, and is available at 2s. per copy when purchased singly or at 1s. per copy when purchased through the dairy companies in bulk. The bulletin consists of forty-eight pages of photographs, plans, and specifications of the most satisfactory types of houses and layouts that are now in use.

"*Feed-supply.*—In association with the Council of Primary Production, District Pig Councils have been in constant touch with the Internal Marketing Department, who have imported an increased supply of barley. This is rapidly going into consumption, thanks to the combined efforts of the Marketing Department, farmers, merchants, and the organization of Primary Production Councils. Through the habit of using pollard and because grain feeding is a new experience to many, there is a demand for finely ground barley. Grinding helps to convert a cheap feed-supply into a dear one; the finer the grinding the greater the cost. Farmers should be encouraged to feed this barley whole and dry in such a way that pigs are forced to eat it slowly. In this way the cheapness would be retained and the feed value wholly realized. Advice on this point has been broadcast and published widely.

"*Publications and Publicity.* Thanks to the assistance of dairy companies, approximately twenty-six thousand copies of the bulletin 'Modern Methods of Pig Production' have been distributed. Action is now being taken to distribute the bulletin 'Layout and Construction of Modern Piggeries' through the same channels. Articles on pigs reporting the results of feed trials, and other relevant matter have appeared regularly in the *Journal of Agriculture*, in the public press, and have been broadcast from time to time. In addition, the public press has taken a very active interest in matters related to pigs, and for this service the appreciation and thanks of the Department are gratefully expressed."

#### MEAT INSPECTION AND SLAUGHTER OF STOCK.

Consequent on the outbreak of war all meat was purchased by the Imperial Government, and some extra responsibilities were placed on the meat-inspection staff in this connection.

During the year the Meat Bill was passed by Parliament, and the Meat Act becomes law on the 1st April, 1940. The Meat Act includes a consolidation and amendment of existing legislation, and introduces a more complete inspection of meat for local consumption, especially regarding the inspection of all pork for consumption in abattoir districts. Certain other amendments in connection with administration included in the Act will tend to bring about a better system of meat inspection generally.

Inspection at meat-export slaughterhouses was efficiently maintained throughout the season, and all meat exported was inspected in accordance with the requirements of the Ministry of Health, England.

In the conservation of storage space, the system of telescoping carcasses of mutton and lamb was put into operation. In bringing about uniformity in the procedure desired a good deal of effort was entailed. The work now, however, appears to be proceeding satisfactorily.

The total numbers of stock slaughtered at registered premises were: Sheep, 3,878,614; lambs, 10,074,502; cattle, 594,933; calves, 1,055,987; swine, 799,759.

The following table shows the stock slaughtered during the past year at freezing-works only, the previous year's figures being shown for comparison :

Stock.	Year ended 31st March, 1940.	Year ended 31st March, 1939.	Increase.	Decrease.
Cattle .. .. .	346,074	331,135	14,939	..
Calves .. .. .	1,001,827	932,333	69,494	..
Sheep .. .. .	2,905,836	3,291,919	..	386,083
Lambs .. .. .	9,928,605	9,780,736	147,869	..
Swine .. .. .	624,038	805,006	..	180,968

For further comparison the following table, showing the killings of sheep and lambs at meat-export slaughterhouses for four periods, 1st October to 31st March, indicates the stock killed from the beginning of each season to the 31st March :—

Stock.	1936-37.	1937-38.	1938-39.	1939-40.
Sheep .. .. .	1,276,234	1,748,035	2,362,223	2,129,396
Of which				
Ewes were .. .. .	588,805	942,380	1,178,543	1,225,834
Lambs .. .. .	6,536,408	7,040,149	7,454,031	7,439,551

The following are the numbers of stock slaughtered under direct inspection during the year ended 31st March, 1940 : Cattle, 518,201 ; calves, 1,054,074 ; sheep, 3,645,018 ; lambs, 10,052,905 ; and swine, 771,544.

The table below shows the class of premises at which this stock was slaughtered :

Stock.	Abattoirs.	Meat-export Slaughterhouses.
Cattle .. .. .	172,127	346,074
Calves .. .. .	52,247	1,001,827
Sheep .. .. .	739,182	2,905,836
Lambs .. .. .	124,300	9,928,605
Swine .. .. .	147,506	624,038

Stock slaughtered at ordinary slaughterhouses during the year was as follows : Cattle, 76,732 ; calves, 1,913 ; sheep, 233,593 ; lambs, 21,597 ; swine, 28,215 : Carcasses of pork killed and dressed by farmers sent into butchers' shops and small factories and examined by departmental officers numbered 19,332.

In connection with the animals shown in the tables above as slaughtered at meat-export slaughterhouses, the following have gone into consumption within the Dominion : Cattle, 27,208 ; calves, 13,943 ; sheep, 292,425 ; lambs, 154,852 ; swine, 169,183.

#### LIVE-STOCK STATISTICS.

The 1939 sheep returns (as at 30th April) showed that sheep flocks in the Dominion had decreased by 481,683, to 31,897,091. The number of breeding-ewes has, however, increased by 296,433, to 19,960,299. The number of sheepowners has increased by 234, to 32,143. The number of cattle in the Dominion as at 31st January, 1939, increased by 58,866, to a total of 4,564,948. The number of dairy cows (included in cattle totals) decreased by 19,084, to 1,853,713. The number of pigs in the Dominion was 683,463, a decrease of 73,003 compared with 1938. Horses show a decrease of 3,364, the 1939 total being 274,803.

#### COMPENSATION PAID FOR STOCK AND MEAT CONDEMNED.

Compensation to the amount of £14,184 was paid out during the year for animals condemned in the field under the provisions of the Stock Act, and £22,510 for carcasses or parts of carcasses condemned for disease on slaughter for human consumption at abattoirs, meat-export slaughterhouses, &c., under the provisions of the Slaughtering and Inspection Act.

#### IMPORTATION OF STOCK.

The following stock were imported during the year : Cattle, 23 ; sheep, 721 ; pigs, 13 ; horses, 10. Of the above animals, the following were placed in quarantine for the respective periods required : Cattle, 23 ; sheep, 8 ; pigs, 13.

## EXPORTATION OF STOCK.

During the year under review the following animals were exported: Cattle, 30; sheep, 17,016; pigs, 31; horses, 47. There was the usual movement of thoroughbred horses to and from Australia.

## DAIRY INSPECTION.

The supervision of the production of milk for consumption in the cities and towns of the Dominion is an important part of the work of officers of this Division. This class of production requires constant supervision to ensure a safe, clean, and wholesome article of diet. In the main, no serious problems were met with during the year, although in some districts it was difficult to maintain an adequate supply during the winter months. Arrangements were made to overcome such local difficulties.

The co-operation afforded by the Health Department in the examination of milk samples as to bacterial counts and keeping-quality of the milk is much appreciated.

Many composite milk samples have been submitted to the biological test at the Animal Research Station, Wallaceville. The results have been very satisfactory.

The general standard of hygiene in production has been maintained, but this requires constant and regular supervision.

## POULTRY.

The instructional staff of the Department has continued to carry out a service of great value to poultrymen throughout the Dominion, and during the year this staff has been strengthened by the appointment of Messrs. Haddon, who is stationed in Auckland as Assistant Instructor, and Jourdain, who is stationed at Dunedin. The appointment of these officers should allow of more extended work of an advisory nature being available than formerly. It is known that the service being given by the instructional staff is appreciated and that poultry-men value the advice that they are able to offer. Some two thousand five hundred visits were made during the year, and in addition many requests for advice were answered by letter.

Disease troubles throughout the year were principally connected with coccidiosis, leukemia, pullorum, tuberculosis, fowl-pox, and black head, but in no case was there any serious trouble, and the application of better management and feeding, combined with early detection and elimination of affected birds, prevented further spread of the trouble. A number of flocks were blood tested for pullorum disease, and some vaccination against fowl-pox was carried out by poultry-men in the Auckland district as a precautionary measure.

Reports indicate that more attention is being paid to the importance of selection of the breeding-stock and that this is reflected in the improved quality of the young stock to be seen on many plants. A considerable amount of selection of breeding-stock is carried out by the Instructors on request, and it cannot be too strongly emphasized that the future prospects of any plant depend on a realization of this principle in breeding.

The Poultry-Station at Wallaceville continues to render a good service to poultrymen in supplying fresh stock or eggs for hatching, and in carrying out trials in feeding, &c., the results of which are made available through the Department's *Journal of Agriculture* and also through the *Poultry World* published by the Poultry Board.

This section of the report cannot be closed without a reference to the deaths during the year of two well-known pioneers in the poultry development of this Dominion. I refer to Messrs. F. C. Brown and C. J. C. Cussen. Mr. Brown for many years occupied the position of Chief Poultry Instructor, from which position he retired in 1935. Mr. Cussen, who succeeded Mr. Brown, died suddenly while still in harness after a period of over forty years official connection with the poultry industry. His death, together with that of Mr. Brown, removed two personalities who were held in the highest respect and esteem by all poultrymen in the Dominion. To their relatives I extend the Department's sympathy.

## WOOL.

The report of Mr. J. P. E. Duncan, Wool Instructor, is submitted herewith:—

"The outbreak of war brought immediate and far-reaching changes in the methods of disposal of our wool-clip, the whole of which was bought by the British Government at a fixed average price of 9-8d. sterling per pound over all. This means that after deducting certain handling and appraisement charges the farmer receives an average price of 12-188d. in New Zealand currency for his wool. In the putting into operation of the 'commandeer,' as the appraisement scheme is popularly known, there was the previous experience of the Great War to draw upon, and for appraisement purposes the New Zealand clip was divided into well over eight hundred different 'types' of wool each valued according to its own characteristics such as count, length, condition, soundness, colour, &c. It would be out of place here to discuss in any detail the operation of the scheme, but it means in effect that the farmer receives a 'guaranteed price' for his wool for the duration of the war and one season thereafter.

"One of the results of the present conditions is that the problem of wool's competitors, the artificial fibres, has temporarily faded into the background. It would be a grave mistake, however, to forget about them, as without a doubt Germany must be striving to the utmost, cut off as she is from virtually the whole of her wool-supplies, to improve existing types of synthetic fibres and perfect new ones. This must also be the case to a lesser degree in other countries which are finding difficulty in securing their normal wool-supplies. It will be pretty safe to hazard a guess that after the war the question of competition with substitutes will loom even larger as one of the major problems in wool-production. For this reason the decision of the International Wool Secretariat to carry on with their

work is a welcome one, and even in New Zealand there is already a good deal of notice being taken of their work, judging by the keen interest displayed in the New Zealand Wool Publicity Council's stand at the Exhibition.

“ Under the regulations of the wool-appraisement scheme the appraisers have power to reject clips which in their opinion are not properly prepared for sale and return them for reclassing at the farmers' expense. It is to be hoped that eventually this will lead to a general improvement in the preparation for market of some of those clips—fortunately, a small minority—which have always fallen well below the general standard. If it does it will at last bring home to the owners the realization that in the long-run the proper classing of wool is a paying proposition.

“ No final figures will be available for some months yet, but present indications are that our wool-clip has been considerably lighter this past season. Estimates of the drop vary a good deal, but the average idea of the drop in production seems to be anything from 7 per cent. to 10 per cent., which in terms of bales would be between sixty thousand and ninety thousand. However, as wool forecasts are notoriously inaccurate too much weight should not be attached to these figures. That there has been a drop in production there is no doubt, and this has been due to seasonal conditions—the long continued dry spell in the early months of 1939, which was pretty general throughout the country, followed by a severe winter accompanied, in some districts such as Banks Peninsula, by heavy sheep losses. The result is evident in the poorer growth of the wool, which, taken generally, has been markedly shorter this season. In most districts, too, it has been somewhat lighter in condition, while from some centres come complaints of tenderness and also poor colour due to dust.

“ During November I personally visited all the wool-scouring works in New Zealand—thirty-one of them altogether, located from Auckland to Invercargill—to collect information required in connection with the allocation of wool to these works. This information was used by our Department, along with that collected by the scourers' own representatives, at a conference which decided the final amount of wool to be allotted to each works from the seventy-five thousand bales available for scouring. The result is that on the whole the wool-scouring industry has been placed on a better basis than existed before the war, as there is now certainty of wool-supply and fair continuity of employment. It is to be hoped that means will be found for continuing this desirable state of affairs after the war.

“ In August I prepared and presented to the Royal Commission on the sheep-farming industry certain evidence which they required. The experiments on sheep-rugging in the South Island were continued during the year, and it is hoped to go on with this work again this season, at the end of which we should be in a position to publish further results. We also commenced another trial of a different nature during the year. This trial is the outcome of a bad crop of complaints which came to hand at the end of 1938 from the wool-buyers regarding the branding of wool with tar, paint, and other substances which will not scour out. These complaints can be traced back for many years, but as they appeared to be definitely on the increase again we have started an experiment on Somes Island using every make and every colour of wool-marking substance on the market. At the end of this year (1940), at shearing-time, we intend to conduct scouring trials with any branding-material left on the wool, and we will then be in a position to say which substances are likely to prove harmful in use.

“ During the past year we have staged wool exhibits at quite a number of A. and P. shows and Winter Shows, and have also given a considerable number of demonstrations and lantern lectures to farmers and young farmers' clubs. These activities will be continued during the coming season, but will necessarily be on a reduced scale owing to the loss of my assistant, Mr. H. R. Lusk, who has joined the Military Forces. I also prepared a wool exhibit for the Centennial Exhibition earlier in the year, and had built a set of model sheep-yards to a scale of  $\frac{1}{2}$  in. to 1 ft. This model is intended for use with that of the wool-shed and dip which I had built previously, and the two together form a very comprehensive layout. On account of the size of the complete model, which covers a floor space of approximately 11 ft. by 4 ft., it could not be included in the wool exhibit in our departmental court at the Exhibition so was loaned to the New Zealand Wool Publicity Council for inclusion in their display. There it has attracted a lot of attention, and as a result I have sent out on request many sets of plans of the complete model or parts of it. During the year I also completed several new plans of sheep-yards, wool-sheds, and dips, and these are available for distribution to farmers and meet with a considerable demand. Later it is hoped to consolidate these various plans and bring them out through our *Journal of Agriculture* as a series of articles to appear later in bulletin form. This is already being done in the case of a series of illustrated articles on sheep-dipping. Two of these have already appeared in the *Journal*, and there are two more to come which includes plans and specifications of all the well-known types of sheep-dips. It is hoped that about June these articles will all be published together in the form of a bulletin which will be available to farmers. Judging by the amount of correspondence I receive on this subject, it should fill a definite want.

“ During the past year I have dealt with the usual variety of correspondence on sheep and wool topics, have reported on various samples of wool submitted, and have sent out quite a number of New Zealand wool samples to schools and other institutions. I have also exchanged samples and information with the departmental Sheep and Wool Instructors in the various States of Australia.”

#### RABBIT NUISANCE.

*Auckland.*—Reports received indicate that the North Auckland portion of the Auckland Province does not show any increase in the rabbit position, which remains satisfactory. Nevertheless, the presence of rabbits in any degree is a matter for constant concern, and every endeavour should be taken to clear them out of this area altogether. The condition of the Waikato area is satisfactory, Rabbit Boards without exception continuing to do excellent work. An attempt is being made to have a Board formed in the Taringamotu-Otangiwai districts, where rabbits are shown to have increased. The Rotorua district also requires careful attention, as rabbits will quickly increase in this class of country if neglected.

*Wellington.*—This district is being kept under satisfactory control, particularly where Rabbit Boards (of which there are twenty-eight) are operating, and it would be very comforting if all infested areas could be gathered under Board control. There are areas in the Marlborough, Nelson, and Wairarapa districts where close and constant inspection is necessary so that there may be no relaxation of the work of destruction.

