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APPENDIX

TO THE

TWENTY-SEVENTH VOLUME

OF THE

JOURNALS OF THE HOUSE OF COMMONS

DOMINION OF CANADA

FROM THE 26TH JANUARY, 1893, TO THE 1ST APRIL, 1893, BOTH DAYS INCLUDED.

SESSION 1893

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
1893

VOLUME XXVII.

APPENDIX—1893.

No. 1.—REPORT of the Select Standing Committee on Agriculture and Colonization.
Printed herein.

REPORT

OF THE

SELECT STANDING COMMITTEE

ON

AGRICULTURE AND COLONIZATION

THIRD SESSION, SEVENTH PARLIAMENT

1893

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
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REPORT.

The Standing Committee on Agriculture and Colonization present their second and final report.

The investigations of the committee have been made under three heads, viz., Agriculture, the Quarantines and Immigration.

AGRICULTURE.

On the first named, agriculture and its subdivisions, the committee have had before them and examined the several officers of the Experimental Farm, at Ottawa, and the information obtained from each is hereunto appended, as forming part of the committee's report.

The officers examined were Mr. William Saunders, the Director; Mr. James W. Robertson, Dairy Commissioner and Agriculturist; Mr. James Fletcher, Entomologist and Botanist; Mr. F. T. Shutt, Chemist; Mr. John Craig, Horticulturist; and Mr. A. G. Gilbert, Poultry Manager. A letter was also read and put in evidence from Dr. William Alexander, of Aberdeen, Scotland, on the importance of improving the quality of the store cattle sent from Canada to Scotland.

The information furnished by Mr. Saunders shows the progress that has been made by the experimental farms in Canada, and contains facts of much practical interest for farmers, as well in relation to what has already been done, as in the experiments now going on. The extent to which the hybridization or cross-cultivation of the several grains is being conducted is stated by Mr. Saunders to be the most unique in the world, and it gives promise of obtaining results which will be of great importance to the whole country.

The work done by Mr. Robertson, the Dairy Commissioner, in his branch of the experimental farm, cannot be overestimated in its importance to the agriculturists of the country. It has already made itself manifest by marked improvement in the quality and increased exports of dairy products, while the interest which is everywhere being manifested by farmers, gives promise of still more important results.

The information furnished by Mr. Fletcher, the Entolomogist and Botanist, is of much interest and contains practical suggestions of value in relation to the utilization of the grasses for fodder and pasture, and the methods by which farmers may protect themselves from the injurious effects of fungous growths and destructive insects.

The information contained in the evidence of Mr. Shutt, the Chemist, cannot be too carefully studied by the farmers of Canada, especially with regard to the utilization of available fertilizers.

The information furnished by Mr. Craig, the Horticulturist, contains practical directions for gardeners, relative to the necessary operations to be carried on and the several spraying mixtures for protection, accompanied by reports of actual results obtained at the Central Farm.

Mr. Gilbert, the Poultry Manager of the farm, showed in his evidence the very great value of the poultry interest of the Dominion. He reports on the several kinds of fowls, and points out those most profitable, both for eggs and marketing, and gives the conditions necessary for successful results.

IMPERIAL QUARANTINE AGAINST CANADIAN CATTLE.

On the cattle quarantines, the committee have had before them Mr. Lowe, the Deputy Minister of Agriculture, and Professor McEachran, of Montreal, the chief inspector of stock in Canada. The action taken by the department and the government in the Dominion, as well as by the High Commissioner and the Canadian Ministers in England, at the end of October and beginning of November last, is fully set forth in the evidence hereunto appended.

Three animals in Scotland, in October last, alleged to have come from Canada by the steamers "Monkseaton" and "Huronia" were diagnosticated by the veterinary officers of the Imperial Board of Agriculture, as being affected with pleuro-pneumonia, and the law officers of the Crown thereupon advised the board that there was no other course open than to place Canada on the schedule of countries from which importations of animals must be slaughtered on arrival.

The committee are satisfied from a consideration of the facts laid before them, in evidence, that there is not, nor ever has been, any pleuro-pneumonia among Canadian herds; and they are, therefore, of opinion that there must have been error in the diagnosis by the Imperial veterinary officers if there were none as respects the identity of the three animals in which it was alleged to have been found.

The committee are satisfied that the government have made every possible representation in the circumstances, to have the Dominion reinstated in its former position as respects the freedom from restriction in the export of animals to the United Kingdom.

EXTENSION OF CATTLE QUARANTINE TO WESTERN CANADA.

The committee were informed that the government on February 18th last, withdrew the privilege, in the North-west, of allowing the entry of settlers' cattle from contiguous territory, in the same conditions of climate and country, where no contagious disease had been known, without a quarantine of 90 days, for the purpose of satisfying an Imperial requirement. The committee was further informed that, on a joint report of the Ministers of Agriculture, the Interior and President of the Council, the services of the Mounted Police are to be very largely utilized for the protection of the frontier, the keeping of the quarantines, and affording all possible facilities for the care of settlers' cattle, which have now to be detained in quarantine 90 days.

The disease of tuberculosis, which is known to prevail to some extent among cattle in Canada, as well as in those of the United States and the whole of Europe, and which was inquired into and reported on by a former Committee of Agriculture and Colonization, in the opinion of this committee, calls for the serious consideration of the government, with a view of taking the necessary measures for its extirpation.

SEA-PORT DISINFECTING STATIONS.

As respects the measures for protecting the Dominion from a possible invasion of Asiatic cholera, during the coming season, announced to have been undertaken by the Government, the Committee have had before them Mr. Gobeil, the Deputy Minister of Public Works. He stated that the work was well in hand, and that the station at Grosse Isle would be fully equipped at the opening of St. Lawrence navigation; also, that all the appliances for the other quarantine stations would be completed as soon thereafter as possible. All the old stations are to be thoroughly equipped with the most approved modern appliances, and William's Head, in the Strait of Fuca, British Columbia, is to be made, as rapidly as possible, a quarantine station of the first class.

THE IMMIGRATION AND COLONIZATION OF 1892.

On the subject of immigration, the committee have had before them Mr. A. M. Burgess, the Deputy Minister of the Interior. He showed that active exertions are being made to promote the immigration to Canada of the classes desired, and for the care and guidance of immigrants on their arrival. The number of homestead entries of returned Canadians and others from parts of the North-western States, are very considerable. Particulars of the movement, as stated by Mr. Burgess, are contained in the report of his evidence hereunto appended.

RECOMMENDATIONS.

In the interests of agriculture, and as the most direct means of benefiting the farmers by the investigations conducted on the Dominion experimental farms, the committee recommend that the final report of this committee for the current session of Parliament be printed to the number of 100,000 copies, in the usual proportions of English and French, in addition to that of the "usual number for distribution," 2,475, or a total number of 102,475.

That 150,000 copies of each of the Experimental Farm Reports and of the Dairy Commissioner's Report for the last year, be also printed. And all of the foregoing be equally distributed to, and only to, the honourable the members of the Senate and the members of the House of Commons.

And that there be also printed 500 copies of his own evidence before this committee and given to each official of the Central Experimental Farm, for personal distribution.

Several important resolutions were passed by your committee, embodying their views on some of the subjects which engaged their attention, which will be found at the end of this report.

All of which is respectfully submitted.

T. S. SPROULE,
Chairman.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
29th March, 1893.

THE EVIDENCE

PART I

AGRICULTURE

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
TUESDAY, 7th March, 1893.

The Select Standing Committee on Agriculture and Colonization met at 10.30 a.m. this day. Col. TISDALE, Chairman, *pro tem.*, presiding.

MR. WILLIAM SAUNDERS, Director of Dominion Experimental Farms, called, addressed the committee, as follows:—

MR. CHAIRMAN AND GENTLEMEN,—It affords me pleasure to have another opportunity of appearing before the Committee on Agriculture and Colonization of the House of Commons to answer such questions as may be asked and to present to you such information as may be at my command regarding the work being accomplished by the experimental farms of the Dominion of Canada.

THE AIMS OF EXPERIMENTAL FARM WORK.

But six years have passed since the work of establishing these farms was begun, yet I think it may be safely said that they have already become an important factor, and are now exercising much influence on the progress of agriculture in this Dominion. There is no difference of opinion as to the importance of doing all that can be done to make farming more profitable and attractive, so that those who are engaged in this work may become more interested and contented with their calling, and that our young men who are brought up on farms may be induced to continue to devote their energies to the farm and become wealth producers. To elevate that calling, to show that there is plenty of room in it for the exercise of all the brain power a man may possess, to point out how farming operations may be conducted to the best advantage to the farmer, how processes may be improved and waste products utilized, are among the aims and objects of the experimental farms. We are not to be content with theorizing on such matters, but to demonstrate the truth of what is advanced by practical experimental work. Farmers are beginning to realize that there is so much still to be learned in connection with agriculture which it will be to their advantage to know, that they are eager to avail themselves of all the useful information we can give them.

INCREASING DEMAND FOR RELIABLE INFORMATION.

As one proof of this, I would refer to the demand which exists for experimental farm reports. Four years ago from 5,000 to 10,000 copies were ample to meet all the demands. Now 40,000 copies are required to supply the farmers whose names are on the experimental farm mailing list and who expect to receive all our publications regularly. In addition to this issue from the experimental farm, there is the large edition published annually by the House for the use of members and the demand is so great that good use is made of all. Hundreds of inquiries have already been made about the forthcoming report now in the printers' hands, as to when it will be available.

This great demand exists because the farmer finds in the pages of these reports information in all departments of his calling. He treasures the experimental farm reports among his best books. Does he desire to find out what grain crops are likely to be most profitable to him, he turns up the experience gained and recorded at one of the experimental farms nearest to him, and by comparing these with the records of similar work at all the farms and the average experience of those farmers who have tested the samples of those cereals sent out from the Central Farm, he has the foundations which will enable him to reach correct conclusions. The chief reason why this experimental farm work is so much appreciated is that it is reliable and honest work.

The utmost pains are taken to avoid errors, and if any are made to correct them as soon as they are discovered; also to point out the defects as well as the merits of everything tested, the object being to examine into everything thoroughly and to present the results of the work in a plain straightforward way for the guidance of those who seek information. It is very gratifying to know that the work is most thoroughly appreciated and that the farmers everywhere are feeling the benefits of it.

THE GREAT VALUE OF SEED TESTING.

Among the branches of work now being carried on and one to which I will briefly refer is seed testing. It is a very important item of the farm work which is undertaken from year to year and it is important this season particularly for the province of Manitoba. In that province the harvest weather of 1891 was exceedingly unfavourable, and much of the grain remained in stacks and in stook all through the winter, was threshed in the spring of 1892, and some of it was held over for seed. A large number of samples have been sent to the experimental farm by farmers to have them tested as to their vitality and they have been found to be exceedingly deficient, so much so, that there is scarcely a single sample of such grain which is fit for seed.

The vitality of these samples have ranged from 15 or 16 up to 30 per cent, instead of giving, as good wheat will usually do, from 90 to 95 per cent. The importance to farmers holding such grain for seed, of knowing exactly what that grain will do, can readily be understood. More than 1,600 samples have already been tested this season, and every mail brings additional specimens.

FREE DISTRIBUTION OF SEED GRAIN, IN 1892.

The distribution of seed is another important work which is being carried on successfully, and which is appreciated very much by the farmers who share in it. Many farmers residing in the outlying districts of the several provinces and territories of this Dominion are not yet in a position to ascertain for themselves much about the best and most useful varieties of grain for them to sow. Many do not even take an agricultural periodical so that they might be informed, and such information as they have they gather mainly from their neighbours. It is partly to reach that class, that this experimental work of distributing seeds is carried on, and I am sure you will be gratified to know the extent to which farmers have availed themselves of the privilege which this distribution affords them. None of these samples are sent out except on request. A very large number of individual requests come in every year, and to these are added requests from members of the House during the sessions, who send to us lists of names of farmers who they know would be interested in undertaking such work.

PARTICULARS OF DISTRIBUTION—KINDS AND QUANTITIES.

Last year the number of samples distributed was 16,905. These samples were of three pounds each, amounting in all to 24½ tons of grain, which went through the mails to different parts of the Dominion in connection with this work. Amongst these were 5,384 samples of oats, 3,954 samples of wheat 3,989 of barley, 719 of pease, 36 of rye, 1,545 of Indian corn and 1,278 samples of potatoes.

DISTRIBUTION BY PROVINCES.

It may be interesting to you to know how these were distributed by provinces. The figures are: Prince Edward Island, 304; Nova Scotia, 1,020; New Brunswick, 1,225; Ontario, 3,634; Quebec, 8,517; Manitoba, 706; North-west Territories, 933, and British Columbia, 566. That was the number of sample bags sent to each of the provinces. The number of individual farmers which this distribution reached was 9,114.

PARTICIPANTS BY PROVINCES.

Nearly 10,000 farmers last year received useful samples of grain for testing in their respective districts in connection with this branch of work. The number of applications in the several provinces were as follows: Prince Edward Island, 134; Nova Scotia, 552; New Brunswick, 759; Ontario, 1,547; Quebec, 5,282; Manitoba, 305; North-west Territories, 350, and British Columbia, 185. Total, 9,114.

DISTRIBUTION BY THE BRANCH FARMS.

In addition to this, the branch experimental farms tested samples and distributed a considerable amount of seed. The superintendents are all authorized to give to any farmer who applies within their province samples of three pounds each for test. Heretofore the number of samples given to an individual had not been subject to any special limit. They have seldom, however, exceeded three or four to any one person, but this year, by instruction of the Minister, on account of the difficulty we had last year in supplying all the demands, the number of samples has been limited to two, to each individual. This will enable us to send to almost every farmer who is likely to apply for them samples from the experimental farms, and to get through with the work in time for seeding.

The distribution for 1893 is now in progress, and up to date over 2,000 samples have been distributed. The work was begun about the middle of February.

SEED GROWING AT BRANDON AND INDIAN HEAD.

On each of the western experimental farms, at Brandon and Indian Head, quite a large acreage is devoted each year to growing pure grain for seed purposes, and in addition to the small samples to which I referred, these farms have sold to some 300 farmers grain in larger quantities. The custom is to limit the quantity in each case to two bushels, and to supply this at a cost of about ten cents a bushel in advance of the ordinary market price of such grain, so that those farmers who apply in good season can have enough grain to sow an acre of their land with any of those new varieties as long as the stock holds out. The object is to grow on these two farms as much as is practicable of the most useful varieties of grain so as to permit of their being distributed without delay over a large area in these grain growing districts.

WORK OF TESTING AT THE CENTRAL FARM IN 1892.

In carrying out the tests in connection with the work at Ottawa, we tested last year 531 varieties of grain and other farm crops. Of these 43 have been spring wheat, 26 fall wheat, 55 barley, 57 oats, 64 of pease, 59 of beans, 15 of carrots, 13 of mangels, 18 of turnips, 7 of sugar beets, 19 of Indian corn, 3 of buckwheat, 10 of millet, 135 of potatoes, &c. These numbers in some instances are much less than they were one or two years ago.

Our lists have become more select, and we are discarding every year such varieties as are not of special promise, and introducing into the lists new sorts from foreign countries, and such also as are produced at the experimental farms. Three years ago we had 80 varieties of Indian corn under test. Last year we tested only 19 varieties. There were a large number in the former tests which were found to be too late for our climate, and there was no particular object in continuing to grow them, in a similar way the lists in all classes of products become more select from year to year, and are being made to include only such as are likely to be useful over a large area of our territory.

THE OAT CROP OF 1892—VARIETIES AND YIELD OF EACH.

Taking the oat crop, which is perhaps the most important in connection with agriculture in the Dominion, next to that of hay, we find that there are a few varieties which succeed well at all the experimental farms.

The six varieties which have done the best at

THE CENTRAL FARM,

at Ottawa, during the past year have been, the Rosedale, 64·24 bushels per acre, weighing 38½ pounds per bushel; Banner, 63·18 bushels, weighing 36 pounds; Rennie's Prize White, 63·18 bushels, weighing 41¾ pounds; Cave, 63·2 bushels, weighing 35¾ pounds; Abyssinia, 61·26 bushels, weighing 39½ pounds, and Golden Beauty, 60·08 bushels, weighing 35¾ pounds.

Last year the varieties which stood at the head of the list were Cream Egyptian, White Egyptian, Flying Scotchman, Holstein Prolific, Longfellow and Early Blossom, ranging from 57 to 38 bushels to the acre. The oat crop this year at the Central Farm has been heavier than last year.

OAT PRODUCTION ON THE NAPPAN AND BRANDON FARMS.

At the Experimental Farm at Nappan, N. S., some of the same varieties are prominent in yield, the Holstein Prolific yielded 85 bushels 33 lbs. per acre, the Abundance 85·36 bushels and the American Beauty 85·35 bushels, averaging about 35 pounds to the bushel, at Nappan, the Improved Ligowo oats, a variety brought out from France two years ago, has also given good crops, amounting to 75 bushels to the acre, and weighing 36 pounds to the bushel.

In 1891 the American Beauty, the Rosedale, New Zealand, Archangel, Prize Cluster and Holstein Prolific were the six best at Nappan. The best six varieties at Brandon run from 78 bushels to 87 bushels to the acre, weighing from 34 to 39 pounds per bushel, standing in yield in the following order: White Hungarian, Australian, Banner, Abundance, Golden Side and Archangel.

OAT GROWTH AT INDIAN HEAD AND AGASSIZ.

At Indian Head the oat crop has not been so large, the six best yielders running from 40 to 57 bushels 16 lbs. to the acre and ranging in weight from 37 to 44 lbs. to the bushel. The particulars of the tests of all the varieties named and a great many others will appear in the Annual Report of the Experimental Farms which is now in the printers' hands.

At Agassiz, B. C., the six best varieties of oats have given from 55 bushels 10 lbs. to 72 bushels and 19 lbs. and may be ranged as to yield in the following order: Improved Ligowo, Giant Cluster, Early Gothland, Doncaster Prize, Challenge and White Poland.

By Mr. Hughes:

Q. Is the Banner Oat you have referred to the American Banner?—A. Yes, and of this variety there was a large quantity sent out in connection with the seed distribution. I think it is important to call attention to this particular variety of oats for the reason that it succeeds so well; 2,123 samples of the Banner were distributed last year. Not many were sent to Ontario, for the reason that this variety of oat is common there, but in Quebec and the eastern provinces it is but little known. Some samples were also sent to the North-west Territories and to Manitoba, to points where they were least likely to have been already introduced. Several hundred reports have been received. In Ontario the yield varied from 44 lbs. to 72 lbs. from three pounds of seed with an average weight of 33¼ lbs. to the bushel. That is not high, but the Banner oat does not usually run heavy. It is a long oat with a good body to it, but it weighs light in the measured bushel. From Quebec 159 reports were received, the average being 63¼ lbs. from three lbs. of seed. From Manitoba, the average yield was 67 lbs.; in British Columbia, 109 lbs. and it is noteworthy that one man in this Pacific province grew 360 lbs. from the three lbs. of seed. Everywhere that oat has shown very good points and I believe that if the Banner Oat was generally grown in place of other varieties at present in common cultivation it would add some bushels to the acre on the average for the whole Dominion. Of course it is impossible to introduce a new variety at once in that general way.

Passing to the subject of spring wheat, we have distributed, during the past two or three years, a large number of samples of Campbell's White Chaff, a variety which has succeeded very well in most parts of the Dominion. I have some samples with me to-day, so that those members of the committee who are not conversant with the variety may see it. It gives a very good crop in the east. It is a soft wheat, but in the west it rapidly hardens and although it does not become as good as the Red Fife, yet it is a good useful variety for flour for home use and it ripens several days earlier than the Fife.

By the Chairman:

Q. What is its average yield?—A. During the past year the average yield of Campbell's White Chaff, from 3 lbs. of seed, was in Prince Edward Island 51½ lbs., in New Brunswick 54 lbs., in Nova Scotia 45¾ lbs., in Quebec 41¼ lbs., in Ontario it was low, being only 34½ lbs., in the North-west 58½ lbs., and the same average in British Columbia, so that taking the whole country through, the average for this variety of spring wheat has been very good except in Ontario where the season was unfavourable last year for spring wheat. The varieties which did the best at the Central Farm during the past season were Pringle's Champlain, Hueston's, Wellman's Fife, White Russian and Rio Grande, the yield ranging from 27 to 29 bushels to the acre and weighing from 59 to 61 lbs. to the bushel. At Nappan, Nova Scotia, which represents the Maritime Provinces, the six varieties which gave the largest yield out of 16 tested, were Wellman's Fife, Colorado, White Connell, Campbell's White Chaff, Red Fern, and Rio Grande. They averaged from 30 to 35 bushels to the acre, weighing from 54 to 60 lbs. to the bushel. The average weight of the wheat raised at Nappan was less than that grown on the Central Farm, but the yield was higher. At Brandon, much heavier crops were obtained. The six varieties which gave the largest returns were Green Mountain, Red Fife, Hungarian Mountain, White Fife, White Connell, and Old Red River. The yield of these ranged from 38 to 41 bushels to the acre and the weight per bushel from 59½ to 61 lbs. At Indian Head 26 varieties were tested, and the crops were lighter. The six best varieties were the Assiniboia, Red Fife, Azima Russian, Red Fern, Pringle's Champlain and Johnston's. The yield averaged from 31 to 34 bushels, but the grain weighed heavier than at Brandon, running from 61 to 63½ lbs. to the bushel. The reason assigned for the light crop at Indian Head was lack of moisture, the season being dryer than the year before. The good results obtained in 1891 induced many people to farm carelessly. That year from any sort of farming, however careless, good crops were realized even when the ground was only scratched, for the reason that the rainfall was greater than usual. During 1892 land which had been imperfectly prepared failed to produce good crops, but where the land had been well prepared the crop has run from 25 to 35 bushels to the acre, which is a very satisfactory return.

WHEAT—COMPARATIVE RESULTS OF EARLY AND LATE SOWING.

The experiments which were reported to the committee last season, in regard to the early and late sowing of wheat, barley and oats, have been continued with the object of indicating to farmers how much is to be gained by early sowing. At the Central Farm here the results have been most unmistakably in favour of early sowing. Last year I gave you the percentages of loss incurred by deferring the sowing from week to week. I will now give you the results of the past season's test. Red Fife and Campbell's White Chaff were the two varieties of wheat selected for this purpose, and the experiments with wheat, barley and oats were all carried on in a uniform way as before, with uniform plots of land of one-tenth of an acre each. The first sowings were made as early as it was possible to work the ground, and there were six successive sowings in all, a week apart. The last sowing brought us up to a period as late as that which the most negligent man would be likely to reach in his sowing.

The result of the first week's sowing was a yield of 20 bushels 20 pounds to the acre of Red Fife; 28 bushels 30 pounds for the second week, showing the second to

be better than the first. The explanation of this is that the land on which the grain was sown was light, and the first plot was located on a spot much exposed, and a wind storm with blowing sand cut the young blades of the first sowing so as to interfere with their normal growth.

The third sowing was about the same as the first, namely 20 bushels and 30 pounds to the acre; the fourth, 12 bushels 30 pounds; the fifth, 10 bushels 30 pounds; the sixth, 6 bushels and 40 pounds. Of Campbell's White Chaff the first sowing produced 27 bushels 20 pounds; the second, 25 bushels; the third, 16 bushels 50 pounds; the fourth, 13 bushels 30 pounds; the fifth, 7 bushels 20 pounds, and the sixth, 8 bushels and 10 pounds.

OATS—RETURNS FROM DIFFERENT SOWING PERIODS.

With regard to the results of the six week's separate sowings of oats, the Banner and the Prize Cluster were the two varieties chosen. The yield per acre ranged as follows for the six weeks: Banner, 73, 71, 68, 59, 50 and 39 bushels, a difference between the first and last sowings of nearly one-half. The last sowing took place on the 25th of May, and the first on the 20th of April. In the case of the Prize Cluster oats, the results were as follows: 64, 56, 44, 41, 33 and 33 bushels.

BARLEY—RETURNS FROM VARIOUS DATES OF SOWING.