*Canterbury-West Coast.*—This district is one where the rabbit pest is well spread, and constant work is necessary if it is not to get out of bounds. River-beds with gorse cover afford ideal conditions, and these abound throughout this district. During the year much work has been done, and the state of the pest is reported to be generally satisfactory.

*Otago Southland.* While many districts show some improvement, there are still far too many rabbits in the Otago-Southland district, and it is regrettable that many settlers still allow the commercial aspect to militate against the destruction of the pest. Five Rabbit Boards are established in the Southland district, and, although two of them are not long established, they are all doing good work and are demonstrating that with systematic and continuous work the rabbit can be effectively dealt with by Board control.

There are six Rabbit Boards in the Otago district, one of them only recently constituted. Rabbits in some of these Board areas have been too plentiful, but it is satisfactory that better conditions have been achieved during this year's operations, and it is trusted that a satisfactory policy aimed at greatly reducing the pest will be continued. Rabbit-skins exported during the year 1939 numbered 11,190,294, and considering that these represent in food consumed an equivalent of approximately 1,500,000 sheep it does not require any financial wizardry to arrive at the substantial economic loss that results from the rabbit.

#### NOXIOUS WEEDS.

Noxious weeds come, but unfortunately they do not go; they remain. In spite of every endeavour and the allocation of large sums of money for the purpose, the menace of ragwort and other noxious weeds does not appear to diminish. Admittedly much good work has been done in clearing areas of affected lands of ragwort, but this has not arrested its spread to other lands, although it has helped to keep large areas in production and thus prevented many farms from being abandoned.

During the year the sum of £50,597 10s. was expended out of a vote of £53,000, principally on ragwort destruction, through County Councils on an allocation made to them for the purpose. Thirty-seven County Councils and two River Boards carried out operations under the scheme, and it is the unanimous opinion of these bodies that the money is being expended to good effect and that it has saved abandonment in many cases. County Councils as a whole deserve praise for their hearty co-operation in this work.

Further work of quite an appreciable nature was done by farmers at their own expense and also under Scheme 13B of the Department of Labour, Employment Division.

The subsidy of 1d. per pound on sodium chlorate and Atlacide was continued throughout the year, and £8,016 15s. 5d. was paid out by way of subsidy.

Other classes of noxious weeds—blackberry, variegated thistle, Californian thistle, &c.—were dealt with according to circumstances, but many lands still carry a heavy infestation.

#### STAFF.

All members of the staff of the Division have worked well and loyally in the exercise of the varied duties coming under the scope of the Division, and I desire to tender to them one and all my sincere thanks.

During the year Mr. W. D. Blair, M.R.C.V.S., District Superintendent, Christchurch, who had served the Department for a period of close on thirty-two years, passed to the beyond, and to his widow and son the sympathy of the Department is extended.

## ANIMAL RESEARCH DIVISION.

## REPORT OF J. F. FILMER, ACTING-DIRECTOR.

The Division of Animal Research was formed on the 1st April, 1939, and this report therefore covers the first year of its existence.

During this year every effort has been made to secure the co-ordination of all animal research work conducted in the Department, and in this regard the officers of the Live-stock and Fields Division have co-operated very readily. There has also been active collaboration with other institutions engaged in animal research work, notably the Department of Scientific and Industrial Research, Cawthron Institute, and Massey and Canterbury Agricultural Colleges. Close contact has been established with the Herd-testing Department of the Dairy Board, and the Division has received the assistance of numerous stockowners, some of whom have served on committees which have been set up for supervising special investigations.

Financial assistance has been received from the Dairy Board, £2,337, and from the Wool Publicity Committee, £1,708.

## STAFF.

An effort has been made to build up balanced teams of research workers at the Animal Research Stations at Wallaceville and Ruakura, and the position at both Stations is now much improved in this regard. It has, however, not been possible to fill certain key positions, and enlistments with the armed Forces are adding to our difficulties.

## BUILDINGS.

During the year the laboratory at Ruakura has been completed and is now occupied. This has greatly facilitated the research work at that Station. Although money was provided on the public-works estimates for the commencement of the extension to this laboratory necessary to accommodate the staff of the Chief Agricultural Chemist, these buildings have not been commenced. Plans have been drawn, however, and though it is appreciated that the war emergency may not permit early action, the necessity for these buildings should not be lost sight of.

The new buildings at Wallaceville have progressed very slowly during the year, and it seems that they will not be ready for occupation for several months. They are badly needed, as the staff at Wallaceville is at present working in very cramped quarters.

## DIAGNOSTIC WORK AT WALLACEVILLE.

The diagnostic service to the Live-stock Division has been continued at Wallaceville Animal Research Station. In addition to pathological and bacteriological examination of specimens, the chemical work necessary for diagnosis is now also done at Wallaceville, so that the complete examination may be made at the one laboratory. The following specimens have been examined during the year:

Milk samples for mastitis .. .. .	576
Composite milk samples for biological test for tuberculosis .. .. .	78
Blood tests for contagious abortion .. .. .	1,068
General specimens—	
Cattle .. .. .	225
Sheep .. .. .	324
Pigs .. .. .	107
Horses .. .. .	29
Dogs and cats .. .. .	16
Other mammals .. .. .	3
Poultry .. .. .	375
Blood tests for bacillary diarrhoea in poultry .. .. .	1,027
Bees .. .. .	6
Miscellaneous .. .. .	55

## ISSUE OF BIOLOGICAL PRODUCTS, WALLACEVILLE.

Wallaceville has continued to be the depot for the distribution of these products, mainly through officers of the Live-stock Division. The following have been issued during the year:

Tuberculin .. .. .	1,599 c.c.
Johnin .. .. .	611 c.c.
Blackleg vaccine .. .. .	4,920 c.c.
Enterotoxaemia vaccine .. .. .	1,267,250 c.c.
Black-disease vaccine .. .. .	25,925 doses.
Distemper serum .. .. .	391 doses.
Distemper virus-serum .. .. .	133 doses.

## RESEARCH WORK CONDUCTED DURING THE YEAR.

*Facial Eczema.* The investigations have continued to be directed by the Facial Eczema Management Committee, and the Department owes its thanks to Dr. Annett and Messrs. Anderson and Hayward, and also to Mr. Bruce Levy of the Department of Scientific and Industrial Research, for their services on this Committee. The collaboration of officers of the Department of Scientific and Industrial Research has continued satisfactorily during the year.

In the experiments at Ruakura and Karamu efforts were concentrated on an attempt to provide the chemists with pasture which was known to be toxic. In addition to the ewes and lambs which remained in the experimental paddocks throughout the season, test wethers were introduced each week and left for periods of a fortnight. Grass was collected daily, and some of this was fed to penned wethers again for fortnightly periods. It was hoped by this means to be able to determine whether or not the grass was toxic during any particular fortnightly period. However, though some liver derangement characteristic of facial eczema occurred in the experimental lambs, no symptoms were detected in any of the test wethers. This would indicate that, under the climatic conditions which obtained in the Waikato this year, the period of a fortnight was at no time long enough to induce the disease in wethers. The experiments are to be modified next season so as to use lambs as test animals, and they will be so arranged that data can be obtained concerning periods of varying lengths. One interesting observation was that for the second year no symptoms of facial eczema occurred in the paddock in which the pasture was kept green throughout by means of irrigation.

The season throughout the majority of the North Island did not favour the appearance of facial eczema, but small outbreaks occurred on the East Coast, where the summer was much drier and hotter. Regular pasture inspection has been conducted on a number of farms by officers of the Fields Division and the Department of Scientific and Industrial Research, in addition to those of this Division. Officers of the Live-stock Division have assisted in collecting blood and urine samples and samples of organs for pathological examination where outbreaks have occurred. Comprehensive chemical surveys of pasture and soil analyses have been made, and though these have afforded little evidence concerning facial eczema they have provided a wealth of data which will be of great value in other respects.

Lambs' livers have been sampled at weekly intervals at seven meat-works in the North Island and two in the South Island. In all 2,588 specimens have been examined histologically. The great majority of these have been normal, but facial-eczema lesions appeared in some livers from the Kaiti Works during February and March. Organs and fluids from experimental and affected animals have been examined histologically and biochemically. Considerable attention has been given to the improvement of biochemical technique, and this has enabled photosensitizing agents to be detected more readily, with the result that valuable data have been obtained. A study has been made of photosensitization in experimental animals produced with known photosensitizing agents and standard sources of light.

A study has also been made of substances which cause the appearance of coproporphyrin in blood and urine, this being a symptom of facial eczema which has been detected during this year. Some experimental work has been done with substances capable of producing liver damage similar to that seen in facial eczema, special attention having been paid in this regard to aniline.

*Photosensitization in Southdowns.*—This disease, which externally resembles facial eczema, but is distinguished from it by the absence of liver lesions, has been known in some strains of Southdowns for many years. It is considered probable that a predisposition to the disease is inherited. During the year biochemical studies have been made and a breeding experiment has been initiated to study the genetic aspect of the disease.

*Rape-scald.*—Biochemical study of naturally incurring cases was undertaken but no results have so far been achieved.

*Photosensitizing Plants.*—A number of species of the genus *Hypericum* have been collected and feeding experiments are being initiated. One of these species has been blamed for the severe photosensitization which sometimes occurs in the Marlborough district.

*Sheep Mortality, Canterbury.* Following the field survey by veterinarians and agriculturists, it was considered that further progress necessitated intensive investigations on an experimental farm with a bad history. Such a farm has been leased in the Kirwee district as from the 1st January, 1940, and experiments have been initiated to study all phases of sheep mortality which occurs in the Canterbury district, especially in wet seasons. Special attention is being paid to the effect of parasite control and various methods of sheep management and feeding. The role played by parasites must be closely studied, and regular chemical analyses of pasture and supplementary feeds are being made. The Canterbury Agricultural College is actively collaborating in this work and is especially interesting itself in the digestibility of pasture and supplementary crops grown in Canterbury.

*Mastitis.*—Experiments have been inaugurated to test the effect of milking-machine adjustments on the incidence of mastitis in an experimental herd. Research is being undertaken in connection with the evolution of a standard milking-machine, with particular attention to the mechanical simplicity and durability, milk hygiene, and the effect produced on the udder. Observations have been made on the effect of milking-machines on the production of mastitis in a number of dairy herds. Consideration is being given to the possibility of testing the performance of milking-machine accessories.

A committee has been set up to co-ordinate the work in connection with milking-machines, and the gratitude of the Department is due to the representatives of the Dairy Board and the Taranaki Federation of Dairies, as well as to the Director of the Dairy Research Institute, who have served on this committee.

Regular observations have been made on the occurrence of mastitis in two experimental herds. General field observations have been made on the occurrence of the disease in the Waikato. The mastitis-control scheme which has been operating in that district during the past eight years has been critically reviewed during this year and it is considered that this scheme will need considerable revision before it can be applied generally. It is hoped to start work in an experimental herd next year with a view to exploring the possibility of devising a more efficient control scheme. A special bacteriological study has been continued with a view to determining the types of organisms responsible for mastitis in New Zealand. Preliminary work has been done to establish a technique for studying the effect of non-stripping.

*“ Grass Staggers ” in Dairy Cows.*—A study has been made of the seasonal variations of magnesium in the blood of cows at Ruakura, Massey Agricultural College, and Wallaceville. The effect of various pasture species and of pasture management and of the administration of magnesium compounds on the blood magnesium status has also been studied. Haematological examination of field cases have been made, and these have indicated that the disease is distinct from one which it resembles clinically in Australia.

*“ Rye-grass Staggers ” in Sheep and Cattle.* Some biochemical studies have been made and feeding experiments have been conducted with pasture collected from affected paddocks.

*Sterility.*—The investigations connected with the diagnosis of bull sterility by semen examinations have been continued. The Technical Officer of the Dairy Board has collaborated in making a critical examination of the results of this year's work. Should the result of this indicate that the method is of sufficient value, a service to dairy-farmers will be initiated whereby it may be made available generally. The experiments designed to study the effect of high protein rations on bull sterility have been continued. There is so far no indication that any dairy pastures usually grazed by bulls in New Zealand are sufficiently high in proteins to cause sterility. The experiments to investigate the effect of protein on sterility in male rats have been continued and some interesting results are being obtained.

With a view to determining the effect of nutrition on dairy-cow sterility, regular pasture observations have been made on a number of dairy-farms throughout the year. During the next season the herd-testing branch of the Dairy Board will collaborate in this work.

*Artificial Insemination.*—A second year's work has been done on eleven dairy farms; the results indicate that before artificial insemination could be widely used in New Zealand further information is required concerning technique. It is intended to use artificial insemination entirely on one experimental herd next season, and it is hoped by this means that valuable data will be obtained.

*Contagious Abortion.* The first calves were inoculated this year in an experiment designed to test the value of calf vaccination in preventing this disease. The project is a long-term one and the work will be continued over several years.

*Pig Nutrition.*—Experiments have demonstrated the beneficial effect of feeding sows for six weeks after weaning on the number of the next litter and the beneficial effect of feeding for six weeks before farrowing on the size of individuals in the litter. The effect of restricted feeding in reducing the thickness of back fat in baconers has been demonstrated, and co-operative experiments on a number of farms have confirmed these results. Experiments have shown that, at the present prices, root crops fed during the winter to store pigs return a profit representing from £40 to £140 per acre of root crops.

*Dairy-cow Nutrition.*—Experiments have been commenced to determine the best methods of managing and supplementing pastures for dairy cows. The initial results indicate that proper pasture management can materially ameliorate the shortage of feed in the winter.

*Chilled-beef Production.* Encouraging results have been obtained in experiments designed to determine if chilled beef can be profitably produced on Waikato sheep-farms.

*Curd Feeding to Poultry.* Experiments indicate that the feeding of curd from skimmed milk to poultry is at least as profitable as feeding skimmed milk to pigs.

*Pasture Research.*—A number of projects have been conducted in collaboration with the Fields Division, and some of these will doubtless be reported more fully by the Director of that Division.

*Feed Flavour.* Experiments have indicated that feed flavour caused by clovery pastures in spring can be controlled by pasture management and special grazing practices.

*Rate of Growth of Pasture.*—This has been measured at Ruakura and Karamu throughout the year, and it has been found that half the total production takes place from October to December, while rather less than one-tenth of the total production takes place from April to June. This emphasizes the very real necessity for special management and supplementing of pasture to increase winter feed.

*Ragwort.*—Experiments have been continued to determine the best time of the year at which to apply sodium chlorate.

*Cobalt Deficiency.*—Experiments at Mamaku have indicated that bush sickness can be completely controlled by annual top-dressing with small amounts of cobalt. It is hoped to produce this year the third generation of sheep on cobalt-deficient paddocks which have been treated in this way. Attention is drawn to a statement in the report of the Superintendent, Ruakura Animal Research Station, that the Mamaku Plateau offers definite possibilities for sheep-farming, if the clearing, stumping, ploughing, and resowing of grass of the abandoned farms were undertaken.

The duration of the effect of larger dressings of cobalt is being studied, and the results indicate the possibility of these larger dressings being used successfully at longer intervals on hill pastures. Tests have been made to discover the effect of administering large doses of cobalt at monthly intervals,

as successful results have been reported by one farmer using this practise. The results indicate that, while sheep may be kept alive in this way and cases of bush sickness may be cured, optimum growth cannot be induced. Chemical work has indicated the value of the cobalt status of the liver for diagnosing bush sickness. The fundamental action of cobalt is being studied by the feeding of liver fractions. The cobalt survey of pastures, soils, and limestones has been continued.