In the tests with barley, two-rowed varieties were selected—one the Kinver Chevalier, a celebrated English malting barley, the other the Goldthorpe. The results of the Chevalier were as follows: 42, 47, 31, 31, 20 and 17 bushels. With the Goldthorpe the figures were: 44, 42, 37, 29, 22 and 16 bushels.

These tests show that without doubt there arises a very great loss to the farmer where from any cause he is obliged to defer the sowing of his grain until a late period in the season. The loss of a single bushel per acre of grain in Ontario alone would amount to some hundreds of thousands of dollars annually, so that it will be seen that this is a matter of considerable importance which farmers should understand and profit by.

Q. Have you experimented with early and late pease?—A. We have not yet done anything special in this line of early and late sowing. Our efforts in this way have thus far been devoted to the three important varieties of grain referred to and they have been carried on at all the branch farms.

SUCCESSIVE SOWINGS—VARIABLE LOCAL RESULTS.

In the Maritime provinces the results obtained are very much like those in Ontario. There is a uniform lessening of the crop from week to week, but in Manitoba and the North-west Territories the results are altogether different. The results are so contradictory in their character there, that they will require to be carried on for a number of years before we shall be able to draw general and safe conclusions from them.

This year, at Indian Head, the wheat sown on the first and last weeks of the six successive sowings ripened exactly on the same day, while some of the intermediate plots ripened in advance of either the first or the last. Similar conflicting evidence reaches us from Brandon, although, if you analyse the whole series, there is a tendency there to a reduction in the last two week's sowings. It would appear, however, that in those districts where the three western farms are located it is not a matter of so much consequence as in Ontario and the eastern provinces that farmers should sow very early.

These differences in results point to the importance of having this work continued until satisfactory evidence is obtained, so that we may be able to give to the farmers residing in the outlying provinces reliable information on this subject. They also clearly show us that it is not always safe to draw conclusions from practices in Ontario and apply them strictly to Manitoba or the Territories.

TEST GROWING OF PEASE—VARIETIES AND RESULTS.

As the Chairman has asked a question in regard to pease, I will give the results of the tests of pease at the Central Farm during the past year. Eleven varieties of pease were tested. The Black-eyed Marrowfat was sown on the 23rd of April and produced 19 bushels 48 lbs. per acre, grown on sandy soil. The Crown, sown on the 2nd of May, produced 24 bushels 40 lbs. to the acre. The Centennial, sown in partly sandy and part peaty soil on the 2nd of May, produced 21 bushels and 23 lbs. The Golden Vine 22 bushels and 15 lbs., running 65½ lbs. to the bushel. The Mummy, sown on the 28th of April, produced 25 bushels and 85 lbs., averaging 61¾ lbs. to the bushel. The Prince Albert on sandy soil produced 15 bushels 43 lbs. to the acre, averaging 61 lbs. per bushel. No conclusions as to best date of sowing can be drawn from these single experiments, the nature of the soil and its treatment being very often sufficient to account for marked differences in the yield. In the annual report the character of the soil and its treatment are given, so that farmers may judge for themselves and allow for certain deficiencies in some crops and increases in others.

By Dr. Roome :

Q. These must be light crops of pease in all cases?—A. They are light crops.

By the Chairman :

Q. What quantity of pease did you sow to the acre?—A. Of the larger varieties, such as the Marrowfat, we sowed 3¾ bushels, which is rather a large quantity. It was a very large plump sample. Of the Crown we used 2½ bushels, Centennial 2¾ bushels and 3¾ bushels of the large White Marrowfat, 2½ of the Multiplier, 2½ for Prince Albert and for Mummy 3 bushels, the quantity depending upon the size of the pea.

By Mr. Cargill :

Q. Which variety was the most productive ?—A. The Mummy, I think.

PEA MARKETS.

By Mr. Hughes :

Q. I would like to ask Prof. Saunders if he has made any study of the marketing of these pease as to prices, where they go, &c. ?—A. I have made some inquiries with regard to this subject. The larger pease, or most of them, are sent to Germany, and they command usually from 25 to 33⅓ per cent more in price than the smaller sorts. If the small pease are selling at from 55 cents to 60 cents, the others will usually run from 80 cents to 90 cents, and for that reason I have endeavoured to introduced such pease as the Mummy, which is a large pea, and although it does not command the top price for large pease, it will generally bring 80 cents when Marrowfats are at 90 cents. I have taken some pains to introduce the Mummy partly for that reason, and also because it will generally yield as much to the acre as any of the smaller pease. This pea bears a large proportion of its pods on the upper part of the plant, where they get the benefit of the sun and air, and on that account the yield is larger than with most other sorts in cultivation.

THE PEA BUG—REMEDIES FOR.

By Mr. Hughes :

Q. Have you discovered any way to cure the bug ?—A. The bug is very easily disposed of by putting the seed pease in large tight vessels and introducing a small quantity of bisulphide of carbon. This is a very volatile clear liquid, which has a very offensive and pungent odour, and is poisonous. The vapour being very heavy if a little of the fluid is put into a shallow pan at the top and the vessel made air tight, it will vaporize and the vapour will pass all through the mass of pease, and by that means every bug in them can be killed. Most of the seedsmen who handle pease

largely now are provided with such appliances for treating pease, so that the bug is mostly kept in subjugation by these men, and very few buggy pease are sold by seedsmen of good reputation.

Q. Does that prevent the pease from being worm eaten during the season ?—A. The pea bug lives during the winter in the pea, and when the pease are sown the bugs come out of the ground and lay their eggs on the young pea pods, and you can prevent this trouble to a great extent by adopting the precautionary measure I have referred to.

SOILS IN RELATION TO WHEAT GROWING.

The experiments at the experimental farm, Brandon, Man., with wheat have shown a very considerable difference in the yield of the same sort of grain in different sorts of soil, and the differences are greater than one would anticipate, considering that these are all on the same section of land.

By Mr. Cochrane :

Q. What cultivation did you give your land ?—A. At the Central Farm in Ottawa we always plough in the fall ; we could not get our land ready in time to sow early enough in the spring, if we did not prepare it in the previous autumn. The importance of this course cannot be too strongly urged on farmers generally.

Q. Now, your experience at the experimental farm with grain is with fall ploughing ?—A. Yes, fall ploughing in all cases here in Ontario, but in almost every instance we state in our reports in connection with the grain the treatment of the land, when it was ploughed and how many times it has been harrowed and what sort of harrow was used, so that farmers have all the particulars to judge from.

Coming back now to this subject of the difference in the crop of wheat at Brandon in three different classes of soil found on that farm. On clay loam the yield varies in different varieties from 25 bushels 50 pounds, to 41 bushels 15 pounds, quite a large proportion being over 35 bushels to the acre. On black loam the crop has run from 20 bushels to 38 bushels, and nearly one-half of that ran over 30 bushels to the acre, showing an average falling off of about five or six bushels to the acre. On upland prairie, where the soil is lighter, it ran from 15 bushels 30 pounds to 28 bushels 30 pounds, showing that with the same treatment and the same varieties of grain the nature of the soil has very much to do with the results. Of course, a man cannot alter the character of his soil, but there is every advantage in his knowing what the results are likely to be from the cultivation of those crops on such land.

FALL AND SPRING PLOUGHING AND SUMMER FALLOW.

In speaking of fall ploughing, I might say that there has been a great deal of difference of opinion in Manitoba in regard to the relative advantage, of spring and fall ploughing and of summer fallow. The experience, however, gained at the experimental farms has been that spring ploughing is better than fall ploughing there. The reason for that is this: When the land is ploughed in the fall, the friable and porous condition in which it is left for the winter gives the strong winds which prevail during that season an opportunity of drying the soil to a considerable extent when the ground is not covered with snow. The result is that it is in a much more moist condition for the crop after spring ploughing than it is after fall ploughing. The results obtained by these three different methods, using the Red Fife wheat for the test, were as follows: Fall ploughing gave 16 bushels 50 pounds; spring ploughing, 28 bushels 10 pounds, and summer fallow, 38 bushels 20 pounds, to the acre, showing that the crop is very largely influenced by the method of treatment of the soil.

By Mr. Cochrane :

Q. Was the summer fallow ploughed in the spring ?—A. Summer fallow in that part of the country is always made in the latter part of June or the early part of July, the object being to get the benefit of the June rains, the rain falling much

heavier in June than in any other month, and when this moist ground is turned under six or seven inches deep at that time and the surface worked with a harrow to break up the capillary structure of the soil, the moisture from below does not readily find its way to the surface, as it does when the ground is more solid and compact.

Q. You are talking about the advantage of spring ploughing, is the fall ploughing compared in that way ploughed again in the spring or do you sow right on the fallows left in the fall?—A. This summer, fallowed land in Manitoba and in the North-west Territories is land that has been ploughed late in June or early in July of one year, cultivated once or twice with the harrow to kill the weeds later in the season, and left over in fallow until the following season and then sown.

By Mr. Hughes:

Q. Without being ploughed in the spring?—A. Without being ploughed in the spring; it is sometimes harrowed before sowing; its treatment in this respect depends much on the character and condition of the soil.

By Mr. Cochrane:

Q. Does not summer fallowing produce the same result in the North-west as in Ontario? We always find it beneficial in creating moisture by absorption from the atmosphere.—A. Much depends upon the condition of the atmosphere. In most climates a good deal of absorption would take place, especially at nights, but the main advantage is to break up at the surface the capillary structure of the soil. In the soil the water below rises to the surface, from the partially tubular condition of the arrangement of its particles, and the soil gradually dries out unless the continuity of this structure is broken up, which can be done by scratching the surface. This acts much like a mulch on the soil. The particles of moisture coming up find a resistance against escape from the loose soil lying on the top.

Q. Does that prevail in the North-west as in Ontario?—A. To some extent, but we have to take other factors into consideration in the North-west, here we recommend fall ploughing invariably.

Q. I am talking about summer fallowing. Was that opinion formed in connection with the fallow in Ontario or in the North-west?—A. The opinion I have expressed now in regard to the capillary structure of the soil will apply to the whole country. Other factors in the North-west, for instance the strong, drying winds, have a marked effect on the soil.

By Mr. Hughes:

Q. Do you not find that the absence of very large bodies of water has an effect upon the soil of the North-west? As a rule the rivers up there are narrow a long way from the mouth, and consequently the situation is different in different parts of the country.—A. The conditions are always different near large bodies of water from what they are on the plains. It is much drier on the plains, but it must not be forgotten that the dews are very often heavy for the reason of the drying which goes on during the day. The moisture is taken up into the atmosphere during the day and descends in the form of dew at night. It is not, however, easy to lay down any one principle which will apply to the whole country, the conditions are so very different, but the effect I have described produced by cultivation applies everywhere.

SOWING, DRILL AND BROADCAST.

Experiments have also been carried on at the Brandon and Indian Head farms with regard to the use of drills. Some parties have advocated the use of press drills, stating that their use resulted in increased crops, others advocate other sorts of drills; while some are in favour of broadcast sowing. We do not find any great difference in the results obtained from the use of the different sorts of drills, but there is a decided difference ranging from 5 to 11 bushels to the acre as compared with the results of broadcast sowing in favour of the use of the drill. In

other words the use of the drill has given an average result with three years careful testing of from five to eleven bushels of wheat more per acre than has been obtained from any system of broadcast sowing whether by hand or by machine.

Another point which has exercised the farmers' minds there, and to some extent here also, is the distance in the rows which the drills will sow the grain. Most of them sow so that the drills are about seven inches apart, and the idea has prevailed that if the rows were closer together there would be a corresponding increase in the crop. The test at Brandon with regard to the width of the drills has only been carried on for one year. The result has been that where the drill has been used so as to have the rows of plants 7 inches apart, the average yield was 37 bushels 40 pounds, and when they were 3½ inches apart, 36 bushels 40 pounds, or one bushel less per acre where double the quantity of seed was used, showing that the influence of the sun and air on the growing grain is a more important factor in producing a good crop than a large quantity of seed.

By Mr. Smith (Ontario) :

Q. How about the sample?—A. The weight of the sample in each case was practically the same, 61 lbs. in the one case and 60½ in the other.