Experiments have been conducted in collaboration with an officer of the Department of Scientific and Industrial Research with radioactive cobalt to study the distribution of cobalt within the body.

In collaboration with the Cawthron Institute a further study has been made of the technique of cobalt estimation in pasture, soil, and animal products.

During the year a pamphlet giving up-to-date information concerning the diagnosis, treatment, and prevention of bush sickness was issued under the joint auspices of the Department of Agriculture and the Cawthron Institute.

*Bone Pathology.* Bone abnormalities have been reported in cattle, sheep, pigs, and poultry, and a special study of bone pathology has been commenced to assist in determining the causes of this disease.

*Palpy Kidney.* Experiments have been conducted with a view to producing a more effective vaccine.

*Blackleg in Sheep.* This disease, which is generally confined to cattle, was diagnosed in sheep in the Wanganni district and it has been controlled by the use of a vaccine.

*Poisonous Plants.* Feeding experiments have been conducted to study the effect of several plants suspected of causing stock mortality.

*Chemistry of Fats.* Investigations have been continued into the occurrence of vitamins in New Zealand butters, fish oils, and pastures. Some work has also been done on the quality of bacon fat produced with some of the more common New Zealand rations.

#### CONCLUSION.

Research officers of the various professional and technical staffs have worked well and have collaborated sympathetically during the year. No attempt has been made in this report to indicate the part played by individual officers, its object being to present a broad survey of the work undertaken.

## FIELDS DIVISION.

## REPORT OF R. B. TENNENT, DIRECTOR.

## THE SEASON.

Climatic conditions throughout the Dominion varied to a considerable degree during the year ended 31st March, 1940. For the first three months the weather was particularly mild, but during July and August intensely cold and wintry conditions were experienced, with snow in some parts of the North Island where it had not hitherto been known to fall, and in the South Island a good many sheep were lost. Following the Dominion-wide severity of weather in these winter months there occurred extremes of variation in different districts. In the northern half of the North Island an abundance of rain during the summer and autumn was most favourable for growth of pasture, and food for stock was in plentiful supply. In the southern half of this Island, however, east-coast districts experienced very dry conditions, while in west-coast areas, and particularly in Taranaki, the rainfall was above normal. A similar variation of climate is recorded in South Island districts. Nelson had an abundance of moisture, whereas conditions in Marlborough were dry. Canterbury also had a very dry summer and autumn, while across the ranges in Westland the season was a very wet one. In North Otago the weather resembled that of Canterbury, while in South Otago and Southland it was rather too wet, the excessive rain causing rank growth, also making harvesting-conditions difficult.

## ORGANIZATION AND FUNCTIONS OF THE NATIONAL COUNCIL OF PRIMARY PRODUCTION.

In the course of the year just closed the National Council of Primary Production was established. As an organization this Council is headed by the Minister of Agriculture as chairman, and includes representatives of the primary producers, workers, organizations related to primary production, and the Department of Agriculture. In association with the Council are a parliamentary advisory committee and a technical advisory committee. There are also commodity subcommittees representing the various primary-production industries.

The District Councils of Primary Production, comprising representatives of workers, farming, commercial and departmental interests, deal with problems affecting the local conditions and put into effect the recommendations of the National Council. Co-ordination is effected through the district and local organizers, who are members of the Fields Division, and receive instructions through the Director of Primary Production, who is also Director of the Fields Division.

The function of the Council is to advise the Government through the Minister of Agriculture (the Minister in charge of primary production) on the specific direction of farm production in order to maintain, increase, or to modify primary production.

## ARABLE CROPS.

In Canterbury the main crop of wheat was sown under ideal conditions and came away well. The acreage sown, however, was not sufficient, and when war broke out an appeal was made for additional areas of spring wheat to be sown. Farmers made a wonderful response to this appeal, but dry weather was against the best results. On the whole, however, these spring-sown crops were not poor, and added many thousands of bushels to the wheat yield. The good results are attributable to a timely rainfall experienced in Canterbury towards the end of November. "Take all" and foot-rot was noticed in places, but the season passed with much less disease than usual. The wheat this season was in most cases hard and generally of good quality, but, with the type of season experienced, thin and pinched grain was met with in the dry light-land areas. It is estimated that at least 70 per cent. of the wheat on the plains of Canterbury was harvested with the header this season, and one outstanding feature of the harvest was the fact that from Marlborough to South Canterbury the harvesting operations were in hand at the same time. This is unusual, as South Canterbury is generally at least a fortnight later than the northern district.

As regards yields, that portion of the wheat crop harvested during the months January-March, 1940, according to returns received from threshing-mill operators up to 22nd April showed that 191,712 acres of wheat threshed returned a total yield of 5,917,258 bushels, the average yield per acre being 30.87 bushels. This actual yield is lower than the estimated yield of 33 bushels per acre. For the season 1938-39 the actual total area of wheat threshed was 189,281 acres, and this, with an average per-acre yield of 29.40 bushels, gave a total yield of 5,564,136 bushels. For 1939-40 the estimated area of wheat for threshing is 253,700 acres, and, as indicated above, the per-acre yield from that portion of the crop already harvested is 30.87 bushels. Thus a considerably larger quantity of locally grown wheat will be available in the Dominion this year.

The oat crop on the whole was satisfactory, although a slightly decreased area was sown. The crop made good growth in the South Island districts where it is grown, but broken weather was experienced about harvest-time and some crops were rather badly lodged. The area from which oats were threshed for the previous five seasons averaged 20 per cent. of the total area under crop. Assuming that a similar proportion is threshed this year, the total yield of grain should be approximately 2,240,000 bushels, as against 2,604,817 bushels for the season 1938-39. The estimated area in oats for 1939-40 is 254,000 acres.

The barley crop is threshing out very well and the grain is of good quality. Barley, estimated at 36 bushels per acre, is expected to yield 4 bushels per acre less than last season's harvest produced. This grain averaged 36.05 bushels over the last ten years. If in 1939-40 a similar average proportion of the total barley area is threshed as was the case in the five preceding seasons, the total yield should be approximately 870,000 bushels, compared with 1,076,774 bushels for 1938-39. The estimated area in barley for 1939-40 is 31,500 acres.

#### POTATOES.

The area in potatoes in the season of 1938-39 was actually 18,032 acres, and the estimated area for 1939-40 is 19,800 acres, an increase of 1,768 acres. The crop for the past season was very good, with a high average yield over the whole Dominion, even allowing for the light crops in drought-affected areas. Most potatoes are still to be lifted, and it is estimated that there will be more than sufficient to meet the Dominion's requirements, and probably a surplus of approximately 8,000 tons to 10,000 tons.

The 1939 season proved an exceptional one for potato-growers, as prices reached levels higher than for some twenty years. The acute shortage may chiefly be ascribed to reduced plantings and to extremely dry summer and autumn weather in the principal producing districts, this resulting in very light yields of table-sized potatoes. Prices advanced steadily during the winter months, and reached extreme values during the spring, when f.o.b. price was up to £22 per ton. For the first time since 1918 it became necessary to import potatoes from Canada, and several shipments, amounting in all to approximately 1,000 tons, were landed from Vancouver during September-October.

#### ONIONS.

Several meetings of the Onion Marketing Advisory Committee were held during the year, and careful records were kept of the production and sale of onions. The year was one of the best on record for onion-growers, as it presented the rare combination of high yields with high prices.

Owing to severe drought conditions in Australia a very brisk demand for New Zealand onions was experienced from Sydney merchants, and prices commencing at about £9 per ton f.o.b. moved up rapidly to £18 to £20 per ton. Realizing the importance of maintaining grading standards for exported produce, the Government decided to make the export of onions subject to inspection by officers of the Department at the port of shipment for grade, packing, and freedom from disease. This system worked most satisfactorily, and reports from Australia on the quality of shipments received were most favourable. The total export amounted to 5,056 tons, of a declared value of £74,132, thus adding quite appreciably to the Dominion's export trade. The price of onions on the local market fluctuated around the export parity, and as a result of such high prices the demand dropped to only about 50 per cent. of the normal winter consumption. Importation of onions was under the control of the Director of Internal Marketing, who found it necessary to import approximately 700 tons from Japan in order to secure supplies in September and approximately 600 tons from Canada for the later spring months. The quality of the Japanese onions was somewhat variable and necessitated picking over of a considerable proportion after arrival. As in former years, the standard of the Canadian pack was very satisfactory.

#### MALTING BARLEY.

The Barley Advisory Committee has continued to function most satisfactorily in presenting to the Minister the views of both barley-growers and maltsters. As a parallel to the price fixed for wheat, the prices of the various grades of malting barley have remained unaltered for the 1939-40 crop, and it can reasonably be assumed that the prices paid in the various barley-growing districts are considered satisfactory by growers since the buyers of this grain experience an insistent demand for contracts. The 1939 harvest produced sufficient for the season's malting requirements, but the 1940 harvest has not been up to expectations owing to the light yields from a proportion of the crops, and it is possible that the total crop will be insufficient for the maltster's requirements until May-June, 1941.

#### FEED BARLEY.

Particular attention has been devoted to securing adequate supplies of feed barley for North Island pig and poultry raisers. A substantial purchase was made by the Director of Internal Marketing in November, and this is being sold to consumers on the basis of 3s. 4d. per bushel ex wharf. This low price has greatly stimulated the demand and has led to a much wider use of barley as a pig-food. The demand has been further increased by an acute shortage of pollard. Barley-growers in the South Island have benefited by being able to sell rejected malting barley at up to 4s. per bushel for feeding purposes. It appears probable that the sales of this grain will reach record figures during 1940.

#### OATS.

A considerable reduction occurred in the acreage sown in oats in 1939, partly no doubt on account of the appeals made for increased wheat-production. In parts of Canterbury drought conditions seriously affected oat crops, which in some cases were fed off by sheep, while in Southland and South Otago wet harvest weather and floods caused considerable damage to this crop. Oat-prices for early delivery have been the highest for a good number of years, and this has particularly been the case with Algerians and Duns. The former variety was in extremely short supply, rendering it necessary to import approximately fourteen thousand sacks from Australia for autumn-sowing requirements in the North Island. It appears probable that this quantity will be insufficient to meet the shortage and that further importations will be necessary. Farmers in the arable areas of the South Island might well be encouraged to grow additional acreages, particularly of Algerians, Duns, or Resistance oats.

## AGRICULTURAL INSTRUCTION AND EXTENSION.

By the appointment of extra staff during the past year the giving of more time to this important phase of the Division's activities has been rendered possible. The service to the farming community has been chiefly by personal visits to farms, although in most districts the number of lectures has been greater, and in this connection the introduction of cinema outfits has proved an attraction and usually ensures larger attendances at meetings, thus becoming a big factor in adult education in country districts. This instruction and extension service of the Division is much appreciated by the farming community, as is evidenced by the ever-increasing requests for advice. There has generally been an increased demand for lectures and field-days, particularly in regard to such meetings organized by the young farmer's clubs and branches of the New Zealand Farmers' Union.

## EXPERIMENTAL FARMS AND AREAS.

The Ruakura Farm of Instruction, in the Waikato, passed from the control of this Division in April, 1939, when the Animal Research Division was created. The new Division took over the farm, which is now designated an Animal Research Station. The Farm Training College section was, however, retained by the Fields Division, while certain experiments are being conducted co-operatively between the two Divisions, the degree of co-operation working admirably for all parties concerned.

The experimental farms and demonstration areas, seven in number, which are established in various districts throughout the Dominion continue to operate largely under the guidance of this Division. Most of these farms are not controlled by the Department, but by a committee comprised of members representing agricultural interests in the districts. In consideration of the demonstration work conducted, the Department makes an annual grant to the body responsible for the management of each place. A considerable amount of the work has been of a highly technical nature for some years past, and this position continues.

In previous reports I have stressed the need for an experimental farm in the South Island. Up to the present, unfortunately, its establishment has not eventuated, and with the outbreak of war there appears to be no option but to let the matter stand over until times are normal again.

## FLOCK HOUSE.

The Flock House property, near Bulls, was acquired in 1937, and is conducted by this Division for the training of lads in agriculture, accommodation for approximately fifty being available.

The lads must be between fourteen and a half years and eighteen years at entry, and are given a full year's training in farming practice. They are then placed in employment with approved farmers.

This institution continues to do good work in the training of youths, and with the efficient staff there it is felt that the community should take fuller advantages of the facilities offered for training youths in farm handicraft.

## FIELD EXPERIMENTAL WORK.

Although the number of field experiments being carried out during the period was 868, in addition a number of experiments planned for last spring were not laid down owing to the extra calls on Instructors under war-time conditions. The work now in progress provides information either for the Fields Division officers generally or is carried out in collaboration with specialist officers of the various branches of the Plant Research Bureau, Wheat Research Institute, and Animal Research Division. A complete summary of trials follows later.

## DESCRIPTION AND PROGRESS OF EXPERIMENTS.

1. *Grassland.*

(a) *Mowing Trials.*—At Marton Experimental Area the seven trials under the alternate mowing and grazing technique were continued, and of these the one on pasture harrowing was discontinued towards the end of the period under review and results written up for publication. Two other experiments in which various strains of rye-grass and red and white clover are being investigated under this technique will be finalized during the current year. An experiment to investigate the effect of silico-superphosphate in comparison with other phosphates was laid down, and measurement is by mowing only and clippings returned to the plots from which they were obtained. In addition, a trial designed to provide production figures from various species under appropriate management was established, and measurement carried out by mowing areas in movable enclosures. New trials planned for the current year include a comparison between silico-superphosphate, superphosphate and lime plus superphosphate where differences will be measured by mowing of enclosures, and this trial will be repeated in another field on the area.

At Ruakura the three mowing and grazing trials on major soil types and the comprehensive experiment designed to test the validity of the mowing and grazing technique are being continued. The drastic harrowing of *paspalum* is also being investigated.

The rate-of-growth trials at Ruakura and Gore's farm, at Karamu, were discontinued during the year and, although originally designed for a longer period, provided very useful information. At Gore's a similar experiment is in progress on another area. Herbage dissections are being carried out by the Grasslands Division, and these enable the production of the main pasture species to be measured. This type of trial where production is measured from areas enclosed by movable frames is also being carried out at Levels, where irrigated are being compared with non-irrigated pastures. Similar information will be secured from the Winchmore area this year.

In addition to the above trials, further experiments under this technique are planned on pastures on the Stratford Demonstration Farm and Winton Experimental Area, while another is projected on the farm at the Peilding High School. From data already secured it would appear that extremely useful information should become available from a series of these trials under varying conditions of climate and pasture management.

(b) *Observational Topdressing Experiments.*—Observational trials on pastures number 392, and these are principally of the routine type in which the effects of phosphate, lime, and potash are being investigated on various soil types. Officers of the Soil Survey Division are now mapping the major soil types throughout the North Island, and with the more accurate classification rendered possible in this way the mapping of "response areas" providing very useful information is projected. In addition to "Heskett" slag, trials have included the proprietary "K-Phos," "Kotkur," and compounded slag on hill country. On the known high-phosphate-fixation soils, twenty trials were laid down in which silico-superphosphate, which is a 3 to 1 hot mix of superphosphate and ground serpentine, was compared with superphosphate and superphosphate plus lime. It is of particular interest to note that progress reports indicate that responses to the new form of top-dressing appear most obvious on the soils where potash gives best results, and also that the ninety parts per million of cobalt contained in the serpentine have appreciably affected the uptake of the latter as shown by analyses of pasture samples. Present indications therefore point to a possibly greater use of this form of reverted superphosphate, in which the magnesium cobalt and silica may all play an important part in plant nutrition. An additional sixty observational top-dressing trials incorporating silico-superphosphate are planned for the coming year.