By Mr. Cochrane :

Q. You double the quantity of seed in the 3½ inches?—A. Yes, we double the quantity.

Q. I should not think that that would be a fair test? I would have sown the same quantity?—A. We used the drill going carefully over the ground twice. We sowed three bushels per acre when the 3½-inch drills were made and 1½ in the 7-inch.

THE USE OF BARNYARD MANURE.

Another point which has been discussed very much in the North-west is the use of barnyard manure in wheat growing, and some experiments have been carried on to test this matter. Red Fife wheat was the variety used. In one case 20 tons of fresh manure was put on an acre, in another 20 tons of rotted manure was used, and in the third no manure at all. The land on which no manure had been put yielded 20 bushels 40 lbs.; the land with rotted manure 21 bushels 10 lbs.; and the land with fresh manure 21 bushels and 50 lbs., showing that there was an increase of about one bushel per acre on the land which had been manured as compared with that which had not. This was not a great gain, but there is this important point to be noted, that in the manured land the grain ripened earlier. On the unmanured land the crop ripened on the 24th August, while on the manured land it ripened on the 19th of August, showing a gain of five days in ripening.

By Mr. Smith (Ontario) :

Q. Was it top dressed?—A. It was top dressed and ploughed in.

By the Chairman :

Q. The manure would have a much greater effect on the following year's crop would it not?—A. Very likely, but the opinion which has prevailed in Manitoba is that the addition of manure gives a rank growth of straw and prevents the early ripening of the grain, and mainly for this reason large quantities of manure are annually burnt or thrown into the river, to be carried away by the spring freshets.

By Mr. Hughes :

Q. Do you carry on these tests on one plot only of one-tenth of an acre, or do you test two or three different plots of one-tenth?—A. In some cases, the tests are repeated on two or three different plots, in others one plot only is used. The object in all these tests has been to make them as reliable as possible.

SUPERPHOSPHATE IN GRAIN RAISING.

At the meeting of the Manitoba Farmers Institute last year, the subject of applying artificial fertilizers to wheat was discussed and the opinion expressed that the addition of a limited quantity of superphosphate of lime would materially hasten the ripening of the grain, and a request was made that this matter be tested at the experimental farm. This was done, and on one plot of ground 250 lbs. of superphosphate was added to the acre, on another 500 lbs. to the acre, while a third was treated with salt in the proportion of 250 lbs. to the acre, and a fourth untreated. The results were as follows: With 250 lbs. of fertilizer to the acre 18 bushels and 40 lbs. were produced; with 500 lbs. of fertilizer to the acre 16 bushels and 30 lbs., with 250 lbs. of salt, 18 bushels and 20 lbs., while the unfertilized land gave 16 bushels and 30 lbs. These plots were all cultivated alike and as far as conclusions can be drawn from one experiment it does not appear that there was any marked gain in the time of ripening of the grain, as they all ripened together on the 20th of August. It may, however, be that more decided results will be obtained from those plots another year from the application of the fertilizer referred to.

By Mr. Cochrane:

Q. What about salt?—A. The yield from the land where the salt was applied was fairly good. It was 18 bushels 20 pounds or nearly equal to that which had received superphosphate in the proportion of 250 lbs. to the acre.

Q. There is an important question which I would like to ask in connection with the oat crop. Where you have been testing the different kinds, have you tested them from year to year to find out how uniformly they produce their crops or are the results you have given us the test of one year only?—A. We have tested some of the varieties for six years, some for five years, and others for shorter periods. Six years ago we began the work on the Central Experimental Farm, it took two or three years to get the land into fair condition. So it is only within the last three or four years that we have been able to carry on these tests in a satisfactory manner.

By Mr. Hughes:

Q. I presume you have kept a record of the kinds of spring and summer—whether it was wet or dry?—A. Yes, we have records kept at each farm of the rainfall and temperature, and at most of the farms there are sunshine recorders, so we have all the necessary particulars in this respect.

Q. In case the professor comes before us again, I would like to get some information with regard to the growing of clover seed?—A. We have not yet carried on any experiments in this line.

Q. Have you made any experiments with the kinds of grasses best to use for pasture in the summer time?—A. We have done some work on this subject, but Mr. Fletcher, who is in charge of that department, will probably be called by the committee, and I would prefer leaving that for him to discuss as he would have the information more fully at his command than I have. We have over 150 varieties of grasses and clovers under test at the experimental farm, and we have quite a number under trial at each of the branch farms.

By Mr. Kaulbach:

Q. Have you had any reports from parties on the coast with regard to the desirability of using sea manure as a fertilizer as compared with that of the barnyard?—A. Our chemist has made some analyses of that sea weed so much used for stable litter in the east, the eel grass, so common on the sea shore, and it was found not to have any very high fertilizing properties. The result of these analyses was published in last year's report under the heading of Eel Grass. While it is a useful material for composting with barnyard manure to increase the bulk and absorb some of the liquid constituents of the manure, it does not add very materially to the fertilizing constituents of the pile.

Q. My reason for referring to it was owing to the question in regard to salt as a fertilizer. It has a salty property and we out west consider it very useful?—A.

It has a limited quantity of salt, but I think the analysis made of it does not show enough salt in it to make that element important in estimating the value of the material.

TILE DRAINAGE.

By Mr. Girouard (Two Mountains):

Q. I would ask you if you have experimented on your farm with the different kinds of drainage?—A. Our farm has been drained with tile drains and we have not thought it desirable to try any other sort. The old fashioned wooden drains are always getting out of order. We had some practical experience of that from the fact that the party who owned part of the land now included in the Central Farm used some of these wooden drains and every now and again our horses when ploughing would go down up to their knees in a hole resulting from the rotting of these drains. They generally decay, get useless after a few years, and it was thought best to do our draining at the Experimental Farm in a way that would commend itself to farmers everywhere from its permanent character and hence we put down tiles. The tiles do not cost very much more than wood. The labour is the same in each case and the durability of the work is such as to commend tile draining every time.

By Mr. Kaulbach:

Q. Which do you consider the best description of tile?—A. The ordinary cylindrical tile is the one we use. At Nappan, N.S., we have used some horse-shoe tiles, but we prefer those that are entirely rounded. We think the water flows away more quickly through them, and in draining, we find that it is desirable to use nothing less than two and a half to three-inch tiles, for the smaller drains, so that they are never overtaxed, and if at any time any silt gets in a greater opportunity is given for it to get washed away. At places where sand is likely to get into the drains from time to time, in order to avoid permanent injury we have wells dug on all the large main drains. They are made about six feet deep, with a curb and a top over them. Generally there is from 2 to 3 feet of water in them, and we find them very convenient for watering horses which may be working at a distance from the stables. The sand is deposited in these wells and the water runs out on the other side. The wells are cleaned out once a year, and in that way the drains are always kept in good order.

Q. Have you had any opportunity of seeing the difference of drainage on different kinds of soil?—A. Yes, sir. We had about 40 acres of swamp at the outset on the Central Farm, partly clay, and partly peaty, with occasional ridges of rock running across, which we were obliged to blast through in order to carry the water off. We have found the drains beneficial to all kinds of soil.

Q. Even on hard clay?—A. Yes. At Nappan, N.S., we have had a good deal of experience on hard clay, but by putting the drains closer than we do on the more porous soil here, the result has been most beneficial, the crop has increased from year to year, and those portions of the land which were formerly regarded as the poorest part of the farm, are now, after draining among the best. The land can be worked in the spring two weeks earlier than formerly, and the crops got in early, and the yield has greatly increased.

FREE DISTRIBUTION OF BULLETINS TO FARMERS.

By Mr. Smith (Ontario):

Q. At a meeting of the Farmers Institute in my riding the question was asked me as to the best method of procuring the farm bulletins?—A. No applicant for farm bulletins is ever refused. The rule that has been adopted and carried out from the beginning—under instruction of the late Minister of Agriculture and confirmed by the present minister, is that the bulletins be sent to every farmer who asks for them. We send to no person, bundles of bulletins or reports for distribution, but want every man's name on our books, so that not only will he get the particular bulletin he applies for, but all that are issued thereafter. Secretaries of farmers'

clubs and institutes, Patrons of Industry and others, sometimes ask for 100 copies or more to distribute among their members, but under our rule we only send one or two copies, with an intimation that if a list of the farmers who belong to the society is sent, who desire to receive the farm publications, their names will be entered on the farm books and the publications sent to the parties direct. When the names come in, we look over our index and see if they are already there. If not, we put them on the list and send them every bulletin that is afterwards published. Any party who wishes to get the bulletins and reports can obtain them on application.

COMMITTEE ROOM 46, HOUSE OF COMMONS,
TUESDAY, 14th March, 1893.

The Select Standing Committee on Agriculture and Immigration met at 10.30 a.m. this day, Dr. Sproule, chairman, presiding.

Mr. WM. SAUNDERS was recalled. He said:—

Mr. Chairman and Gentlemen:—In continuation of the statement submitted to you last week, permit me now to call your attention to a department of work which promises in the near future to have an important influence on the agriculture of this country.

CROSS-FERTILIZATION OF CEREALS.

I refer to the production of new varieties of grain by cross-fertilization and hybridizing. When the male and female used in this work belong to the same species, as in the case of two varieties of wheat, the progeny are called cross-bred wheats, but where two distinct species are used, such as two-rowed and six-rowed barley, or in the case of fruits, a cross between the black currant and the red currant, or the gooseberry in such cases, the results are known as hybrids. The work at the experimental farm has been carried on along both these lines, as I shall be able to show you by samples which I have with me.

This work was begun in the summer of 1888, when crosses were made in wheat with the Ladoga and the Red Fife, and between the Ladoga and the White Fife. One of these, a cross between Ladoga and Red Fife, has been named "Abundance," for the reason that it has yielded very well as far as the tests have yet gone. Beginning with one kernel in 1888, it had produced by the end of 1890, in three seasons, 382,658 kernels, or 32 lbs., 3½ oz. This is the wheat, Mr. Chairman (producing specimens of the heads mounted.) These are the parents, the Ladoga, on the left side, being the female, and the Red Fife, the male, on the right, and in the centre is the cross, the Abundance. This grain was divided last year between the central and the branch experimental farms, so that I am unable to give you the exact total of the results for this year, but we have at the central farm nearly 500 pounds, or over 8 bushels, from that portion of the grain which was sown here. On account of the unfavourable nature of the season, however, this grain is not as heavy as it was last year, when it weighed 63 lbs. to the bushel. It is proposed to send the surplus to the North-west for seed for this season, as the soil is so strong there that even light grain usually produces very good results. We shall have enough of this grain to test it by the acre during the coming season at all the experimental farms, and if it continues to promise well, there will no doubt be sufficient next season to permit of making a limited distribution in small quantities to a few farmers in the different parts of the Dominion for further test.

FLOUR FROM RED FIFE AND LADOGA WHEATS.

By Dr. Roome:

Q. Have you tested the flouring qualities of the Ladoga wheat?—A. Yes, sir, and a bulletin giving the results has been prepared on this subject, copies of which have been mailed to every member of the House.

Q. Is it very satisfactory?—A. The results of the milling test placed the Ladoga wheat in an intermediate position between No. 2 frozen and No. 1 frozen. The

miller does not consider it quite equal to No. 1 frozen, but it is superior to No. 2 regular or frozen. This is the opinion of one of the best milling firms in the country, after a very careful test, the miller, however, must cater for the bakers, and the bakers will not use flour that is yellowish in colour, and it is this yellowness of the flour that they chiefly complain of. They have also complained in some instances of the texture of the bread, but it will be seen in the bulletin referred to that it is possible to make good bread from Ladoga. Two years ago, I submitted samples of home-made bread from Ladoga flour, which was made under my own supervision, to the members then composing this committee, and it was pronounced good. One of the Toronto bakers in one instance in the recent test turned out a quality of bread about equal to that from No. 1 Red Fife flour, but he did not succeed in doing this a second time. If we only knew the exact particulars of the process necessary to bring out the good points in that variety of wheat, there is no doubt that it would give much better results, but under existing circumstances, it is not likely that bakers will give themselves any great trouble to find that out, so long as good Red Fife flour can be had. In the meantime Ladoga makes excellent bread for home consumption, and in those districts in the North-west and other parts of the Dominion where an early ripening variety is absolutely required, there is no other early wheat I know of better than Ladoga, or more likely to produce good results for home use in bread making, where a slight shade in colour is a matter of no great moment. The bread is as nutritious and healthful as that from any other wheat we have, so that it will no doubt still serve a useful purpose in that way, and I am prepared to show this committee that it is very likely to serve as a useful basis for cross-fertilizing with other varieties, and this wheat, the Abundance to which I have referred, is one of the examples of a promising cross between the Ladoga and Red Fife.