(c) *Demonstration of Grass and Clover Strains.*—Information of particular value is obtained from these experiments, which are carried out in collaboration with specialist officers of the Grasslands Division of the Plant Research Bureau. Trials of this type incorporating new strains brought out by the above and also imported species have been laid down throughout most of the districts in the Dominion, and future areas will be laid down only under special circumstances. Results secured to date are being written up for publication by officers of the Grasslands Division.

(d) *Grazing Trials.* The two trials on the Winton Area are being continued, and on the first, where certified is being compared with uncertified rye-grass, the total sheep-grazing days per acre shows that the former has approximately a 50 per-cent. increase over the latter. In the second trial, where certified rye-grass is compared with uncertified from Southland, the production of wool and lamb as well as sheep-grazing days are being secured. Progress reports on this experiment have been published each year in the *Journal* of this Department.

On the Marton Area the investigation into the effect of grazing management on the persistence of white-clover types was continued, and the rotationally grazed area is showing superiority in sheep days per acre over the continuously, and this is ahead of the loosely grazed fields. This trial will be finalized this year and results written up for publication.

During the year a comprehensive grazing trial was commenced on the Manaia Demonstration Farm, where half the holding was top-dressed with superphosphate and the remainder with basic slag. As each was run as a separate unit and accurate figures comparing the milk and butterfat production from the two herds, young stock carried, and winter feed saved, the trial promised to be of particular value.

(e) *Subterranean-clover Trials.*—These experiments are being continued, and a number of new trials were established on both ploughed and surface-sown areas during the year. While no definite statement could be made at this juncture, it should be possible in the near future to outline the conditions under which this species will prove profitable in farm practice. Useful information is being obtained also from the strain trials established in a number of districts under varying soil and climatic conditions.

(f) *Feed-flavour Investigation.*—Although detailed studies in connection with this problem are being carried out by the Animal Research Division and Dairy Research Institute, a number of trials in connection with the control of cress in pastures were laid down in the Tauranga instructorate, when it was shown that efficient cultivation and the sowing of seeds of good type followed by good grazing management would reduce the weed. Additional trials are planned for the current year.

(g) *Hill-country-pasture Deterioration and Soil Erosion.*—The trials in progress last year were continued, and the experiments involving the introduction of legumes and new pasture species are providing useful information. Additional areas will be established in the Balclutha instructorate, where species will be introduced by surface sowing following light burns.

Exploratory trials in connection with slip erosion have been laid down during the year, and those in progress in the previous season have been kept under observation. Where so many factors are involved it would appear that the matter of establishing and maintaining a dense sward of suitable pasture species must be regarded as an adjunct to a long-range programme rather than as providing a practical solution to the problem.

The pampas-grass trials are being kept under observation, and, while this fodder may provide useful winter feed on areas which can be cultivated, particularly in the early stages of establishment, it would appear of doubtful value on the hill country generally. On the latter areas, if it can be well established on the easy parts on workable land, it will undoubtedly be a considerable asset in wintering the run cattle which are so important in pasture and weed control.

(h) *Grassing of Depleted or Intractable Areas.* Trials on the Pisa Flat area in Central Otago have been continued in collaboration with the Botany Section of the Plant Research Bureau, and a number of new species from other similar regions outside the Dominion have been established. The area was subdivided during the year, and a study of the various species under controlled grazing has now become possible as a preliminary to the establishment of the most suitable ones under field conditions.

Experiments in the ironstone soils, except those in which silico-superphosphate and ground serpentine are being top-dressed, have been discontinued.

2. *Annual Crops.*

(a) *Wheat Varieties.*—Eleven experiments with wheat varieties were carried out in collaboration with the Wheat Research Institute, and in these new varieties and newly developed crosses were mainly concerned. Four trials in which hessian-fly and stem-weevil infestation were studied were laid down in collaboration with the Entomological Division of the Plant Research Bureau.

(b) *Oats.*—Two oat variety trials were carried out in collaboration with the Agronomy Division, Plant Research Bureau, and these included the varieties Abundance, Marton and Anthony. Owing to bird damage only one trial was harvested, and no significant differences in yield were obtained.

(c) *Barley.*—Three experiments on barley varieties and manuring were carried out, but as malting tests have not yet been completed final results are not available.

All cereal trials were harvested by the new "sampling" method, in which samples were cut from each plot and bulked for threshing, while these results were checked by the usual method of whole-plot harvesting on three areas. If found successful in providing reasonably accurate data the whole matter of harvesting cereal trials will be simplified, as well as being less expensive and more convenient than was the former method.

(d) *Potatoes.*—Two variety trials were carried out at Ohakune and Taieri, but the outbreak of war precluded the laying-down of a number of projected manurial trials. Two of the latter have been established on early crops, and six additional ones are projected on main-crop potatoes for the coming season. Plans for variety trials have not yet been finalized.

(e) *Turnips, Swedes, and Rape.*—Two manurial trials in which various lines of "reverted" superphosphate and silico-superphosphate were used were laid down, but both crops failed owing to weather conditions. Seven trials with swedes in which varieties were examined for yield and palatability were carried out in the King-country.

Five experiments to investigate the merits of varieties from the point of view of club-root resistance were laid down, and two others where manurial preparations were supplied by Dr. Gibbs, of the Plant Diseases Division, were completed. Present indications suggest that the inclusion of mercuric chloride solution will be of value in club-root-infected areas. On the Marton area a hand-sown trial, including a number of treatments with borax and other ingredients to control mottle-heart without adversely affecting germination, was completed.

Rape varieties were included in three trials, in two of which the club-root-resistant strain supplied by Dr. Gibbs were compared with standard varieties. In the third experiment, rape-seed harvested with grass-seed was sown in comparison with normally produced lines.

(f) *Sugar-beet.*—Only two variety trials were laid down, this being due to the fact that two lines of special seed from Germany were not available. The information supplied to the Bureau of Industries from previous trials was incorporated in the report prepared by Dr. Hayek, on whose recommendation the experiments with German high-sugar-content varieties were planned.

(g) *Linon Flax.*—In collaboration with the Agronomy Division forty ecological trials were laid down, and on completion of these it should be possible to indicate the most suitable districts on which seed and fibre can be produced commercially. The variety Liral Crown was mainly sown, but for the coming season Liral Prince, Giza Purple, and Stormont Cirus will be tried out if seed is available. A number of drilled manurial trials are also projected.

(h) *Onions.*—Methods in control of onion-smut in Canterbury were investigated in three trials in collaboration with the Plant Diseases Division, and in these the formalin treatments appear fairly successful. Three manurial trials, one of which investigated the matter of placement at seed level and below the seed, were also established.

(i) *Maize.*—As a considerable number of maize varieties have been grown under various conditions in previous years and a considerable amount of information has been collected, only one variety and one manurial trial were laid down. Both of these are in the Dargaville district, and it is proposed to publish a comprehensive statement on maize-growing in the near future. Future trials will be mainly concerned with manurial treatments.

(j) *Peas.*—Two trials in which varieties suitable for lamb-fattening were included were laid down, but final results are not yet available.

(k) *Miscellaneous Crops.*—Three trials with Hungarian millet to investigate the possibility of growing bird-seed on a commercial scale were established, but results are not yet to hand.

In collaboration with the Agronomy Division a number of small areas were sown with *Perilla ocymoides*, while in two localities plots of hemp (*Cannabis sativa*) were established.

At Marton a small area was sown in sweet yellow lupins for seed-production for future field experiments.

3. *Miscellaneous.*

(a) *Pampas-grass.*—Observations were continued on a number of farmers' crops of this grass on both dairy and hill-country holdings. Provided good establishment is followed by efficient weeding and management, especially in the early life of the stand, this species is promising to be of value as a supplementary winter feed in certain districts.

(b) *Ragwort-eradication.*—Most of the detailed investigations have been concentrated at Ruakura and results are being published. A certain number of field trials are being carried out in the Auckland District, where pasture establishment in ragwort-infected areas and the control of the weed by spraying are being investigated.

(c) *Pig-feeding Experiments.*—A number of trials at Ruakura have been transferred to the Animal Research Division, but one investigation was completed on the Dargaville Demonstration Farm, where a further experiment is planned for the coming season. On the Manaia Demonstration Farm trials with sugar-beet were repeated, and the value of this fodder was economically demonstrated.

(d) *Other Trials.*—On the Stratford Demonstration Farm, where half the holding was devoted to sheep on the Phillips system, the number of ewes was increased to four hundred on 64 acres, and this demonstrated the possibilities of this departure from dairying entirely in times of relatively low returns from butterfat. Under present price conditions it is proposed to return to all-dairying over the whole farm.

Other investigations not classified above include trials on the eradication of various weeds and trials on grass-seed production.

#### 4. General.

While officers of the Fields Division are called upon to undertake special duties under war-time conditions, it is becoming increasingly obvious that investigational work expands in these times of necessity. This is reflected in the increased number of manurial trials planned for the coming year, largely necessitated by the urgent need for information regarding substitutes for imported and other fertilizers not now readily available.

*Summary of Experiments laid down, discontinued, and carried on, 1st April, 1939, to 31st March, 1940.*

Type of Experiment.	As at 1st April, 1939.	Discontinued during Year.	Laid down during Year.	As at 31st March, 1940.
1. Pastures—				
(a) Mowing trials .. .. .	18	2	2	18
(b) Observational top-dressing .. .. .	441	148	99	392
(c) Strain trials .. .. .	129	46	14	97
(d) Grazing trials .. .. .	4	6	6	4
(e) Pasture establishment or management .. .. .	30	14	5	21
(f) Subterranean clover .. .. .	127	25	37	139
2. Crops—				
(a) Wheat-manuring .. .. .	8	8	1	1
(b) Wheat variety .. .. .	10	10	11	11
(c) Oats .. .. .	4	4	2	2
(d) Barley .. .. .	7	7	3	3
(e) Potatoes .. .. .	14	14	2	2
(f) Brassicas .. .. .	17	19	22	20
(g) Sugar-beet .. .. .	5	5	2	2
(h) Maize .. .. .	6	6	2	2
(i) Linen flax .. .. .	61	61	40	40
(j) Onions .. .. .	8	8	6	6
(k) Other crops .. .. .	3	3	5	5
3. Miscellaneous—				
(a) Pampas-grass .. .. .	53	8	1	46
(b) Ragwort control .. .. .	56	41	11	26
(c) Control of other weeds .. .. .	9	6	1	4
(d) Miscellaneous trials .. .. .	18	2	11	27
4. Stock trials transferred to Animal Research Division	23	23	..	..
Totals .. .. .	1,051	466	283	868

#### SEED CERTIFICATION.

The activities of the seed-certification scheme throughout the Dominion provide one of the most important functions of this Division, particularly in those districts where the harvesting of grass, clover, and small seeds, seed wheat, and seed potatoes provide an appreciable contribution to the livelihood of the farming community.

During the 1939-40 season more than three thousand actual areas have been inspected for purposes of certification, while return visits to most of these areas have also been made. Thus, while the certification of seed primarily gives a direct benefit, the value of the scheme in an indirect manner as an opportunity for closer contact with and increased advisory service to the farming community cannot be overlooked.

The activities of the seed-certification section include, in addition to the usual seed-certification operations, the production under contract and the disposal of certified Government stock grass and clover seeds, the contract growing for fibre and seed purposes of linen flax, and the close supervision of the production of special seeds such as rape.

*Multiplication and Distribution of Government Stock Seeds.* The following acreages, sown with nucleus stocks of strains of grasses and clovers selected by the Grasslands Division of the Plant Research Bureau, are at present under a system of contract to the Department for the production of certified Government stock seeds:—

	Acres.
Perennial rye-grass .. .. .	76
Italian rye-grass .. .. .	44
White clover .. .. .	74
Red clover .. .. .	30

The produce of these areas will be distributed through the recognized commercial channels, and will be used primarily in order to further multiply supplies of seed of these improved strains. In line with this programme there were distributed from the areas harvested under contract in 1939 the following quantities of certified Government stock seeds: Perennial rye-grass 1,000 bushels; white clover 2,000 lb; Montgomery Red clover, 250 lb.

*Linum Flax.*—Experiments in the past few years having demonstrated the feasibility of the production of linen flax in this country, steps were taken last season to produce this material on a commercial scale. With this object in view the Division arranged with farmers in North Canterbury and in Marlborough to grow under contract 325 acres of linen flax. Excellent results have been obtained from the 100 acres established in the latter district. The seed from these very fine crops is now being separated preparatory to the treatment of the straw to obtain therefrom the linen flax.

Owing to extremely adverse weather conditions in North Canterbury the areas sown in this district proved not so successful. Nevertheless, valuable quantities of seed have been obtained which will be utilized in a further extension of the industry. All the crops sown were inspected in order that the seed produced might be recognized as certified, while close co-operation with the contracting growers has led to the harvesting of crops of the best possible quality.

*Brassica Seed.*—This Division is responsible for the supervision entailed in the multiplication of the improved strain of rape-seed raised by the Agronomy Division of the Plant Research Bureau.

In this connection official certification was extended to the rape-seed produced on 300 acres in the past season. An excellent harvest was experienced, yields of up to 1,600 lb. of seed per acre being recorded, and in all approximately 150 tons of certified seed were produced. This seed, together with the carry over of imported seed, will be sufficient to meet requirements for next season's sowings. In order that future supplies of rape-seed might be safeguarded, 1,000 acres have already been sown for the production of certified seed in the next harvest season.

The position in regard to the production of turnip, swede, and chou moellier seed is also under investigation. In the meantime a considerable area has been sown to turnips and swedes with the intention of producing these seeds under Government supervision.

*Perennial Rye-grass.*—Approximately 13,000 acres saved for the production of perennial rye-grass seed were inspected with a view to recognition of the produce as certified seed. This figure is an increase of 1,000 acres over that for the previous season. In addition, approximately 40,000 bushels of seed from this season's harvest have already been accepted for certification per medium of the ultra-violet-light test. This quantity will be considerably increased as further lines of seed are machine dressed.

It is interesting to note that during the autumn and spring of 1939 there was on the market a quantity of perennial rye-grass seed of pedigree strain approximating 30,000 bushels. A very considerable proportion of the 13,000 acres intended for certification this season is representative of this type.

*Cocksfoot.*—A decrease to 7,250 acres in the area of cocksfoot-seed entered for certification has occurred. The reduction, amounting to approximately 1,300 acres, is due almost entirely to the reduced acreage on Banks Peninsula which is being harvested for seed this season. It is expected that seed yields in the 1939-40 season will be considerably below those experienced in the previous harvest.

*Brown-top.*—Certification now applies to at least 75 per cent. of the total brown-top seed harvested. The quantity of seed certified during the period under review, 230 tons, was the highest on record for any one season. Most of the seed certified finds a market overseas.

*Italian Rye-grass.*—There is need in most farming programmes for a really good strain of Italian rye-grass, and this demand is being met by the supply of certified seed. The area under certification is increasing, and reached a total of nearly 1,500 acres during the present season. Owing to crop failure it has not yet been possible to make any distribution of Government stock seed of an improved selection from the certified strain. The Department has recently arranged for the contract growing of 44 acres of this selection, however, and the release into commerce of this strain will be welcomed by farmers.

*Phalaris tuberosa.* The production in New Zealand of *Phalaris tuberosa* seed is making little headway owing to the combined difficulties of erratic seed yields and low germination percentages. Experience in the handling of this plant for a seed crop is being obtained, however, and those persevering in this industry are hopeful that the difficulties will be overcome. In the present season 80 acres are under certification.