EARLY RIPENING WHEATS.

With regard to earliness of ripening, the Abundance does not appear from our tests made in Ottawa to be quite as early as the Ladoga, but it will probably ripen from five to seven days earlier than the Red Fife. There were nine kernels sent to the Experimental Farm at Agassiz, B.C., in the spring of 1891, which produced 4¾ oz. of grain, which ripened there five days earlier than Red Fife. At Indian Head small plots of several of these hybrids were sown, but they were so injured by winds that no reliable results were obtained. The sample of seed of Abundance, which was sent to the Experimental Farm at Brandon miscarried, so that while Mr. Bedford's report covers several of the other cross-bred varieties, no returns of this particular one are made. At the Experimental Farm at Nappan, 4½ pounds were obtained from 4 oz., which was sown on the 7th of May and was ripe on the 24th of August, whereas the Ladoga sown on the 27th of April was not harvested until the 25th of August, and the Red Fife sown at the same time did not ripen until about a week later.

We can say nothing about the quality of this new wheat, but being composed of one-half of Red Fife, it should not be very deficient in this particular. It seems to be a well fixed variety, showing little or no tendency to sport. I shall next call your attention to a beardless cross between Ladoga as the female and White Fife as the male. This has been named "Alpha," and has turned out to be a productive wheat, but the type is not yet very well fixed, and it sports considerably. It has been customary to regard bearded wheats as quite distinct from beardless, and red chaff sorts as quite distinct from those having white chaff, but in the progeny of the one kernel in this cross we have produced beardless and bearded wheat, red chaff wheat and white chaff wheat, showing that these peculiarities are not very fixed in nature. Fifteen kernels of Alpha were grown on the Experimental Farm at Agassiz, in 1891, and produced 12½ ounces of grain. In 1892 ten and a half ounces produced 36 pounds, equal to 32 bushels 42 pounds per acre, and it ripened at Agassiz five days before the White Fife. At Brandon, Alpha was sown on plots alongside the Red Fife. These plots were 11 feet square, and the yield from Alpha was a little more than that from Red Fife on the same area, Alpha growing 3 pounds 9 ounces, while Red

Fife from the same quantity of seed gave 3 pounds 7 ounces. The Alpha ripened on the 25th of August, while the Red Fife ripened on the 4th September, a difference of ten days in this instance in favour of Alpha. These were all sown on the 16th of May.

EXPERIMENTS WITH HIMALAYAN MOUNTAIN WHEATS.

In view of the great importance of obtaining early ripening varieties of grain for many parts of the Dominion negotiations were opened in 1888 with the Government of India for the purpose of obtaining samples of grain grown on the higher elevations in the Himalayan Mountains, and through the kindness of Lord Dufferin, instructions were given to the directors of agriculture in those parts of India to collect samples of grain for the experimental farms of Canada. These were collected and forwarded here for test. The information which led to this correspondence was obtained from one of the members of this House, Col. F. C. Denison, through some correspondence which that gentleman had with a relative of his in England, who was intimate with Mr. A. S. Heyde, a Moravian missionary labouring in the Himalayan Mountains. This gentleman, who lived at an elevation of about 11,000 feet up the mountains reported that wheat grown in the valleys at that elevation ripened in a very short period, and mentioned the Spiti Valley as a good district for such wheats. Through the kindness of Lord Dufferin, samples have been obtained from that district, which have been tested on the experimental farms for the past three or four years with interesting results. We have found, however, that all the varieties obtained from India are poor croppers. This sample submitted is one of the best of them, the "Hard Calcutta." It has a small head, and will generally yield on our best land in the North-west Territories about 12 to 18 bushels to the acre, while the Red Fife will run from 30 to 35 bushels. In earliness, however, these wheats are from one to three days earlier than Ladoga, and 10 or 12 days earlier than Red Fife. These varieties have also been taken as a basis for cross fertilizing. In the specimen submitted you find Hard Calcutta on one side of the group; on the other side you have one of the hybrids of the wheat produced from the Spiti Valley crossed with the Red Fife. This cross has a very plump full head. I cannot say yet as to its earliness. It is an early variety, but we have not tested that sufficiently to speak positively about it further than this that it is a promising sort. The infusion into these feeble growing sorts of the blood of the Red Fife, so vigorous in growth and fertile in character, will, it is hoped, give us varieties of grain which will be of very great use to the country. (Hear, hear.)

In my evidence before you last year I told you we had from 80 to 90 of these new cross-bred varieties. That year a number were added to the list, and during the past summer, having strong faith in this department of the work as being one of the most important for the farms to undertake and extend, efforts were made to give to to it a still wider scope. It has been found by careful tests that the seeds of trees produced in the North-west are better adapted to the climates which prevail there than those from the same any varieties which have been obtained elsewhere and sent there, and it is quite probable that the same may hold true regarding varieties of grain. Impressed with this idea, I had planned myself to visit the different farms last season at the time of the blossoming of the grain and do some crossing at each place, but the pressure of work in connection with the World's Fair prevented that, but I induced one of my sons, who had worked with me in this department, who at present is one of the fellows of Johns Hopkins University, Baltimore, to go out and undertake this work, which he did, and the results have been very gratifying. No one who has not investigated this subject can have any idea of the amount of labour that this work involves. The flowers of the grain are exceedingly delicate in character and a great many operations are necessary in order to obtain a few results.

WORK IN CROSS FERTILIZATION AT AGASSIZ.

I will give you as an example of this the results of my son's work at Agassiz:—

Arriving there in July, he operated within a few days on 294 flowers of wheat and succeeded in obtaining 21 crosses. Mr. T. A. Sharpe, the Superintendent of the

farm at Agassiz, who worked with him at the same time, operated on 138 flowers and produced 14 crosses. In oats 91 flowers were worked on and one cross produced. In barley 87 flowers were operated on and 32 crosses obtained. In leguminous plants, some interesting results were obtained there, not only in crosses of pease with peas, but also of pease with vetches and also of annual pease with some perennial leguminous plants, which may give us good variety of pease of a perennial character. That is one of the objects we are aiming at.

AT INDIAN HEAD.

Coming further east to Indian Head a similar series of operations were carried on. Thirty-four crosses in wheat and 53 in pease were produced and at Brandon 72 crosses of wheat, 16 of oats and 62 of pease, making a total on these western farms of 141 new crosses in wheats, 17 in oats, 42 in barley and 172 in pease, in all 372 new varieties as the result of this special work in one season. Besides this, through the efforts of Mr. William Macoun, my assistant in the experimental work at the Central Farm, our crosses there were increased by 58 wheats, to which must be added 7 produced by myself, 65 in all; to which must be added 14 barleys and 35 pease, making a total of 486 new crosses produced last year.

TOTALS OF CROSS-BRED AND HYBRID SEEDS OBTAINED.

Our total stock in this line at the present time embraces over 600 new varieties, which have been produced since 1888 in this way. These will all be carefully watched, their earliness, quality and fertility noted and all those that prove unpromising will be discarded, but with such a large number to select from, varieties produced in all the different climates of the Dominion, the crosses being carefully planned so as to combine the best and most useful qualities, some good and important results will surely be obtained. It is safe to say that there is not existing anywhere in the world so unique and interesting a collection of cross-bred cereals as will be found on the Central Experimental Farm during the coming season. In attempting these crosses we have had in view the following objects, to combine earliness with quality, vigour and productiveness and to produce varieties specially adapted to the various climates of the several parts of our country. Red Fife has been used as a basis for quality, vigour and productiveness; Ladoga, Onega and the Indian wheats for earliness, especially for the North-west, and crosses of Red Fife with Campbell's White Chaff and other varieties for the eastern provinces.

CROSSES OBTAINED IN BARLEYS.

In barleys, some interesting hybrids have been produced between Swedish two-rowed barley and Baxter's six-rowed. These are among the most remarkable hybrids which have been produced on the Central Farm. All the sample heads here submitted for your inspection have been grown from two-rowed barley crossed with pollen from the six-rowed. The results, as you will notice, vary in character from two-rowed to pure six-rowed. Some are four-rowed; some only partially developed between two and four-rowed some between four and six-rowed and some pure six-rowed. This cross was undertaken with the object of producing new six-rowed varieties larger and longer in the head than existing sorts and heavier yielders, in other words to produce new varieties with greater vigour and productiveness. Samples of this cross have been sent to experts in France, England, and the United States where they are regarded as exceedingly interesting and promising. This has, I believe, been the first successful attempt at hybridizing these two distinct forms, and it is hoped that the progeny may develop forms which will be very useful to this country.

By the Chairman:

Q. Might I ask you if you suceeded in that would it not spoil them for malting purposes?—A. That is a point which has not yet been investigated.

QUALITIES OF MALTING BARLEYS.

By Mr. Carling:

Q. Might I ask you a question with regard to the two-rowed barley. There is an impression abroad that the two-rowed barley is not suitable for Canada, and that it has been a failure. Now, from information I have received, it gives a better yield, and if that barley was properly cultivated and cleaned there is an unlimited market for it in the old country. What is your experience as to that?—A. In reply to that, I would say that I think the evidence which we have obtained from the whole Dominion shows clearly that with a favourable season a very large proportion of two-rowed barley can be produced, which will command a good price in England for malting purposes, but unfortunately, we have had during the past season the most unfavourable year within my knowledge for all sorts of barleys and there has been very little two-rowed barley produced in Ontario which would command a paying price in England or which would sell for malting at all. It could be sold there for grinding, but that would not bring enough to enable buyers here to pay more than a small price for the grain. The two-rowed barley, has however, produced on an average a greater yield especially those varieties of barley belonging to that class of which the Duckhill is an example. On account of the heavier crop and smaller proportion of husk, the two-rowed barley for feeding purposes promises to be the best barley for this country.

In the North-west some very good samples of barley have been grown during 1892, and I have no doubt a large quantity can be got there suitable for the English market. During the past season it has run from 51 to 53 pounds to the bushel at the Experimental Farm at Indian Head and good samples.

By Mr. Cochrane:

Q. How do you explain the fact that they want our barley bright. They have no barley in England that is bright. Still they want bright barley when they buy it from us?—A. I know that it is a fact that bright barley will command as a rule a better price than a dull looking sample, although I don't believe it is a matter of very great consequence to the brewers. I cannot see where there is any material advantage to the brewers in bright barley excepting for the making of the paler and brighter coloured ales.

By Mr. Hodgins:

Q. Is not the weight of the barley taken more into consideration than the plumpness?—A. It is the weight, plumpness and mellowness of skin combined which raise the value of the sample. Nearly all the higher priced European barleys are bright in colour and are grown in climates where such grain is grown almost uniformly bright, and perhaps the prejudice in favour of bright barley may have its origin here.

By Mr. Carling:

Q. How does the yield of the barleys compare the two-rowed with the six-rowed?—A. The last calculation made was two years ago when the difference was ascertained of the results of about one thousand tests and it averaged nearly four bushels per acre in favour of the two-rowed barley.

Q. Did it not average about four bushels to the acre?—A. Nearly four bushels to the acre more from the two-rowed than from the six-rowed grown alongside of it.

CROSSES OBTAINED IN OATS.

Passing to the subject of oats, the object of the crosses made with that grain was to develop new varieties with increased vigour and productiveness to take the place of such as are now under cultivation and which will in time become more or less run out; and also to develop varieties large in the kernel and thin in the hull. For that object we have used some very thin hulled varieties defective in strength of

straw, crossed with others strong in the straw, with the hope of getting an oat with a thin hull, a large kernel, stiff straw, productive and of the best quality.

By Mr. Cochrane:

Q. Do you think any kind of grain will run out if it is properly cleaned and we take the best kernels for seed?—A. I am not sure whether that question can be answered directly, but I think we have clear enough evidence that varieties do run out from the fact that scarcely any of the varieties which were under cultivation 25 years ago are being grown to any considerable extent now. We have evidence that with ordinary cultivation such as is commonly practised, varieties do deteriorate, but whether they would run out if we handled them more carefully and selected the seed, and changed the soil from time to time, is a question I am unable to answer. Crosses have also been made in oats between the sided and branching sorts, to ascertain how far that may effect the lodging of the oats and their general utility.

CROSSES AND HYBRIDS IN FRUITS.

This process of cross-fertilization has also been carried on in connection with fruits and a large number of crosses have been produced between the different varieties of raspberries; also hybrids between black raspberries and red raspberries. Hybrids have also been raised within the past two years between the black currant and the gooseberry, and between the black currant and the white currant. These partake of the characteristics of both parents in their foliage, but they have not fruited yet, although they are expected to do so this coming season. Their fruiting is looked forward to with considerable interest. The objects in crossing and hybridizing fruits are much the same as in crossing grain, the producing of useful varieties to succeed or supersede those now under cultivation.

SMUT IN WHEAT—REMEDY FOR.

I desire also at this time to call the attention of the committee to another question of considerable importance to the farmers of the North-west. I allude to the smut in wheat and the remedy therefor. Smut has been increasing very much of late years all through that western country, and has lowered the quality of much of the grain grown in some sections and affected the price obtainable for it sometimes to the extent of 25 and occasionally 50 per cent, and occasionally making it entirely unsalable. By careful experiments carried on for the last three years at the experimental farms we find that by a treatment of the seed with bluestone or sulphate of copper with water in the proportion of one pound of the bluestone dissolved in a pailful and a half of water and sprinkled on ten bushels of grain this disease can be practically stamped out.

The plan adopted in carrying on these tests has been to select the most smutty wheat which could be found and treat a part of it with bluestone and leave another part untreated. Different proportions of the bluestone have been tried to get at the right proportion for the best results. Other chemicals which have been recommended have also been tried, such as sulphate of iron, lime, salt, &c., and these have been carefully compared in their results with the bluestone, and the efficacy of the bluestone as a reliable remedy and superior to all others clearly established.

I will give you the particulars of one of these series of experiments as a type. Red Fife treated with sulphate of iron gave from the heads growing on a space of ten feet square 120 smutty heads and 2,730 heads without smut. With agricultural bluestone—a mixture of sulphate of iron and sulphate of copper, which has been used a great deal in the North-west—there were 36 smutty heads and 2,450 good heads, while with bluestone alone there were only eight smutty heads with 2,550 good heads, showing that it is an effective and reliable remedy against smut. In another test, seed which was not treated at all gave from six feet square 207 smutty heads to 957 which were clean, while that treated with one pound of bluestone to ten bushels of grain gave but fourteen smutty heads from the same area, and where the bluestone was used in the proportion of one pound to seven bushels of

grain only one smutty head was found, showing that if the farmers generally will carry out this exceedingly simple and inexpensive method of treatment they can keep this troublesome enemy in subjection. It is gratifying to know that much attention is now being given to this subject both in Manitoba and the North-west Territories, and that the use of bluestone in the treatment of seed wheat is becoming general.

THE EXPERIMENTAL FARM AT AGASSIZ, B.C.

I desire now to call your attention to a few points in connection with the work on the Experimental Farm in British Columbia. There we have no very broad areas of agricultural land, no great opportunities for growing grain on a large scale, but the country is likely to be exceedingly valuable for its fruit. We are, however, carrying on experiments with grain, roots and other farm crops, and have about 105 acres under cultivation, while about 20 acres more have been cleaned and stumped and made ready for the plough. Experiments are also being conducted with dairy stock, and with swine and poultry. But more attention has been given to the establishment there of a large test orchard, where all the varieties of fruit likely to be useful to that country will be tested and reported on and the information given to settlers as to what sorts of fruit they can most profitably plant and what they should avoid planting. Although possession of this farm was not had until the 19th of September, 1889, we have now in the test orchards there 887 varieties of fruit, 569 of which are large fruits and 318 small fruits. The number of each sort planted is usually limited to two trees, but in some instances of standard sorts four or five trees have been planted. Some have been planted on the valley land, while others have been placed on the bench lands and on patches of ground between the rocks on the mountain sides. I may explain that a mountain rises about 1,000 feet at the rear of the farm, and at heights varying from 100 to 800 feet small orchards of fruit trees have been planted, and the tests being made on these bench lands is looked upon by the farmers in British Columbia as of great value, for the reason that if it should prove to be the best sort of ground for fruit growing, there is an unlimited quantity of such land available in British Columbia which cannot be profitably devoted to ordinary agricultural purposes.

Another very important point being tested is with regard to the usefulness of the eastern hard woods in that country. While British Columbia has enormous timber resources, with supplies of Douglas spruce and western cedar which are practically inexhaustible, there are scarcely any hard woods in that province. With a view to the more general introduction of the most useful varieties growing in the east, a large number of young trees are being planted on the mountain slopes at the back of the farm, consisting of black walnut, butternut, ash, elm and hickory and other hardwood trees which have been found useful in the east. From the growth these varieties have already made on the farm at Agassiz, it is contemplated that the production of wood will be much more rapid there than it is in the eastern parts of the Dominion, and I have no doubt that in a very few years we shall be able to demonstrate that it will be a profitable undertaking for people to plant such trees on a large scale on the hill sides where the land is not valuable for ordinary agricultural purposes. The climate there is of such a character that almost all the more tender sorts of fruits succeed. This last winter, however, has been exceptionally cold and may have injured some of the more tender things under test.

The outlook in British Columbia for the production of pears, apples, cherries plums, peaches and many other fruits, is exceedingly good. I have no doubt that these test orchards which, when completed, will be the largest for fruit existing anywhere in the world, will be the greatest benefit to that country by supplying settlers with information as to the best varieties to grow, and the best modes of planting, &c. There are many other topics which might be referred to in connection with our work on the Pacific coast, but perhaps enough has been said to indicate the general character of the work in progress.

HOW CROSS-BRED GRAINS ARE OBTAINED.

By Mr. Carpenter :

Q. What is your mode of procedure in crossing two varieties of grain ?—A. It has to be carried on when the blossom is exactly in the right condition. The flower of the wheat is covered with two thicknesses of chaff. In crossing varieties, the outer coating of chaff is taken off and by pulling back the inner covering the flower is exposed. It consists of a central, soft and very delicately-fringed organ, known as the pistil, which is the female organ, and surrounding this are three thread-like stamens, each crowned with a small sac at the top called the anther in which is the pollen or fertilizing agent. The flower must be opened before these organs are fully developed, and the stamens with their anthers removed before the pollen is matured. Pollen must then be brought from matured flowers of the variety which is to serve as the male and applied to the pistil, when the inner covering of chaff must be replaced in its natural position and the flowers operated on carefully wrapped with thin tough paper. If a kernel results from this operation you have a cross, and the plant grown from that kernel will usually inherit more or less of the peculiarities and qualities of both its parents. The operation is a very delicate one and requires to be performed with fine forceps and sometimes with a magnifying glass, and it frequently happens that hours of close application may be given to this work without obtaining any results.

ACREAGE PRODUCTION OF WHEAT IN INDIA—QUALITY.

By Dr. Cameron:

Q. Is twelve bushels of grain the average crop in India?—A. From information received from that country, the yield appears to vary in India in different districts as it does here. In the report of the Experimental Farms for 1888, you will find a very full account of those Indian wheats with some references to the methods they adopt in carrying on their agricultural operations, also the usual yields they get. This is said to range from six fold up to ten and fourteen fold. As a rule, they run from 8 bushels of barley up to 20 bushels, but generally 10, 12 or 14 bushels is about the average yield of barley, and 10 to 12 bushels of wheat. Their system of manuring is singular. In the communication sent to me from Seorag by Pestouji, the director of agriculture in that district, he says: "The land is manured before sowing commences, generally by sheep being penned on it for some nights." This would be considered a rather homœopathic dose of manure by our Canadian farmers. Their system of agriculture seems to be exceedingly primitive, and their varieties of grain have become deteriorated from being grown on comparatively poor soil, for perhaps one or two thousand years. When transferred to our rich soils in the North-west we cannot get them to yield very much above what they have been producing in India. If we can infuse their good qualities as to earliness into our vigorous sorts, we may get in that way some varieties that will be exceedingly useful to us.

By Dr. Roome:

Q. Is their wheat equal to or superior to our Red Fife?—A. I am unable to speak of that positively. The Indian Government some four or five years ago spent several thousand pounds in making a test of their wheats as to the quality of flour produced from them, and they were pronounced good by some of the millers and bakers in Great Britain. Their grain, however, does not command the price which our Manitoba No. 1 hard will bring, so I preseme it is not equal in quality to our best wheats. On the lower plains in India they grow two crops a year, one usually of wheat or barley in the winter and rice or some other crop in the summer. The wheats grown there in the winter must ripen in a short season so as to be harvested in time for sowing the summer crop, and on this account the varieties grown on the plains seem to be equally early in ripening with those grown on the higher elevations in the mountains. The Spiti Valley I have already spoken

of is about 11,000 feet up the mountains. They have a short summer season there and sow as soon as the snow is off, and they sometimes resort to throwing earth on the snow with shovels in order to get it to melt more quickly so that they may get their grain in. These Indian varieties of grain have been grown for so many generations in a short summer season that they have acquired an early ripening habit which seems to be very persistent and sticks to them, and which we hope to make use of by infusing it into new varieties in the way I have explained.

GRAPE CULTURE—VARIETIES.

By Mr. Carpenter:

Q. What has been done in experimenting with the different varieties of grapes. That is an industry of interest to a certain portion of the community in the district in which I live. The output in 1891 was 11,000,000 lbs., and it is growing in amount every year?—A. On the Central Experimental Farm we have at present 160 or 170 varieties which are being tested as to their quality and period of ripening, but we have not at any of our experimental farms a climate suitable for testing the varieties of grapes which form the bulk of the important crop to which you have referred. There are, however, many of the varieties which ripen in western Ontario, which also ripen here. At Nappan, N,S., the conditions for grape growing are scarcely so favourable as at Ottawa. At Brandon and Indian Head tests have been made two or three times with about 100 vines each time of the hardiest sorts but without success. At Agassiz, B.C., all varieties of grapes make good growth, but only the early sorts ripen their fruit, for the reason that the amount of heat there during the season is not sufficient to bring the later ripening varieties to perfection.

Q. You think then that the experiments in grape growing here will not be of very much use to the grape growers of Western Ontario?—A. The grapes which ripen here will ripen over the larger portion of the settled districts of Ontario and Quebec, but our experiments are not specially useful to the grape growers of the Niagara Peninsula, because we cannot ripen with any regularity the later sorts, as we could do in a more favoured climate. On this account we cannot do as well with grapes here as we can with some other kinds of fruits.

CONSTRUCTION OF BARNS AND STABLES.

By Mr. McMillan (Huron):

Q. I visited one of the experimental farms in the west and I noticed that the horse stable was not high enough to enable the men to work a hay fork. One would think, in putting up new buildings, that they would be erected on the most approved plan, so that our farmers could copy them. I think it is a great mistake to erect buildings of such a character?—A. That only applies to the addition to the barn at Indian Head, where the beams were put in too low. The horse stable in question was built during the first year of the experimental farm work, when all sorts of work crowded on us rapidly. The plans were prepared by the Department of Public Works, in accordance with suggestions given by the several superintendents of the branch farms. When the plans were prepared they were submitted to the superintendents, carefully examined and approved by them, but I presume that the arrangement of the timbers was not sufficiently inquired into. The defect was seen as soon as the Indian Head stable was built, and it was altered before building at Brandon and Agassiz.

Q. I understand that some of the managers, when they saw the plan, tried to get it changed?—A. That is not correct. We had all three of them here at the outset and they went over the plans very carefully and attached their signatures as approving of them.

By Mr. Cochrane:

Q. It appears to me that your barns—all those that you require on your farms—should be a model for the farmers. You may not require to use a horse fork or a hay fork, or many appliances which farmers should use, but you ought to have them so that farmers may see them in actual operation?—A. Some of the conditions that prevail in the North-west have not to be contended with down here. More timbers have to be put in, in some cases on account of the heavy winds which prevail at certain seasons.