*White Clover.*—During the past twelve months over 500,000 lb. of white-clover seed have been accepted as certified seed following the application of the necessary tests. It is of interest to note that, whereas in the 1937-38 season 15 per cent. of the seed then certified was classified as of mother standard and the balance as of permanent-pasture standard, in the present season the proportion of mother seed (using the same standards) has increased to 35 per cent. Actually in the last three months

this figure has increased to over 50 per cent. This is certainly an indication that a definite improvement in the strain quality of white-clover seed is taking place, even within the scope of the seed actually being certified.

*Red Clover: (a) Montgomery:* During 1939, 65 tons of Montgomery red-clover seed were sealed and tagged as certified. This is a very considerable increase over any previous seasons' harvest of certified seed, yet the supply is still insufficient to meet local demands.

The figure of 2,200 acres entered in the present season is considerably above the 1938-39 entry of 1,300 acres, though less favourable yields this season will result in little, if any, increase in the total production of certified seed.

A few areas, some with Government stock seed distributed in 1938, have now qualified for certification, and from these areas seed classified as "pedigree" will shortly be available for the first time.

*(b) N.Z. Broad:* Commenced last season, the certification of New Zealand Broad red-clover seed is being continued, with a total of 350 acres producing seed this autumn. In the meantime the scheme of certification provides that the seed in question is genuinely of the type commonly known as "New Zealand Broad." As with other seeds, however, it is anticipated that seed of a selected strain will be available for distribution before long, thus giving added emphasis to the advantages derived from the use of certified seed.

*Seed Wheat.* The acreage of wheat inspected this season (10,000 acres) was the highest on record and was almost twice the acreage inspected a year previously. The acreage qualifying on field inspection shows a corresponding increase to 5,760 acres.

Three varieties deserve special comment. Five hundred acres of the recently released Tainui wheat have been sown out and offered for certification. Marquis appears in the list of varieties for the first time in a number of years. The crops concerned were sown with seed wheat especially imported in 1939, and the action taken has resulted in the re-establishment of this variety into commerce.

A reselection of College Hunters, a variety which of late years has been almost entirely replaced by Hunters II, was distributed in 1939, and several crops sown with this seed have been entered for certification.

*Seed Potatoes.* For the first time in several seasons the acreage of potatoes entered for certification has shown a reduction on that entered in the preceding season. During this season 3,300 acres were inspected, this being a decrease of 400 acres when compared with the 1938-39 area. While a saturation point in regard to this crop, as in regard to other crops, is to be expected, it is considered that the present falling off is due rather to the acute shortage and consequent high prices of potatoes last winter. Many farmers were thus prevented from replacing their stocks with certified seed in order to make entry into certification, while on the other hand, farmers holding certified seed discovered that higher prices could be obtained by disposing of such seed for table use.

Another result of the potato shortage has been the large number of crops planted last spring with seed below 2 oz. in weight—seed commonly referred to as under grade.

While the use of such seed in the conditions existing was justifiable, a continuation of the practice will doubtless result in more rapid deterioration of the crops so produced.

*Onions.*—Following upon an investigation into the various varieties and strains of onions being grown in New Zealand, the Department has now undertaken to certify the seed harvested from areas planted with certain approved lines of Pukekohe Longkeeper onion bulbs. On account of the biennial nature of the onion, it will not be possible to certify any onion-seed until the 1944 harvest. In the meantime, however, the position is being met on part by a temporary scheme whereby certain onion-seed crops grown under departmental supervision have received approval for use for seed purposes.

Already the activities of the Division in respect of better-quality onion-seed have resulted in some improvement in the quality of onion bulbs marketed in the spring of the year. The introduction of full certification should increase this improvement and go far to make unnecessary the present practice of importing onions in the months of September to November.

#### SEED-TESTING.

For the calendar year 1939 a total of 26,150 seed samples were recorded for analysis, this number representing an increase of 5,359 on the previous year's total, and is an outstanding record.

Trade dislocation followed the Station's complete inability to provide prompt services, and for the first six months of the year the position was undoubtedly serious.

This position was met by the provision of additional staff and equipment in sufficient time to permit of staff-training prior to the 1940 season. It can now be reported with satisfaction that, notwithstanding a further increase in the number of samples received for the first quarter of the current year, all services are being provided with the required promptness. In this respect gratification has been expressed by seed-merchants and growers for the changed conditions.

The following are the numbers of samples worked for the requirements of the standard tests:—

Purity analysis	..	..	..	..	..	..	15,642
Germination tests	..	..	..	..	..	..	21,731
Ultra-violet-light examination	..	..	..	..	..	..	2,470
Picric-acid tests	..	..	..	..	..	..	1,949
							—
Total	..	..	..	..	..	..	41,792

an increase of 10,000 over 1939 figures.

*Ultra-violet-light Tests.*

Of the 2,470 examinations of perennial rye-grass seedlings, 759 were made as check tests of certified seed for the information of the Department; 844 on official drawn samples for the purposes of commercial certification, and 717 on trade samples preliminary to entry for commercial certification.

*Picric-acid Tests.*

Of the 1,949 tests, 1,616 were made in connection with the certification of white clover and 296 on trade samples preliminary to certification entry.

*Certified Seed: Purity inspection.*

A total of 3,329 samples were examined, and 315, or 9.4 per cent., rejected as not conforming to the required standard of analytical purity. The percentage of rejected lines is the highest yet recorded, but is not unexpected in a year of seed scarcity.

*Canadian Seeds Act.*

Approximately 400 samples were examined and certificates endorsed as prescribed by the Act and by authority of the Canadian Department of Agriculture for importation into Canada.

*Australian Seeds Acts.*

During the year an increasingly large number of samples were examined, and the possibility of conformity of the lines to Australian Federal Quarantine and the State Acts reported.

*Seed Certification on Laboratory Test.*

*Perennial Rye-grass.*—For the purposes of certification in the commercial class, officially drawn samples, representing 844 machine-dressed lines, entered for certification were examined under ultra-violet light. Of the total quantity of 154,571 bushels entered, 615 lines, comprising 120,485 bushels, conformed to the required standard and were accepted, and 229 lines, comprising 34,086 bushels, were rejected.

*White Clover.*—A total of 826 lines were entered and tested by the picric-acid method for certification entry.

Of the total 763,355 lb. of seed, 540 lines, equalling 506,804 lb., conformed to the required standard of test and were passed as certified seed, and 229 lines, comprising 256,451 lb., were rejected. Of the quantity passed, 151,731 lb. were classified as mother seed and the balance of 355,073 lb. as permanent pasture.

*Rye-grass-seed Crops: Disease Examination.*

A total of 371 green sheaf samples, representing standing crops, were examined for the presence of seed disease, and the approximate percentage of infected seed estimated. A standard form of report was issued giving the percentage of sound and diseased seed and the estimated percentage of germination to be expected for the crop when harvested. As a result of these examinations a number of heavily infected crops were not harvested for seed. This service is meeting with wide appreciation and will undoubtedly become permanently established.

*Chewing's Fescue: Moisture Content.*

With the introduction by the United States Government of a minimum standard of 75 per cent. germination for Chewing's fescue, some New Zealand exporters are taking precautionary measures in ensuring that the moisture content of all seed shipped is not in excess. As a result, a number of moisture-content determinations have been made and reported.

*Investigational.*

(1) *Low Germination of Perennial Rye-grass.*—(a) *Technique for Disease Inoculation:* A satisfactory method of experimental infection of large numbers of flowering plants being developed; seed-infection rates up to 80 per cent. were secured.

(b) *Examination of Green Sheaves:* Procedure and technique improved.

(c) *Crop Sampling:* Certain areas were specially sampled as a check on present sampling technique and to ascertain the extent of error, if any. The necessity for great care in field-crop sampling was demonstrated.

(2) *Wheat: Effects of Dry Pickling on the Germination of Wheat during Storage.*—The effect of dry dusting is apparently influenced by the condition of the grain, and it is evident that grain with a high moisture content is better not dusted before storage.

Marked delays in germination, both in germinators and in soil, occur in such samples, whereas, on the other hand, the germination of dusted well-conditioned grain after prolonged storage is unaffected.

(3) *Vernalization of Rape and Kale Seed.*—Continued from 1938 in collaboration with the Agronomy Division of the Plant Research Bureau. Difficulties were encountered in preliminary treatments, but sufficient success has attended the work as to warrant its continuance.

(4) *Chewing's Fescue*.—Seed-drying experiments have been continued in collaboration with the Department of Scientific and Industrial Research. Trial shipments have been made to Washington, United States of America, and the results of the American tests and observations are awaited.

(5) *Cheap Seed Mixtures*.—Intensive press advertising of cheap seed, mainly in mixtures, by several distributors lead to the collection of a wide range of samples representing seed either offered or delivered to farmers. In all cases the samples were found to be of very inferior quality, weed-infested, and priced above actual value. Publicity through the Department's *Journal* was followed by direct advisory action by field officers, with the result that the activities of the cheap trader have unquestionably been curbed. It is reported, also, that, in the areas most affected by the cheap-mixture trade, sales of high-grade and certified seed have markedly increased. Furthermore, from the direct inquiries received from farmers for reports and opinions as to the value and suitability of seed about to be purchased it can be assumed that the publicity given to the question of the use of inferior seed has been most effective. Although on a smaller scale, the cheap trade still continues, and is being assisted by the fact that prices for good, reliable seed, are so high.

#### Seed Trade, 1939.

*Export*.—For the year ended 1939, the Dominion exported approximately 2,300 tons of grass and clover seed, valued at £284,514, the quantity being about equal to that of the previous year, but the value shows an increase of £50,000.

Slightly less than half the total quantity was purchased by Australia, and one-quarter by Great Britain.

In view of the fact that 1939 was the third unfavourable seed-production year, and that with the outbreak of war trading was for a time disorganized, the season can be considered very satisfactory. The export prospects for the present year, in view of very high prices and seed shortages, are not particularly good.

*Import*.—A total of 520 tons of grass and clover seed, representing the lowest import for very many years, the bulk of it being accounted for by the items—

	Tons.
Red clover .. .. .	65
Subterranean clover .. .. .	147
Paspalum .. .. .	88
Timothy .. .. .	115

Approximately 400 tons of brassica seed, valued at £36,000, were also imported, both totals showing a substantial reduction on the importation for the previous year.

#### SEED-PURCHASING FOR GOVERNMENT DEPARTMENTS.

For the year ended March, 1940, 1,024 tons of agricultural seed, to the value of £110,000, were purchased on the open market for Government Departments. These figures are an easy record for this office and place the Department as one of the largest seed-buyers in New Zealand. It is of passing interest that, following a study of markets in August-September last year, 450 tons of grass and clover seed were purchased in one week in October for sowing autumn 1940.

The arrangement and completion of the purchase was not without difficulty, but this office has had the satisfaction of effecting a saving of approximately £6,000 on prices in January of this year.

Seed-markets remain very difficult, and it is hoped that advantage may be taken this year of large bulk purchasing at an appropriate time.

The following tabulation shows the extent of the purchases authorized, together with those for the previous year:—

	1938-39.	1939-40.
Number of requisitions .. .. .	739	740
Number of lines considered .. .. .	11,000	9,850
Number of lines accepted .. .. .	3,800	3,578
Total quantity—		
Grass and clover (tons) .. .. .	718	1,024
Cereals, &c. (bushels) .. .. .	4,754	2,620
Root seeds (lb.) .. .. .	10,507	9,868
Seed potatoes (tons) .. .. .	63	115
Total value—	£	£
Grass, clover and roots .. .. .	82,000	108,021
Cereals, &c. .. .. .	1,841	1,296
Seed potatoes .. .. .	424	1,414
	84,265	110,731

## LAND-UTILIZATION.

The major sections of the work in hand at the end of the previous year have been continued, and the rate of progress made has varied considerably.

*Primary Production in War-time.* A good deal of effort has been directed to assisting in the promotion of primary production in war-time—work that is the particular function of the National Council of Primary Production. The work done in this connection has been widely varied, consisting mainly of advisory and organizing activities. Herein the results from the various land-utilization investigations carried out in recent years have proved of marked value.

To further the major objectives in war-time farm production an advisory service under the auspices of the Council of Primary Production was inaugurated. This has involved close and extensive co-operation with district officers of the Fields Division, and resulted in statements containing the best available advice relative to farm practice and farm management under war conditions appearing regularly in daily newspapers. The statements have been accepted for publication by a gratifyingly large network of newspapers, including the majority of those with an important country circulation: at present thirty-five newspapers are co-operating valuably in this work.

*Land-utilization Survey in Hawke's Bay.* Substantial progress has been made in the land-utilization survey of Hawke's Bay, which is now approaching completion. In general the work during the year has been of a routine character: it has not been marked by any spectacular advances in our knowledge, the additional information that has been obtained serving mainly to further confirm prior deductions from the evidence previously available. Such confirmation has been valuable, this being especially true of top-dressing trials, which a year ago were too new to provide conclusive evidence. These trials are to be conducted for another year, which will make the total evidence obtained from them still more dependable as a basis of conclusions relative to the aspects of top-dressing with which they deal.

*Survey of Subterranean-clover Position in Canterbury and Otago.*—Two years ago a survey of the position of subterranean clover and its culture in Canterbury and Otago was carried out. The results of this survey were published in the *Journal of Agriculture*. Some of the findings necessarily were tentative or incomplete: some of the evidence then available was imperfect, and only the lapse of time would improve it as guidance to the role or culture of subterranean clover in the respective districts. In the year under review a survey of the subterranean-clover position in the same territory was made again and the subterranean-clover areas studied in the earlier survey were revisited, the special purpose of this being to take into account the development in the meantime. The survey has been completed and a report prepared for publication.

*Investigation of Canterbury Foothill Farming.*—The farming of large portions of the Canterbury foothill belt has given rise over a considerable number of years to difficulties both for the landholders concerned and for organizations which have undertaken the financing of these landholders.

The investigation work already carried out points to the conclusion that under the current relationship between farm costs and farm returns an objective which is financially attractive over a considerable extent of the foothill belt is the establishment of long-term pastures in which rye-grass and clovers continue prominent throughout. Measures which generally would contribute valuably towards the attainment of this objective are the sowing of high-grade strains of the pasture species mentioned and the regular top-dressing of the resultant swards from their establishment with phosphatic fertilizers. Quite often liming in addition would prove a vital factor in success; and in the areas of relatively heavy rainfall mole drainage installed efficiently along modern lines would be of value in the maintenance of more profitable pastures than as a rule are to be found in these areas.

*The Development of Flax (Phormium) Production on the Moutoa Area.* Considerable attention has been given to the development of flax (phormium) production on the Moutoa area, near Foxton, in the Manawatu district. The conditions in respect to soil and moisture supply obtaining on much of this area favour satisfactory commercial flaxgrowing, but the position is complicated by the presence of serious weeds, notably willows, blackberry, tall fescue, and goat's-rue (*Galega officinalis*), which, if not properly controlled, tend to be able to compete so successfully with the flax as to make it doubtful whether the growing of flax can be kept on a satisfactory commercial basis. While control of these weeds can be effected, just what are the most economic means of control has not yet been established, and attention continues to be given to the problems relating to this matter.

*Land-deterioration and Soil-erosion.*—Land-deterioration and soil-erosion, which in many instances are closely correlated, are viewed as matters of national importance, and as such have been given some close attention in preparation for a comprehensive investigation. The work up to date has been mainly exploratory, and a good deal of it was carried out in preparation for or in association with the sittings of the Sheep-farming Industry Commission, which were discontinued shortly after the outbreak of war.

The field evidence considered to date establishes the following main facts:—

- (1) Land-deterioration is widespread, differs considerably in type or direct cause, and varies greatly in intensity.
- (2) The progress of the deterioration can be checked wholly or partly by suitable modifications in farming practice: Some of these modifications would be economic, others would not be so, and of still others it is not known whether or not they would be economic.

The position as a whole is serious and calls urgently for the initiation of remedial action as soon as possible. Fundamental to such remedial action is a programme of investigational work in which

economic problems should be prominent. The carrying-out of such a programme would fill a gap not filled by the activities of any of the organizations already undertaking investigation of farming problems. Such a programme is contemplated, and when facilities for carrying it out are available attention will be concentrated at the outset upon the following matters because of the magnitude and urgency of the problems which they present:—

- (1) The high-country pastoral lands of the South Island.
- (2) The hill-country sheep-farming land of the North Island, and especially that part of it which is subject to serious deterioration.

#### YOUNG FARMERS' CLUBS.

Definite progress has again been made in the young farmers' club movement during the past year. This is apparent not only from the additional clubs and increased membership, but from the work and activities carried out by individual clubs and by the organization as a whole.

*Organization.* The aim during the period under review has been more in the direction of consolidating the movement rather than extending it. As would be expected, the war conditions have had an effect on activities generally, the benzine restrictions being the greatest handicap so far as club and district activities are concerned; recruiting has also depleted club membership, and in some cases labour shortages have discouraged members from taking part in activities. Despite these factors, however, the movement is still very much alive, and, although at the outbreak of hostilities it was considered necessary to suggest that many major activities should be curtailed, it has been noticeable that in many instances they have been undertaken at the wish of the members themselves and have been very well supported. A few clubs have gone out of existence, but they were definitely units that were in a weak condition prior to the beginning of the war. It is understood that the formation of one or two new clubs in various districts is contemplated.

The number of clubs has increased during the period by 20 and the club membership by approximately 1,000. At 1st April, 1939, there were 187 clubs throughout the Dominion, 71 being situated in the South Island and 116 in the North Island: the total membership was round about 5,000.

There are now 207 clubs in the Dominion—74 in the South Island and 133 in the North Island with a total membership of approximately 6,000 (active members) and an honorary membership of over 500. The average club membership is about 29. Membership varies, some clubs having only from 12 to 20 members, others between 40 and 60, while one or two clubs are particularly strong, having from 70 to over 100 members; the greater majority of clubs have a membership approximating 30.

A comparison of the number of clubs functioning to date with those in existence in August, 1936, when the present organization came into operation, is interesting:—

	August, 1936.	To Date.	Increase.
Number of clubs—			
South Island .. .. .	59	74	15
North Island .. .. .	27	133	106
Total number of clubs .. .. .	86	207	111
Total membership .. .. .	1,900	6,000	4,100

*Value of the Movement.*—All who have come in contact with the Y.F.C. organization have been impressed by its value to the youth of the farming community and to the Dominion as a whole. The movement is also of great importance to the Department and to the individual Instructors, to whom, as a means of contact, it is invaluable. The club members are realizing more and more the value of the Department's extension work; these young men are the farmers of the future, and they are at present taking full advantage of the assistance given by the Instructors, and will no doubt continue in later life to look to the Department for guidance in all matters pertaining to farming.

#### REGISTRATION OF FERTILIZERS.

The registration and certification of fertilizers and fertilizer-vendors was carried out as usual during the year. The Inspector of Fertilizers paid visits periodically to superphosphate-works and other premises where fertilizers are prepared, and samples of the various fertilizers were taken and the invoice certificates examined. A good deal of correspondence was dealt with from vendors, farmers, and State officials on various aspects of the fertilizer question.

In my last report I referred to experimental mixings of certain natural rock material found in New Zealand which, when incorporated with superphosphate, minimizes phosphate fixation. This was further developed during the year, and it appears that the product designated "silico-superphosphate" may prove to have considerable value.

Owing to war conditions many difficulties are arising in connection with supplies of fertilizers, and there are matters of greater moment for attention than the normal duties of an Inspector of Fertilizers. The industry must be kept under constant review, and everything possible must be done to serve the fertilizer needs of the Dominion with the object of having adequate supplies available for users.

## EXHIBITS AT SHOWS.

During the year the Department continued to stage exhibits at agricultural and pastoral summer shows and winter shows. It is not possible to comply with all the requests received for the staging of the departmental exhibit, but it is erected in all cases where arrangements can be made. These exhibits are of an instructive and educative nature, and are much appreciated in the many centres where they have been shown.

A feature this year of this phase of the Department's activity was the comprehensive exhibit displayed at the New Zealand Centennial Exhibition. The exhibit covered a considerable area of floor space, was a credit to the officers concerned, and received high praise from visitors from the various parts of the Dominion and overseas. The Department is indebted to several persons who put exhibits at its disposal for display.

## THE PHORMIUM INDUSTRY.

The production of phormium fibre shows a further decline this year. The amount of fibre produced was 10,645 bales, a decrease of 14,652 bales on the quantity produced the previous year, and 2,555 bales of tow were produced, a decrease of 5,165 bales. Locally the fibre is used principally for general cordage, woolpacks, and for incorporation in fibrous plaster material. During the year a survey of all flax areas of commercial value was carried out.

## DEPARTMENTAL PHOTOGRAPHY.

The photographic section continues to give good service to this division and other sections of the Department. Research institutions are also availing themselves of the services of the photographer. The class of work done at the studio is of a high standard, and the photographs make excellent exhibits for display at shows as well as for illustrations for the *Journal of Agriculture*.

## CHEMICAL LABORATORY.

The Department's Chemical Section was subdivided from April, 1939, into two sections, one more concerned with animal research, and the other dealing with fertilizers, soil fertility, mineral content of pastures, &c., attached to this Division. A total of 1,082 analyses of soils, pastures, crops, fertilizers, limestones, &c., were undertaken. The laboratory is, of course, an essential institution for departmental work, and it has given valuable service during the past year.

## STAFF.

I must place on record my appreciation of the continued loyal support of the staff of this Division, particularly for their cheerful acceptance of additional duties with the onset of war.

## DAIRY DIVISION.

### REPORT OF W. M. SINGLETON, DIRECTOR.

#### THE SEASON.

It is seldom that New Zealand experiences two unfavourable dairying seasons in succession, but in most dairying districts throughout the Dominion both 1938-39 and 1939-40 were climatically unfavourable to production. In the North Island the very serious shortage of feed for dairy cattle which resulted from the dry weather in the closing months of the 1938-39 season brought about a considerable reduction in the output at that period. As a consequence the amount of winter feed saved was considerably reduced, and such small stocks as could be saved had to be used in the autumn months, so that many dairy-farmers found themselves with insufficient reserves to carry stock over the winter. As a result there was a heavy mortality among dairy cows in the North Auckland - Bay of Plenty and Poverty Bay districts, and to a lesser extent in other areas also.

In some areas a prolific growth of clover in the spring also added to the number of deaths of dairy cows, up to 10 per cent. of the cows being lost in some herds. As a consequence of these losses production was affected over the whole season.

It was not until about December that weather conditions were favourable, and until January output showed a reduction in comparison with the corresponding period of the previous season. The good rainfall experienced in most dairying districts in December, 1939, however, resulted in an exceptionally heavy growth of grass, and it is many years since such favourable conditions for production have been experienced during the late months of the financial year.

#### QUANTITIES GRADED FOR EXPORT.

In terms of butterfat the quantity of butter and cheese graded for export during the year ended 31st March, 1940, showed a decrease of 4,176 tons, or 2.98 per cent., over the total butterfat represented in butter and cheese graded during the preceding financial year.

Creamery butter received for grading during the year under review amounted to 123,277 tons, and cheese 86,486 tons, as compared with 129,277 tons butter and 84,236 tons cheese for 1938-39, a decrease of 6,050 tons butter (4.67 per cent.) and an increase of 2,250 tons cheese (2.67 per cent.). The increased production of cheese may be accounted for by the diversion of five factories from the manufacture of butter and casein to the manufacture of cheese. This change was prompted by the poor demand for casein and the low prices offering.

Of the total amount of butter received for grading, 92,131 tons was produced in the Auckland Province, as against 92,501 tons during the previous year, a decrease of 370 tons.

#### EXPORT VALUES.

Including all dairy-produce—butter, cheese, casein, dried milk, sugar-of-milk, condensed milk, and cream—and basing export values on Customs figures, there was an increase of £451,748 in the value of this year's dairy-produce, the total values for the two financial years 1939-40 and 1938-39 being £22,907,700 and £22,455,952 respectively. Customs values are based on realization values.

The increase in total value in the face of a decrease in total quantity exported was due solely to the influence of the war. Until the end of August, 1939, prices on the Home market for both butter and cheese were lower than for the corresponding period of the previous financial year. The war, however, brought a change in the tone of the market, while the British Government's purchase price for both butter and cheese was at a level considerably higher than the level of prices ruling for the past two or three years. The net result was an increased average realization value for the twelve months in comparison with the 1938-39 financial year.

#### CREAMERY BUTTER.

The principal faults connected with butter quality may be traced to feed conditions, and, while feed flavour was very prevalent in the Auckland Province and to a certain extent in other districts during the early months of the season, it is probable that the quality for the later months has never been on a higher average level. Nevertheless, the improvement came too late to quite correct the falling-off in average grade in the early part of the season, with the result that the average grade for the financial year barely maintained that of the previous twelve months. The average grade of butter graded for export during the year ended 31st March, 1940, was 93.361 points, compared with 93.373 points for 1938-39. Of the 123,349 tons of butter received for grading, 100,175 tons, or 81.21 per cent., was classed as finest, 22,521 tons, or 18.25 per cent., as first grade, and 653 tons, or 0.53 per cent., under first grade.

Practically no unsalted butter was made during the year, the percentage being 0.16 of the total graded, as compared with 3.16 per cent. for the previous year. War conditions made it undesirable to continue the manufacture of unsalted butter for export, because such butter will not so satisfactorily withstand the long periods of storage likely to result from the dislocation of overseas shipping.

#### PH TESTING OF BUTTER.

This test, which serves the purpose of indicating the addition of excessive neutralizer to cream, has been continued at the various grading-stores. Tests carried out at Auckland numbered 2,366; Gisborne, 32; New Plymouth, 890; Patea, 32; Castlecliff, 145; Wellington, 936; Lyttelton and Timaru, 159; Dunedin, 109; making a total of 4,669, compared with 5,107 for the previous year.

The amount of pH testing of butter samples has been decreased during the last year or two, for the reason that as the result of this work the position regarding the neutralization of cream is much more satisfactory than formerly, and it is now rare to find samples which indicate excessive over-neutralization.

The number of bacteriological and chemical examinations was further increased, the total number of samples examined at grading-stores during the year being 4,104, in comparison with 2,526 for the previous year. The majority of the examinations were made at Auckland, where 2,086 tests were carried out. The figures for other ports were Gisborne, 31; New Plymouth, 871; Patea, 31; Castlecliff, 85; Wellington, 739; Lyttelton and Timaru, 203; Dunedin, 20; and Bluff, 38. A number of samples were also dealt with at Wallaceville.

#### PHOSPHATASE TEST.

The Division again co-operated with Mr. K. W. Griffin, Government Analyst at Auckland, and furnished him with a number of samples of butter for examination by the phosphatase test for the efficient pasteurization of the cream used in its manufacture.

#### TESTING BUTTER FOR MOISTURE AND SALT.

In keeping with established practice, all churnings of butter forwarded for grading were tested for moisture and salt. Moisture tests carried out at grading ports during the year covered 138,905 churnings, of which 0.27 per cent. were found to exceed the legal limit of 16 per cent. allowed by the Dairy Industry Act and were returned to the companies for reworking. The average moisture content of the churnings below 16 per cent. was 15.632 per cent.

Salt tests carried out during the year totalled 118,912 samples, and of these only 0.06 per cent. failed to comply with the regulations.

#### WHEY BUTTER.

The quantity of whey butter exported showed a slight decrease, the 1939-40 figure being 1,782 tons, as compared with 1,820 tons for the preceding year. Average quality showed a slight improvement, while a larger percentage qualified for the higher grade.

#### CHEESE.

Particulars of cheese sent forward for grading during the year under review, figures for the previous year being given in parentheses, are as follows: Total quantity received, 86,486 tons (84,236), of which 14,755 tons (14,672), or 17.06 per cent. (17.41), was graded as finest: 68,608 tons (67,080), or 79.32 per cent. (79.64), as first: and 3,123 tons (2,484), or 3.61 per cent. (2.94), below first. The average of all cheese graded was 92.065 points, as compared with 92.133 points for the year ended 31st March, 1939.

Cheese quality did not reach the same high standard during the early months of the season as during the previous year, although, as with butter, an improvement was shown as the season advanced. A contributing factor in both butter and cheese quality was the cool nights experienced, and in the case of cheese the comparative freedom from starter difficulties.

As no hot weather was experienced during the summer months, the injurious effect of high curing-room temperatures has not been much in evidence. New cork-insulated curing-rooms have been erected at several cheese-factories, the rooms being fitted with temperature and humidity control. The plants installed have worked quite satisfactorily, and the control of humidity in these rooms has practically eliminated mould growth.

Labour conditions in dairy factories remain much the same as in the previous season. A new award for dairy-factory employees has recently been granted and made retrospective to the 1st July, 1939, but conditions regarding hours and wages remain practically the same as under the previous award.

#### CASEIN.

There has been little change in the market for casein, with the result that only small quantities are being manufactured, although exports have shown an increase over last year. Gradings during the past year amounted to 177 tons, of which 113 tons was graded at Wanganui and 64 tons at Auckland. The previous year's total was 189 tons. The grading of casein, however, is not compulsory, so that grading figures provide no indication of production.

Customs returns give the quantities exported during the past three years as 2,270 tons, 1,626 tons, and 3,203 tons. Values were £86,581, £71,651, and £215,133.

#### REGRADING OF BUTTER AND CHEESE AFTER STORAGE.

The re-examination of selected representative samples of butter and cheese after a period of storage for the purpose of checking their keeping-qualities and the accuracy of the original grading has been extended during the year. Regrading at various grading-stores covered 207 churnings of butter and 189 vats of cheese.

These trials are of distinct benefit from the point of view of the study of defects due to lengthy periods of storage. They also enable a check on the original gradings, and it is reassuring to find that in the great majority of cases the original grading standards are confirmed.

#### CHECK-TESTING OF MILK AND CREAM SAMPLES.

Visits to dairy factories by officers of the Division for the purpose of checking the testing of milk and cream totalled 1,074, as compared with 1,044 during 1938-39.

#### SHORT-CREDITING OF BUTTERFAT TO SUPPLIERS OF SOME DAIRY COMPANIES.

Efforts have been made during previous years to reduce this method of injustice and unfair competition by bringing in regulations requiring certain procedure in the weighing and testing of milk and cream at manufacturing dairies. That unfair methods still persist at some manufacturing dairies is evidenced by the testing of butter and cheese for butterfat at the various grading-stores. From the butterfat recovered in the butter and cheese an estimate of the minimum number of pounds which should have been credited to the suppliers can be arrived at.

A method whereby dairy companies giving marked short credits would have to adjust their figures as appearing in their annual reports was brought before the National Dairy Federation's Conference in June, 1939, by the Director of the Dairy Division and is now under survey by the Dairy Industry Council. The giving effect to the suggestion would cause these dairy companies to add the estimated short credits to the butterfat credited to the suppliers for the year and use this total when figuring their yield of butter or cheese as per pound of butterfat, and also use the same total pounds of butterfat when figuring the price paid for butterfat for the financial year. This should eliminate some of the unfair competition as between dairy companies. It cannot, however, be brought into operation without legislation.