MR. MCMILLAN (HURON).—I must say this, that at the western farms the work done has been such as to astonish me. I was really surprised at the great amount of work that was done at the British Columbia station. One thing may retard the advantages to be derived from these farms, and that is the lack of help. I think the superintendents out there should be given a fair chance. At Indian Head 500 acres were under plough and the superintendent had only three teams to do the work. Part of this summer fallow was not ploughed. I think you ought to give Mr. Mackay a fair chance. I was very well pleased with everything I saw there, except the construction of the buildings.

MR. SAUNDERS:—Arrangements were made last autumn to provide Mr. Mackay with another team in the spring. He had more horses, but unfortunately lost two of them by death. It is very gratifying to me that so good an authority on farming as Mr. McMillan should only be able to find, after careful examination, these two or three minor points deserving of criticism. It speaks well for the management.

Having examined the preceding transcripts of my evidence on the dates named, I find them correct.

WM. SAUNDERS,
Director Dominion Experimental Farms.

COMMITTEE ROOM NO. 46, HOUSE OF COMMONS,
FRIDAY, March 10th, 1893.

The Select Standing Committee on Agriculture and Colonization met this day at 10.30 a.m., Dr. Sproule, chairman, presiding.

The CHAIRMAN:—Mr. Fletcher, the entomologist and botanist of the experimental farms is before us this morning to give us information as to what is being done in his department. The question was raised at the last meeting about grasses. Mr. Fletcher has some specimens with him here. Perhaps it will be well to dispose of that subject before he makes a statement.

MR. FLETCHER:—Mr. Chairman and Gentlemen: I am very glad of this opportunity to again appear before the Committee on Agriculture, as I believe it affords me an excellent opportunity of getting into touch and into correspondence with farmers throughout the country, through their representatives in Parliament, who come to Ottawa annually, and then are able to advise their constituents where to apply to for help whenever outbreaks of agricultural pests occur, and also to let them know of the work which is being done here. In attending meetings of Farmers' Institutes in different parts of the country, we find that, although the Dominion experimental farms are being carried on at large expense, for the benefit of the farmers, many are entirely ignorant, and others know very little indeed, of the nature of the work we are doing.

When, however, we can get farmers to visit the experimental farms, as a rule, they are satisfied with what is being done, and that what we are doing is for their benefit. They then take an interest in the work, which helps it very much. We often get suggestions from practical men as to important and useful lines of work, and we are always glad to receive suggestions from them.

FODDER GRASSES.

Without further introduction, sir, I shall now go straight to my subject, and shall, first of all, direct your attention to the subject of grasses, as I understand some gentlemen who are anxious to leave to catch the train, are desirous of hearing something about these important plants. First, with regard to the fodder grasses which are being grown at the farm, I will make the bare statement, which may surprise some of the members of the committee, that we have here at our Central Experimental Farm at Ottawa, the best grass garden in North America. This is acknowledged to be the case by specialists who have taken up this work. I need not waste time, sir, in explaining to the committee how important a place grass crops hold among farm crops, nor to the fact that we should pay great attention to this subject in our experimental work. The dairy industry is now being developed to such an extent in all parts of Canada, and has become of such magnitude, that it is necessary for all scientific agriculturists to do what they can to help on so important an industry, an industry which, I think, has been developed more during the last ten years than ever before. This being the case, the discovery of the best and cheapest foods for cattle becomes a matter of great moment; therefore, the necessity is shown of finding out as soon as possible the most suitable varieties of grass to grow in different districts and the best way to cultivate them.

We know now the great advantage to farmers of growing corn and feeding it as ensilage. In many districts, however, corn cannot be grown to advantage, and it is therefore desirable to pay more attention to the growth of grasses. In prosecuting this part of the work at the experimental farm, I have endeavoured to test all the different kinds of grasses that were available. Seeds were procured of all the varieties mentioned in seedmen's catalogues on this continent and in Europe, besides a few from India. These have all been tested. Moreover, whenever possible, I have collected or obtained from our own mountains, prairies and fields, the wild grasses of Canada. These have been grown carefully, and from them we have got some very satisfactory results. What led to this critical study of our native grasses was the conviction that many of the grasses imported from Europe and put into the expensive permanent pasture mixtures, which are offered for sale, are quite unsuited for cultivation in the Dominion. A very large percentage of these mixtures is made up of one particular kind of grass which in this part of Canada, at any rate, is utterly useless. That is the Perennial Rye grass. For this part of the Dominion the sooner we get rid of this grass the better, because it nearly always dies out the very first winter. It seems at first sight surprising that seedsmen here should supply and our farmers grow this grass; but it is the one chiefly supplied to them. Seedsmen would by far prefer to sell to their customers what would satisfy, but they cannot get anything better, because the demand for other grasses has not yet been sufficient to create the supply. Directly we can show that Perennial Rye and some other grasses are unsuited to our requirements, something else and something better will be found to take their place.

VALUABLE NATIVE GRASSES.

I think we shall find among our native grasses some kinds better suited to our requirements than many we now get from Europe, because they will be better suited to the climate, which is a very important matter. By this, I do not refer to the intensity of cold only, for few native plants are affected by the severity of the cold, if at all. In the majority of cases it is of little importance to plants covered with snow, whether the temperature in winter is 100 below or at zero. With introduced exotics, however, this is not the case, and the peach tree is a notable example. It is generally believed that, if the thermometer drops to 15° below zero in the peach-growing districts, the peach trees are seriously injured.

FIG. 1.—WOOD DROP-SEED GRASS.
(Mühlenbergia glomerata.)

With regard to the grasses imported from Europe, we know now that our climate is far less suited to their cultivation than to that of the native grasses. We have, too, among our 300 kinds of native grasses some from which we have obtained very good results. I am sorry that I could not bring a better collection with me, than that which I have to-day. Most of my specimens have been sent to Chicago to the World's Fair Exhibit. I have here with me, however, a few which I think will be of interest to the members of the committee. Here is a grass which seems to me to possess all the requirements of a good hay grass. It is very leafy from the bottom to the top, and although the seed does not form a large portion of the grass, a large quantity of seed is produced, because it is exceedingly small. It is the Wood Drop-seed grass (*Muhlenbergia sylvatica*) [Fig. 1]. That grass sown in the early spring will produce hay the first year in August. The spring grasses are gone by that time, and the aftermath is not ready, so that an abundance of green food in August is a very valuable adjunct to the farmers' fodder supply. There are three of these grasses which are extremely hardy and indigenous to Canada, and will grow from the Atlantic to the Pacific. The seed of the first one, which I have shown to the committee, I got in the woods near Ottawa. I have also received seeds of the others from Brandon and Indian Head.

By Mr. Carpenter:

Q. Have you tested its feeding qualities? Do the animals like it?—A. Yes, the animals like it very much. Here are specimens of two other grasses of the same family, which are probably of equal quality with the first one. This is called the Satin Grass (*Muhlenbergia Mexicana.*)

By Mr. Hughes:

Q. Will you give us the name of the first one?—A. It has not an English name. It is named Mühlenburgia after a German botanist. The species is called *sylvatica*, and it may be called Wood Drop-seed grass.

By Mr. Carpenter:

Q. How does it winter? Does it heave with the frost?—A. Not at all. It grows on the top of the ground and spreads out its roots like a bird's claws on the surface.

By Mr. McMillan (Huron):

Q. Does it form bunches or does it grow in a heavy mass?—A. It forms a solid mass of fodder.

Q. Where does it grow?—A. On rather low land or in woods in a state of nature; but I have it growing on well drained soil.

Q. I suppose where you tested it, the soil was pretty well manured?—A. Not particularly well; but it is good land.

By Mr. Semple:

Q. Is there any danger of not being able to remove it at all, if it is introduced? —A. No, sir. The peculiar habit of growth on the top of the soil allows of its easy removal when necessary.

By Mr. McDonald (Huron):

Q. Does it always grow as high as the sample we have here?—A. I have only grown it for two years and on both occasions it attained that height. The other two grasses of the same family do not grow so high, Satin Grass and Wild Timothy, both of which have been grown and the fodder is of great value. Wild Timothy (*M. glomerata*) was first brought to notice in Iowa about ten years ago. The botanist at the Government Experimental Farm in that state found that the livery stable keepers went out on the prairies and cut this grass in preference to any other. On analysing and examining it, he found it an exceedingly valuable grass. It does not produce such a heavy crop as Timothy but its nutritive qualities are very high, and I think it will be a very valuable grass for this country in districts where Timothy will not grow well.

FIG. 2.—SPIKE, of *M. glomerata.*

By Mr. Hughes:

Q. When do these grasses ripen?—A. They flower in August, and are ready for cutting then, but of course they take a longer time to ripen their seeds. The next of the native grasses to which I will call the attention of the committee, are two common ones that grow all through Canada. These are the Canadian and the Northern Blue Joint which grow in wet land. [Figures 2 and 3.] They are often called Beaver Hay. I found last year that both in good and poor soil they did very well indeed. For one or two years they will succeed very well on dry land. In my last year's report I called attention to them at some length. During the past season they attracted the attention of many visitors. They make capital hay. But public opinion is not ripe yet to accept hay made of native grasses, at its proper value. It is called "wild hay," and such will not sell. If a load of "wild hay" goes on the market, the price offered for it is far less than that which can be readily obtained for hay made from old over-ripe Timothy which is really worth far less.

W. FIG. 3.—CANADIAN BLUE-JOINT. *(Deyeuxia Canadensis.)*

STAGE AT WHICH TO CUT GRASS.

FIG. 4.—REED CANARY GRASS. *(Phalaris arundinacea.)*

This is one of the points of ignorance on the part of our farmers upon which we hope to enlighten them, for they lose money in buying Timothy, when, perhaps wild hay can be more readily obtained, and it is far more valuable than Timothy left uncut, as is frequently the case, until the seed is almost ripe. The proper time to cut all grasses for hay is soon after the flowering stage. As soon as the seed is formed, the nutritious principles are transferred from the stems to the seed, and if Timothy or other hay is left standing too long, when cut and dried the seed drops out and the good constituents are gone, leaving nothing but dry weedy stems. The excellent qualities of well made Timothy hay are well known, and this gives a special value to all Timothy; it pays farmers to grow it because they can always get a ready market for it. They can sell almost a worthless over-ripe Timothy when other good hay will not sell at all. Timothy is popular and is convenient to handle. The hay is easily handled. You know always pretty well what the weight of the crop will be, and what it will sell for; again, the seed is easily handled, and always meets with a ready sale; for this reason it will always be a paying grass for farmers to grow, but at the same time some of those other native grasses when better known are going to pay farmers well too. There is another grass that grows in wet land, the Reed Canary Grass (*Phalaris arundiracea*). [Fig 4.] It belongs to the same family as the Canary seed (*Phalaris Canariensis*). This on the 3rd of June was nine inches higher than Spring Rye, and the crop was much heavier. It was also a much more succulent grass, and a better spring fodder grass for that season. The seed is not easily obtainable yet in the market, but it will be in time as the demand increases. We cut twice and got good crops both times.

A VALUABLE EUROPEAN GRASS.

FIG. 5.—ARMLESS BROME GRASS. *(Bromus inermus.)*

I will now draw your attention to a European grass. Of all the imported grasses this is undoubtedly the most valuable one we have ever imported. It is called the Armless Brome grass (*Bromus inermis*, Fig. 5). It was imported five or six years ago from Germany. We are now getting enough to distribute small quantities all over Canada. Some of our seedsmen are also now supplying it to customers. It grows a heavy crop, four feet high, is succulent very early in the spring and has a heavy aftermath. It is the one grass above all others reported upon favourably and uniformly, from the North-west Territories. I sent out last spring, by mail, over 2,000 small packets of seed grasses for testing and it was spoken of most highly by every person who sent in a report. These reports show that it is of value in the West and the experience of it in Ontario, Quebec and in the Maritime Provinces is no less favourable. It is an extremely heavy and uniform cropper. It is also succulent and palatable, as stock eat it readily; further, the chemical analysis shows that its ratio of useful constituents is well above the average. It has grown best on low rich land, but has done well in the West on dry land. It belongs to the same family as Chess grass, of which I have specimens here.