#### FARM-DAIRY INSTRUCTION.

This service, on which seventy-seven Farm-dairy Instructors are engaged, is now nearing the end of the second year since its extension to a Dominion-wide basis, and there is already ample evidence of its great value to the industry. Even in those districts where it was received in the first instance with a certain amount of reserve the services of the Farm-dairy Instructors are now welcomed, and an improvement in the quality of the milk and cream received at dairy factories is evidence of the value of the work being done.

#### INSPECTION OF MILKING-MACHINES.

Advices received by officers of the Division indicate that 4,394 milking-machine installations were made during the past financial year, as compared with 3,095 during the previous twelve months.

Attempts to improve milking-machines are still persisting, and seventeen new devices were submitted for inspection during the year.

#### DAIRY-FACTORY MANAGERS' REGISTRATION BOARD.

During the past year the Board dealt with 122 applications for registration, 99 certificates being granted. The number of certificated managers on the register now stands at 735.

#### INSPECTION OF NEW ZEALAND DAIRY-PRODUCE IN BRITAIN.

The three officers of this Division attached to the High Commissioner's Office in London continued their routine duties from the commencement of the financial year to the outbreak of war. The advent of control by the Imperial Ministry of Food created an interval during which certain necessary adjustments had to be made, and during that period assistance was given by our officers to the Food Ministry as requested. Later it was more fully recognized that this voluntary assistance was valuable in facilitating the smoother working-out of the Ministry's scheme in certain directions. The senior officer of the Dairy Division in London was then asked to become responsible for the classification of imported butters, so as to avoid certain difficulties which had been experienced by the sending to certain markets of qualities which were not suited to those markets. Mr. Taylor has the assistance of Messrs. Wern and Foy in connection with this work, and I am of the opinion that the selection of our London staff for this responsibility is a great commendation of their knowledge, efficiency, and integrity.

Not only are these officers rendering assistance to the Food Ministry, but they are so far making it convenient to continue their inspections of New Zealand butter and cheese, as is evidenced by the large number of reports which are received in Wellington and sent on to secretaries of dairy companies.

## DAIRY LABORATORY, WALLACEVILLE.

The number of samples dealt with to assist the Dairy Division's instructional staff during the past year shows a slight increase to not far short of 3,300. By the introduction of improved methods and organization during the past few years the number of samples dealt with has increased considerably. It would appear that a limit has been now almost reached, determined by the existing staff and facilities rather than by the need for extending this work in various directions.

As in previous years, the testing of butter samples for contamination has provided a large proportion of the bacteriological work. In addition to the regular testing of samples from Wellington and New Plymouth, some trouble has been taken to procure samples for testing from several of the smaller grading ports. The results indicate the need for continuing and extending this work.

For yeast and mould counts upon butter the roll-tube method has continued to be used so that greater accuracy, especially of low counts, can be obtained. A further improvement for obtaining more accurate mould counts has been successfully tried out. By the use of cylindrical bottles of suitable size, into which 1 gram portions of butter are weighed, direct mould counts upon 1 gram of butter can be obtained without involving the use of saline dilutions.

The number of cheese starters tested for contamination shows a slight increase. Too many of these starters are still found with a varying amount of contamination.

The number of water samples procured from butter-factories for testing has again further decreased as compared with the previous season. This is partly due to the ice-boxes required being used for other purposes.

It had been hoped during the past season to interest the dairy industry in the value of the Resazurin test for milk and cream grading, but the amount of progress to be recorded is again comparatively small. A few men who have made numerous trials of the test, especially for cream grading, have obtained useful results. This indicates that if the test were more widely known its value would be better appreciated.

The testing of butter for metallic contamination has again formed a large part of the chemical work in the laboratory. With a view to minimizing keeping-quality defects due to high copper content, an increased number of samples of butter have been tested for copper contamination. This work has shown that in most cases the copper content of New Zealand butter lies within satisfactory limits.

During the past winter arrangements were made, with the assistance of Mr. A. G. Frieberg at Auckland, to prepare a series of standard colour cards to be used for the pH tests upon butter at the grading-stores throughout the Dominion. Copies of these cards have also been supplied to the Butter Instructors to enable them to make tests upon buttermilk direct from the churn. A few results have been obtained which indicate satisfactory correlation between the buttermilk pH tests and the pH tests upon the corresponding butter done at the time of grading.

For many years past information has been collected and circulated from time to time to the Dairy Division's Instructors with a view to explaining the properties of various alkalies and detergents, in order to encourage the use of newer types of alkalies. From time to time samples of various cleansers in use in dairy factories have been procured for examination, and work of this kind can usually be dealt with in the winter when other work is less pressing.

Some attention has recently been given to a difficulty known as "oiling off" which occurs at certain times of the year in the composite samples at certain dairy factories. Various proposals have been investigated with a view to either preventing the occurrence of this trouble or obviating the difficulties which its occurrence gives rise to.

In addition to the larger groups of samples referred to above, a number of miscellaneous samples of various kinds have been dealt with. Various other matters which have arisen from time to time have received attention.

## ZONING OF CREAM- AND MILK-COLLECTION AREAS.

During the period under review the work of the Executive Commission of Agriculture in connection with the zoning of cream-collection and milk-receiving areas for dairy companies was continued.

In the Wairarapa district all the butter-manufacturing companies have now been allotted exclusive territories. On the West Coast of the South Island the remaining proprietary dairy company in that district has been purchased by a neighbouring co-operative company, and a boundary as between the West Coast companies and the Canterbury companies has been defined. In North Taranaki a boundary between two butter-manufacturing companies was fixed, thereby completing the zoning of that district. A number of requests from various districts for revisions of existing zoning orders were dealt with and, where necessary, alterations to zones were made. The Commission has also acted as arbitrator in a number of matters affecting neighbouring companies. A few amalgamation projects between co-operative butter-manufacturing companies have been set on foot and are under consideration by the companies concerned.

## CERTIFICATE-OF-RECORD TESTING.

The past two seasons have been unfavourable for high production records, with the result that fewer cows have been entered for the Division's certificate-of-record test.

During the calendar year 1939 first-class certificates of record were issued for 447 cows, as compared with 570 cows in 1938, 390 cows being in the yearly test division and the remaining 57 in the 305-day division.

The average production represented by first-class certificates in the yearly division was 499.02 lb. fat, a decrease of 5.68 lb. over the 1938 figure of 504.70 lb. fat. A decrease in average production was also shown in the 305-day test division, the average production for the fifty-seven first-class certificates issued in this division being 436.42 lb. butterfat, as compared with 451.13 lb. for seventy-three certificates issued during 1938.

#### GOVERNMENT OFFICIAL HERD-TESTING.

Entries for this branch of the Division's cow-testing service are well maintained, and for some time past have shown little variation from year to year. The Government official herd-testing year closes at the 30th September, and for the year ended at that date in 1939 cows tested numbered 2,111, a decrease of 73 cows over the previous season's total of 2,184. The number of testing breeders represented was 178, in comparison with 203 for the year ended 30th September, 1938. Average yield figures are taken out on the basis of cows which milk for 180 days or more, and on this basis 1,908 cows qualified with an average production of 303.57 lb. butterfat from 6,211.5 lb. milk.

Since the commencement of the system 23,098 statements of seasonal production have been issued for 15,790 cows, of which 7,308 have been tested more than once.

#### ORDINARY HERD-TESTING.

The herd-testing work for the Dominion as a whole is under the supervision of the Herd-recording Department of the New Zealand Dairy Board. The Dairy Division, however, still carried out "association own-sample" testing for a few odd herds. The figures for last year were 18 herds, comprising about 270 cows.

#### THANKS.

Thanks are again due to the staff for assistance rendered, and also to those organizations whose functions bring them in contact with the work of the Division.

## DIVISION OF HORTICULTURE.

### REPORT OF W. K. DALLAS, DIRECTOR.

#### THE FRUITGROWING INDUSTRY.

The 1939-40 season's apple and pear crop has been a somewhat variable one. In the Nelson, Canterbury, and Otago districts good average crops are being harvested, while in the other commercial fruitgrowing areas the apple crop is below average and pears light. Fair average crops of stone-fruits have been secured, and small fruits gave satisfactory returns.

There was, however, a reduction in the area planted in strawberries in the Auckland district, due to adverse weather conditions at planting-time.

In the Hawke's Bay and Gisborne districts heavy gales reduced the fruit crop to a considerable extent, especially apples and pears; and in the Etrick district, Central Otago, orchards suffered considerably as the result of a heavy frost.

A further increase is noticeable in the area planted in tomatoes, the crops being well up to the average.

The season's lemon crop is anticipated to be somewhat below the average. Owing to the inclement weather which prevailed during the winter months, the trees and crop received a severe check. A number of frosts and hailstorms experienced during the period also caused considerable damage to the fruit. Poorman oranges have produced fair crops.

The Government control of the marketing of lemons through the Internal Marketing Department came into operation on the 1st May, 1939. The scheme is proceeding satisfactorily, and further improvements are being effected in the curing and handling of the fruit.

The control of orchard diseases and pests has been reasonably well maintained and no serious outbreaks have occurred during the year. Brown-rot, however, continues to take considerable toll of stone-fruits, the production of which is rendered somewhat difficult by the presence of this fungous disease.

Fireblight has appeared in only a few isolated instances during the period under review and has been readily kept in check.

The reworking of unprofitable varieties of apples to better sorts has been carried on more extensively, and varieties not recommended for export are gradually being eliminated.

Several factors, including the incidence of war, have made it increasingly difficult for orchardists to secure the necessary experienced casual labour for fruit harvesting, more particularly in regard to packers and efficient shed hands, the employment of indifferent and inexperienced workers adding considerably to labour-costs.

A new avenue for the disposal of surplus stone-fruit has been made available in the Central Otago district by the establishment of a stone-fruit-drying factory. Although only still in the experimental stage, the results so far obtained have been such that every inducement has been given to the company concerned to pursue its operations further.

With a view to keeping the field officers in closer touch with the many problems affecting the work of the Division, a conference of Orchard Instructors was again held at Auckland in August last, and a refresher course also arranged in conjunction with the officers attached to the Plant Disease Division of the Department of Scientific and Industrial Research.

#### EXPORT OF FRUIT.

The unfavourable climatic conditions which prevailed during the 1939 growing period—heavy gales in the Hawke's Bay district and drought conditions generally—considerably reduced the quantity of fruit (apples and pears) available for export during the 1939 season.

The total quantity exported amounted to 1,051,261 cases (951,744 cases apples and 99,517 cases pears).

Of these, 602,253 cases apples and 73,215 cases pears were consigned to the United Kingdom, 203,973 cases apples and 992 cases pears to the Continent, 58,863 cases apples to North America, 63,600 cases apples and 25,310 cases pears to Sweden, 17,000 cases apples to South America, and 6,055 cases apples to the East.

The Government guarantee again applied to the 1939 shipments, the grower being guaranteed a c.i.f. return of 11s. (New Zealand currency) per case in respect of approved varieties of apples and pears graded and packed in accordance with the requirements of the fruit-export regulations for shipment to duly approved markets.

The inspection of fruit at the ports of shipment was carefully carried out by the Fruit Inspectors, and any lines not conforming with the export regulations were rejected. Considerable attention was also given to the loading and stowage on the overseas vessels, with the view of ensuring as far as possible the fruit arriving at its destination in the best possible condition.

The prices realized on the British markets for apples were, generally speaking, fairly satisfactory, and were in advance of those realized on the 1938 shipments.

The market for pears was, however, disappointing, considering the excellent condition of most of the lines. The position was prejudiced by heavy arrivals from the Argentine and the extension of the South African season well into the Australian and New Zealand season.

The quantities of fruit (apples and pears) exported from the Dominion during the last five years are as follows: 1935, 1,065,420 cases; 1936, 1,228,286 cases; 1937, 944,753 cases; 1938, 1,562,720 cases; 1939, 1,051,261 cases.

In view of the unsettled conditions caused by the war and the probability of it not being possible to obtain freight for the 1940 season export, the marketing of the fruit crop (apples and pears) was taken over by the Government at certain fixed prices to the grower according to grade.

It was eventually found possible to obtain space for the first shipment of 17,731 cases on the "Port Gisborne," which sailed for London on the 15th March.

It is hoped that further space will become available on other overseas vessels from time to time before the season closes.

#### LOCAL MARKETS FOR FRUIT AND VEGETABLES.

Owing to the lighter production of apples and pears for the 1939 season, prices realized for fruit on the local markets were well above the previous season's figures and were on the whole satisfactory to growers, especially in regard to cool-stored fruit, which sold exceptionally well. The instructional work carried out by the field officers attached to the Division is reflected in the continued improvement noticeable in the manner in which the New-Zealand-grown Fruit Regulations 1938 are being complied with, the grading, packing, &c., being very favourably commented upon.

At the same time, the careless grower has still to be contended with, and non-compliance with the regulations necessitated the issuing of a considerable number of warning notices by the Fruit Inspectors.

The outbreak of war in Europe, and the probability of shipping space not being available for the export of fruit overseas, gave considerable concern to representatives of the fruit industry as to the marketing of the 1940 season's crop.

As the result of representations made to the Government, a scheme was devised whereby the Government took over the marketing of the fruit (apples and pears) through the Internal Marketing Department at certain fixed prices according to grade. The scheme came into operation on the 5th February.

Under the scheme arrangements were completed whereby the fruit from each district was required to be submitted for inspection at assembly points conveniently situated and, where possible, adjacent to the orchard areas.

Assembly-point inspection, which necessitated the appointment of additional Inspectors to cope with the work, has proceeded very satisfactorily, and a close co-operation has been established between the officers of the Division and the Internal Marketing Department, which is tending towards more orderly and successful marketing.

#### ORGANIZATION OF MARKET-GARDENERS.

The eleventh Annual Conference of the Dominion Council of Commercial Gardeners, Ltd., took place in Wellington in July. Matters connected with the registration of market gardens, standardization of containers, grading and packing regulations, &c., were discussed.

Quarterly meetings were held during the year by the Advisory Committee, which was appointed by the Government for the purpose of co-operating with and assisting the Council in its deliberations. At these meetings representatives from the main producing centres are given the opportunity of reporting any matters of interest and discussing the more important problems that have arisen.

It is hoped that as a result of the work being carried out that the market-gardening industry will eventually be placed on a better footing in respect to the methods of production and marketing.

#### IMPORTED FRUIT, PLANTS, ETC.

Careful attention has been given to the inspection of fruits, plants, bulbs, &c., arriving at the ports of entry in the Dominion.

The total importations show a decrease for the year from all countries, with the exception of bananas from Tonga, which were in excess of the quantity imported last year, due to the recovery made by the plantations from storm damage.

Imports of all fruits from the Cook Islands were considerably lower, pineapples only showing an increase.

Most of the consignments of fruit arrived in satisfactory order both as to pack and condition, and were clean and free from disease, fumigation being only necessary in connection with a small line of pineapples for mealy-bug infection.

There was an increase in the quantity of grain and grass-seed requiring fumigation. The bulk of this was maize infected with weevil, which was dealt with on behalf of the Internal Marketing Department.

## FRUIT COLD STORAGE.

Further work of an experimental nature has been carried out in connection with the cold storage of fruit in conjunction with the officers of the Department of Scientific and Industrial Research.

The tests dealt with matters of considerable importance to the fruit industry, and were mainly with the view of eliminating as far as possible certain wastage taking place in fruit during cold storage.

Included in the programme was the question of the stage of maturity for the picking and cold storage of Granny Smith variety of apple to avoid the development of post-storage skin discoloration.

Soft scald in Jonathan apples was further investigated, and also matters connected with the precooling of pears prior to packing.

Results of considerable value have been obtained as the outcome of these experiments, and the information will be made available in the interests of the fruitgrowing industry generally.

Further attention has also been given to the loading and stowage of fruit on board ship, and a number of suggestions made for the better dunnaging of the fruit in the larger holds of certain overseas vessels, and thereby improving the air circulation.

The handling of fruit on the wharves and in the ships' holds still leaves much to be desired. Instances of damaged cases and bruised fruit are all too frequent evidence of rough and careless treatment.

An inspection was made during the year of most of the fruit cool stores in the Dominion, and advice given in cases where an improvement in general cool-store management was considered desirable.

## INSTRUCTIONAL AND EXPERIMENTAL WORK.

One of the most important phases of the work of the officers of the Division is the affording of advice and information on the many problems confronting the grower in connection with fruit and vegetable growing and horticultural matters generally. The demand for guidance on these subjects has increased considerably, and every effort has been made to meet such requests by correspondence, lectures, and demonstrations and by personal visits to orchards, gardens, &c. A great deal of the improvement that has taken place in the grading and packing of fruit for the market is due to the classes on these subjects conducted by the Orchard Instructors in the main commercial centres during the winter months in co-operation with the fruitgrowers' associations. The opportunity thus given of obtaining the departmental certificate of competency in apple grading and packing is fully appreciated by those attending the classes. The same applies to the examinations held for the certificate in orchard pruning and spraying.

The Instructors also make a point of attending district meetings of the local branches of the New Zealand Fruitgrowers' Federation, Ltd., and affording any information of a general character that may be required.

The Division has again co-operated with the Department of Scientific and Industrial Research in the carrying-out of orchard research work, and the manurial and root-stock trials have reached a further stage of development. Orchard cover-crop experiments are also included in the programme.

For the purpose of demonstrating up-to-date methods in small-fruit production, pruning and manuring and experiments with raspberries, gooseberries, and black currants were inaugurated in the Greytown district. A raspberry varietal trial, comprising some twenty-two varieties obtained from various districts in the Dominion, was also established in the same locality, and the results will be watched with interest.

In the spring the first cutting was taken from the asparagus test plot established on the Napier Lagoon reclamation, the crop being disposed of at a satisfactory price.

An additional 1½ acres have been planted in asparagus, with the view of further testing out the suitability of the large area of reclaimed land for this and other vegetable-culture.

## VITICULTURE AND WINEMAKING.

The weather conditions during the fruiting season were not altogether favourable to the development of outdoor-grown grapes. As a result, the crop of the well-known Albany Surprise table grapes was considerably lighter than that of last season. The higher prices received by growers, however, compensated to a fair extent for the reduced crop.

Considerable interest is being manifested in the growing of grapes for winemaking, and a large number of requests for advice have been dealt with.

An additional 40 acres were planted during the year in wine-producing grapes. It is estimated there are now approximately 700 acres in vineyards in the Dominion, the bulk of which being in the warmer areas in the North Island.

The majority of the vineyards are well cared for, and little trouble has been experienced in the control of disease.

Although the abnormal weather experienced during the setting season caused a reduction in the grape crop, it is considered that with the coming into bearing of newly-planted areas the quantity of wine produced will be in the vicinity of that of last year—viz., 223,500 gallons.

Growers of grapes under glass have experienced a good season. A fair number of new glasshouses have been erected, and in a few instances houses previously used for tomato-growing have been converted for the purpose of grape-culture.

Diseases and pests of glasshouse grapes have been kept reasonably well under control. Mealy bug is, however, proving somewhat difficult to deal with in houses where it has become established.

#### CIDERMaking.

There has been an increasing demand for advice and information on cidermaking from persons desirous of producing this beverage on a commercial scale.

The output of cider for the season is estimated at some 60,000 gallons.

#### THE KAUWHATA HORTICULTURAL STATION (LOWER WAIKATO).

Weather conditions were generally favourable to the carrying-out of farming operations, and a good growth of feed contributed to the fattening-off of stock carried on the Station for grazing purposes.

Sales of live-stock, wool, skins, &c., amounted to £594 10s.

In the early spring there was every indication that the grape crop grown for winemaking purposes would be above the average. Cold winds and showery weather experienced in October, however, resulted in a bad setting and a light crop. The weather was also conducive to the spread of fungous diseases, rendering control difficult. Considerable damage was caused to the crop by the bird nuisance, which appears to be growing worse each year, notwithstanding every effort taken to keep it in check.

It is estimated the wine-production for the year will be approximately 13,000 gallons, which is considerably less than that of the previous year, when some 19,000 gallons were produced.

An area of approximately 4 acres was prepared and planted in vines of the Direct Producer variety.

There is an increasing demand for the wines produced at the Station, the quantity sold during the year being some 14,155 gallons, which realized £10,330, and representing an increase of approximately 1,650 gallons on the previous year's figures.

Considerable interest has been manifested in the vinegrowing operations, and numerous orders received for rooted vines and vine cuttings.

The financial position of the Station is satisfactory, receipts exceeding the general working-expenses by some £2,900.

#### TOBACCO-CULTURE.

Increased attention has been given to tobacco-growing on commercial lines for the 1939-40 season. It is estimated the total area planted was some 2,586 acres, practically the whole of this being in the Nelson Province. This shows an increase of 456 acres as compared with the previous year's figures.

Favourable weather conditions have resulted in a heavier crop and better-quality leaf than that secured last year. No leaf was exported overseas during the 1939 season, all the leaf now produced being readily absorbed by the manufacturing companies operating in the Dominion.

#### HOP-CULTURE.

The season has not been particularly favourable for hopgrowing. The hops are light, but a much better crop than that of last season. It is expected that the yield will reach 3,000 bales this year.

The quantities and values of hops exported from the Dominion during the last five years ended 31st March are as follows:—

						Cwt.	Value. £
1936	..	..	..	..	..	3,436	22,684
1937	..	..	..	..	..	4,258	28,495
1938	..	..	..	..	..	1,856	12,385
1939	..	..	..	..	..	2,814	17,042
1940	..	..	..	..	..	1,337	7,627

#### ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE.

The Royal New Zealand Institute of Horticulture continues to carry out a considerable amount of valuable work in the interests of horticulture and fruit-culture generally. Matters connected with nomenclature, improvement of economic plants by selection and hybridization, recording new varieties of plants produced in New Zealand, and the training of young men and women in all branches of horticulture are some of the main features of the work of the Institute.

Under the New Zealand Institute of Horticulture Act passed in 1927 the Institute has full legal authority to grant diplomas in horticulture to those qualified and passing examinations during the course of a special training.

This very important phase of the work is being taken advantage of, and quite a number of persons have already gained the diploma in question.

The annual examinations of the Institute were held in November, and a total of thirty-eight candidates sat for the Junior, Intermediate, and Diploma examination, a good percentage being successful in passing.

The Loder Cup for 1939 was awarded to Mr. William Alexander Thomson, of Dunedin, for his outstanding work in the cultivation and preservation of the New Zealand flora.

This cup was presented by the late Lord Wakehurst (Gerald W. E. Loder, Esquire, Sussex, England) for the purpose of encouraging the protection and cultivation of the incomparable flora of the Dominion, and was first competed for in 1929.

#### CENTENNIAL EXHIBITION.

An outstanding feature of the year has been the Centennial Exhibition commemorating the completion of one hundred years of settlement in New Zealand. The Division co-operated in connection with the departmental exhibit in the Government Court, and the work of the Division was represented by a diorama brightly illustrating fruit-production and an automatic projector throwing up on an illustrated screen pictures and text supplying information on the progress made in the various branches of horticulture.

At the end of January a Horticulture Week was held, and a National Flower Show staged in the Assembly Hall under the Exhibition tower was an unqualified success. The show was exceedingly well patronized, and the wonderful display of flowers was the subject of much favourable comment.

#### REGISTRATION AND INSPECTION OF NURSERIES.

Close attention has been given to the inspection of nurseries in which prescribed plants, as set out in the regulations relating to the registration of nurseries, are raised for sale.

Reports to hand indicate that the majority of the nurseries in the Dominion are kept in good order and condition, and the stock raised is well up to standard and free from disease. In any instances where it has been found that disease exists steps have immediately been taken for its control.

Nurserymen experienced a somewhat difficult season in the raising of plants, owing to continued wet conditions in the spring, and this also had the effect of the public holding off buying plants until the conditions improved.

A total of 582 nurseries located in different parts of the Dominion were registered during the year and certificates of registration issued, the registration fees amounting to £582. This shows an additional 48 nurseries as compared with the number registered last year.

#### ORCHARD REGISTRATION AND ORCHARD-TAX.

The total number of registered orchards in the Dominion (orchards from which fruit is sold) is 4,639, comprising 2,422 taxable and 2,217 non-taxable.

Changes in ownership and alterations in areas—either by increase or decrease—necessitated a considerable number of fresh registrations and reallocation of registered numbers.

The total amount of orchard-tax payable for the year, which applies to orchards containing 120 trees and over from which fruit is sold, was approximately £2,074 inclusive of penalty for late payment. The tax is not what might be termed a Government tax, but is levied on fruitgrowers at their own request in the interests of the fruit industry generally. A portion of the tax collected is paid to the New Zealand Fruitgrowers' Federation, Ltd. (less cost of collection), and the balance to the Department of Scientific and Industrial Research to assist in the carrying-out of research work relative to the many problems connected with fruitgrowing.

In view of the fact that fireblight disease is now being kept well under control, no fresh outbreaks having occurred during the year, the collection of fireblight-tax only applied to the Gisborne commercial fruitgrowing district.

#### THE BEEKEEPING INDUSTRY.

The 1939-40 honey season, generally speaking was a satisfactory one, good crops being obtained in all the commercial beekeeping areas with the exception of Canterbury and Otago, where unfavourable weather conditions spoilt what otherwise promised to be a record season and resulting in the crop being below the average.

Exceptionally good returns were obtained in the Hawke's Bay and Gisborne districts.

The results taken as a whole were therefore very encouraging to beekeepers, especially in view of the fact that the previous season had been a poor one.

Inspection of apiaries for the control of diseases has been steadily maintained, and in order to assist the Apiary Instructors in the carrying-out of this work in their respective districts a number of part-time inspectors were appointed for certain periods during the spring and summer months.

This arrangement has given satisfactory results, and has enabled a closer inspection to be made than has hitherto been possible in the large districts allotted the Instructors. If brought into operation again next year the assistance given should go a long way in the cleaning-up of any diseased apiaries existing.

Considerable interest is still being maintained in beekeeping operations, and the demand for new apiary-sites continues. The fairly extensive areas being sown down in permanent pasture each year is to a certain extent meeting the demand for new territory.

The numerous requests received during the year for information and advice on various matters connected with beekeeping have been given full and prompt attention by the Apiary Instructors not only in regard to those persons desirous of making a start in the industry, but established beekeepers have also been assisted in dealing with problems that have arisen from time to time.

The requirements of the regulations in respect to the removal of bees and bee material from one locality to another have been carefully watched, and permits issued where such apiaries are pronounced clean and free from disease.

The marketing of honey, which is controlled by the Internal Marketing Department, is proceeding satisfactorily, and is being given the support of the majority of the beekeepers throughout the Dominion.

Grading of all honey for export has been attended to by the Chief Honey Grader at the Auckland grading-store, and grade certificates were issued covering a total of 18,843 cases (120 lb. each).

It was found necessary to reject a considerable quantity of bulk honey submitted for grading for various reasons, all the lines concerned being below the acceptable standard.

Some 620 packages of honey packed in small containers for shipment to various places were also dealt with.

The following shows the quantities and values of honey exported from the Dominion during the last five years ended 31st March :—

						Cwt.	Value. £
1936	..	..	..	..	..	10,446	34,258
1937	..	..	..	..	..	7,774	24,658
1938	..	..	..	..	..	3,804	12,658
1939	..	..	..	..	..	14,298	42,605
1940	..	..	..	..	..	5,321	17,205

#### REGISTRATION OF APIARIES.

A considerable increase is noticeable in the number of new apiary registrations made during the year. This is largely made up by the registration of recently established small apiaries consisting of one or two hives as well as a number of new commercial apiaries.

Apiary registrations now total 7,231, comprising a total of 122,012 colonies of bees.

#### STAFF.

I have to express my appreciation of the loyal assistance rendered by the staff as a whole in carrying out the many activities engaged in by the Division during the year.

Thanks are also due to a number of organizations for their helpful co-operation.

Messrs. C. E. Lowe, Tobacco Instructor, and J. C. Woodfin, Vine and Wine Instructor and also Acting-Manager at the Te Kauwhata Horticultural Station, retired during the year, the latter on superannuation after some twenty years' service in the Department.

## NAURU AND OCEAN ISLANDS PHOSPHATE.

## REPORT OF SIR ALBERT ELLIS, K.T., C.M.G., NEW ZEALAND COMMISSIONER, BRITISH PHOSPHATE COMMISSION.

Particulars are given herewith of operations at Nauru and Ocean Islands for the year ending 30th June, being the twentieth year since the industry came under Government ownership. The figures as stated are based on estimates so far as the current month is concerned, actual shipments being dependent on the weather experienced at the islands and other factors beyond our control.

Shipments as compared with the two previous years are as follows:—

	1937-38. Tons.	1938-39. Tons.	1939-40. Tons. (Estimate.)
Nauru .. .. .	836,250	924,250	932,000
Ocean Island .. .. .	329,850	300,267	315,000
Totals .. .. .	1,166,100	1,224,517	1,247,000

The distribution of shipments for the three years is as follows:—

	1937-38. Tons.	1938-39. Tons.	1939-40. Tons. (Estimate.)
United Kingdom .. .. .	15,650	61,500	40,000
Australia .. .. .	771,150	818,020	677,000
New Zealand .. .. .	290,300	293,047	404,000
Other countries .. .. .	89,000	51,950	126,000
Totals .. .. .	1,166,100	1,224,517	1,247,000

The proportion of output coming to New Zealand is about 32·4 per cent. for the current year, as compared with 24·9 per cent. in 1937-38 and 23·93 per cent. in 1938-39.

Shipments for the year are again in advance of any previous year, and the satisfactory figures have been reached under difficult conditions, as the weather experienced has been the worst for more than ten years, both as regards adverse westerly gales and heavy rainfall, the latter causing difficulty with the artificial drying of the phosphate. Though unavoidable delay took place in the shipping operations at times, no accidents occurred, other than the recent carrying-away of one of the sets of deep-sea moorings at Nauru. It is hoped that this can be relaid shortly.

It will be noted from above figures that 404,000 tons have been shipped to the Dominion for the year, more than 100,000 tons in excess of previous shipments. To some extent this quantity consists of special war reserve stocks which are being established at the various manufacturing centres. These should amount to 75,000 tons by 30th June.

A number of the Commission's chartered vessels have been requisitioned for the transport of food and munitions to Britain; the replacing of these has been difficult, and attended with largely increased costs of freight. Fortunately, it has not been found necessary to take the four vessels owned by the Commission, and which were specially built for the trade. They continue to render excellent service. In addition to increased chartering rates there are other unavoidable war expenses, but the industry has not been affected in the Dominion as much as in other countries so far as the cost of phosphate is concerned.

During the year under review the health of many of the labourers at the islands has not been good at times, and there was also some labour trouble among a section of the islanders not in any way attributable to the war. Generally speaking, the attitude of the whole community there has been most satisfactory throughout, and the good results attained for the year's work are largely through special efforts put forth in recognition of the exigencies of these times.

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