FALL WHEAT AND CHESS, NOT HOMOGENEOUS.

I will first mention briefly that I have been carrying out during the last two years some experiments to try to convince farmers that chess has no connection whatever with fall wheat. It is a good grass and is now largely grown as fodder in Washington and Oregon States, it produces heavy rich hay and has a special value from the fact that it will grow in alkaline soil where timothy will not succeed. One of the peculiar ideas is that chess is a bastard grain, that it is a cross between wheat and some other grains and therefore will not produce seed at all. The fact that it is now grown so largely in Washington State shows that it will grow from seed. I have myself had it growing from the seed year after year for six years. There are however circumstances occasionally which make it difficult for farmers to understand that it has nothing to do with fall wheat. The circumstances are that it is most often found growing amongst fall wheat; but this only means that it is a grass of the same nature as fall wheat, and to flower the next spring it must be sown in the autumn, and moreover, fall rye and fall wheat are almost the only crops we treat in this manner. Again, there are one or two instances on record in which a head of chess has been alleged to have been found growing out of an ear of wheat. These are, however, all mistakes. There was one well known instance, of which a figure appeared some years ago in the *Farmers' Advocate* of London where the ear of wheat had a head of chess apparently growing from the base. It was found that the wheat head held a head of chess mechanically by means of the scales of chaff which had been broken off its own stem in picking it. This was submitted to Professor Saunders years ago and he would not touch it alone. He said: "I won't touch it because some one would say I have made a mistake about it." Having gathered together two or three witnesses, the wheat head was bent sideways a little and the chess head dropped out. There was no connection whatever between the two. It was plainly shown that it was a mistake. Very frequently the two plants are claimed to grow together from the same root. The fine roots of grasses frequently grow so closely together, that it is difficult to separate them. I am frequently told by people that they have actually found the two growing together on the same root but I always say "I don't doubt your word at all; but bring along your specimens and we will examine them together." I have had three of these brought to me, and although to the botanist, of course, the idea is utterly absurd, that they can be joined together, to the ordinary observer that is not the case. By washing out the roots in water, in every instance the plants separated easily; with plants having a great many fibrous roots, such as grasses of all kinds, including both fall wheat and chess, they will undoubtedly grow together; and the roots will intertwine, but there is no closer relation whatever between the chess and fall wheat.

Now the only importance of this question is this, a great deal of time is frequently wasted at Farmers' Institute meetings discussing this question, and I will just mention this for the benefit of the gentlemen present, that if you ever find the interest in farmers meetings lagging and the people in attendance getting tired, you can pull them together in just about five seconds by standing up and saying fall wheat has nothing to do with chess—they will jump up immediately all over the meeting, and you will have no more lack of interest for that session at any rate: each will want to give his experiences. I have tried it and know the remarkable interest that is taken in the matter. This is the trouble. Many think that it is a very important question. I think it is one of no importance whatever, and they are wasting time over a thing they cannot settle by discussion, but can very easily by experiment. Let me tell you, Mr. Chairman, how I tried to settle it.

One of my correspondents, through a member of parliament, wrote to me and asked me to try to solve the problem. I said I would try any experiment he would suggest. We wrote several letters to each other on the subject and finally I said: "I will send you the seed of fall wheat and chess and you can do anything you like to them. I will do anything you suggest and we will see if we can either turn chess into fall wheat or fall wheat into chess. Finally we each took 100 grains of chess and 100 of fall wheat. I took a witness and planted them myself and put a picket in with each grain. They were all sown last autumn and came up before winter set

in. They did not look much alike the first autumn, but the next spring they looked so much alike I could hardly tell them apart when they began to grow. The fall wheat as I have said was planted in the autumn and came up the same season, the next spring before the snow went off and when the thermometer was below zero, I uncovered half of the bed. After the snow melted, water lay for three weeks in the lower part of the bed. Some of the fall wheat was drowned out, but very little of the chess was injured. It is claimed by the advocates of the transmutation theory, that "freezing out" or "drowning out" will turn fall wheat to chess. Another contention is that "trampling" or "eating off" by stock will have the same result; therefore to give all the adverse circumstances possible, early in the spring I walked over the ground—I weigh more than 200 pounds, which I thought sufficient for the experiment, I threw all my weight on to the poor fall wheat seedlings and stamped them down into the ground as far as I could and left them so. Directly they began to grow I took a pair of scissors and cut off the tops of half the plants right to the ground. The result was that every seed of chess sown produced chess, and every grain of fall wheat which grew produced fall wheat. My friend said he could not quite understand it, and is going to try it again; but he will certainly get the same results. Now I think that this experiment was important for this reason. We had more than 3,000 farmers who came to the farm last year, and although some of them refused to acknowledge that they were convinced, many others were, and a few of the most positive have acknowledged they were wrong. If we can get only a few of these men believe it, it is going to do some good, for they will convince others, and there is more time wasted over this useless question than almost any other which comes before our farmers to-day.

NATIVE LAWN GRASSES—IMPOSITION BY DEALERS.

Another experiment that was tried with regard to grasses was in connection with the unnecessary waste which comes from importing seeds of grasses for lawns. All through our farming districts, farmers and others want a little piece of lawn about their houses. A farmer generally goes to town and buys 50 cents' worth of some lawn mixture, gives it to his wife or daughters, and says to them: "Attend to it as you like." Now, as a rule, this lawn is a nuisance to them. Unless a lawn is properly cared for, a farmer might just as well, or better, do without it, for a badly kept lawn is not an ornament to a house. To one who knows what a good lawn is, and that our wild June grass, which grows wild by every roadside, is the very best variety for a lawn, the question naturally presents itself: Why should they spend 50 cents for a thing that they can get far better for themselves along the sides of the roads at the end of June? Why, as a man is coming from church, he could pick enough seed to enable him to sow a splendid lawn. Careful experiments were tried last year to see which were the best grasses for lawns, at Ottawa. We procured all the grasses advertised as lawn grasses, and several of the mixtures, for the purpose of testing them. Different grasses vary just as much in colour as they do in appearance.

A feature of much importance in a lawn is that it should be of a bright and uniform colour. In order to demonstrate the unadvisability of having several varieties mixed together in a lawn, I chose some varieties which differed most in colour, and sowed the seed so as to form a grass Mosaic, in the pattern of the Union Jack. First the St. George's Cross was sown with the Hard Fescue, which is a deep blue green. Across this was now sown St. Andrew's cross of the yellowish green Sheep's Fescue. Both of these have hair-like leaves, and are very much in use on lawns. They are not very suitable, however, because in the hot weather they turn to a dull colour. Then there were left eight triangular patches between the limbs of these crosses, and I was able to separate eight grasses of distinct colours, which could be told easily by sight. The seeds took well and the figure was very conspicuous; it attracted much attention. When I asked visitors which grass had the best appearance for a lawn, in every instance they pointed to one grass, and that one is the one I have mentioned, our wild June grass (*Poa pratensis*, fig. 6), which sometimes we call Kentucky Blue Grass (when we want to pay a high price for it). The "Spear grass," or "June grass," of Canadians, and the "Kentucky blue grass," are identically the same thing. Lately I have learned that this seed is being shipped from western Ontario to Kentucky, whence we shall probably buy some of it back again at two or three times the price. Our June grass is not only one of the best pasture grasses of the country, but absolutely the best lawn grass nearly all over the world; it is certainly so in Great Britain and the north of Europe. It is indigenous to our country, and grows from the Arctic regions to Texas, so that any one who wants a good lawn can easily get the best seed for $1.25 or $1.50 a bushel.

FIG. 6.—JUNE GRASS.
(Poa pratensis.)

It should be sown at the rate of three bushels or more to the acre, and with that quantity there should be put in two quarts of white clover seed. This will give about the best lawn mixture that can be made. When we go to the seedsmen and get one of their lawn mixtures, we get ten, twelve or fourteen kinds of grasses. These only swell the price, and are a great disadvantage. As soon as you get rid of all the varieties but June grass, you are going to have a good lawn, but not till then.

AN ECONOMIC MIXTURE OF GRASSES.

FIG. 7.—RED TOP.
(Argostis vulgaris.)

Grasses are required for different aspects. Sometimes a man may have a moist farm and want the best grass for such a farm to mix with his timothy. The best that he can get is, I think, Red Top (*Argostis vulgaris*, Fig. 7). If he has a dry farm he should mix June grass with his timothy. This gives him a good stocky bottom. Red Top is better for lowlands than uplands. It is a well-known perennial native grass, which grows in wet bottom lands and flowers about the same time as timothy. It gives from one to two tons of hay to the acre, soft and of good quality. Red Top will grow well on marsh land, too wet for some of the better varieties, and forms a thick matted sward, which prevents the feet of cattle from poaching. It is generally considered a good grass in this country, but in England is lightly esteemed. It is just possible that the grass they have there under the name of *Agrostis vulgaris* may have decidedly different characteristics from ours.

By Mr. Carpenter:

Q. I suppose you recommend Kentucky Blue Grass as the best for permanent pasture?—A. I do for the basis of it. I think you might also grow with it Meadow Fescue, which is an exceedingly valuable grass. I would suggest Meadow Fescue, Orchard grass and Kentucky Blue Grass for dry land, and would put in all the three clovers, that is, Mammoth Red, a little Alsike and White Clover and some Lucerne, which has succeeded well in mixtures.

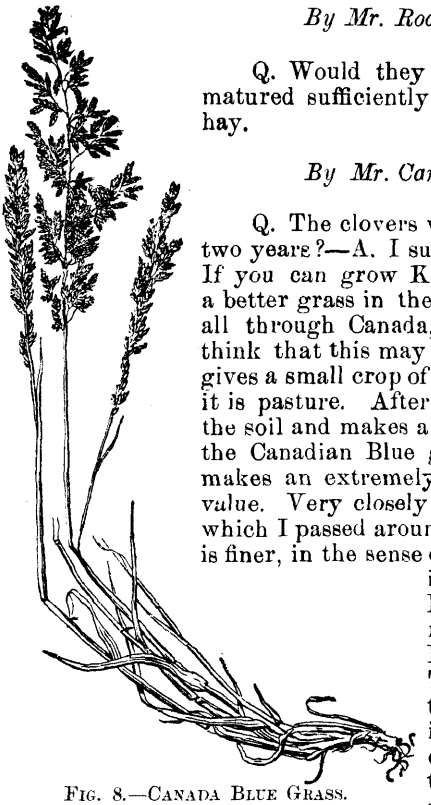

FIG. 8.—CANADA BLUE GRASS.
(Poa compressa.)

By Mr. Roome:

Q. Would they mature so as to make good hay?—A. They matured sufficiently near enough to one another to make good hay.

By Mr. Carpenter:

Q. The clovers with us won't remain in the ground more than two years?—A. I suppose so. Most of the clovers are biennials. If you can grow Kentucky Blue Grass, I do not think there is a better grass in the world for pasture. It grows spontaneously all through Canada, but seems to be very little thought of. I think that this may be so for this reason. It flowers in June and gives a small crop of hay; but it is not hay that you want from it, it is pasture. After flowering it sends out runners all through the soil and makes a thick mat of tender leaves. On rock pastures the Canadian Blue grass or Wire grass (*Poa compressa*, fig. 8) makes an extremely rich, heavy hay, which is of high nutritive value. Very closely allied to the Armless Brome grass (fig. 5) which I passed around, is the Rocky Mountain Brome grass, which is finer, in the sense of being a thinner and more slender grass. It is not such a heavy yielder nor so valuable. It is one of our native grasses and grows naturally over a wide area in the North-west. Here is another grass which is called White Top, White Bent or Water Grass; it is sometimes used for seeding down wet pastures. It is, however, too small for a pasture grass and even for lawns. It is of rather too thin a texture to be of great value; the leaves are all small and of a pale yellow, and it dries up very easily unless well supplied with water.

WESTERN QUACK GRASS AND RYE GRASS AS FODDERS.

The grass to which I will now call your attention is a western form of what farmers here know very well as Quack grass. It is claimed to be par excellence the very best grass which grows for hay. This opinion is also endorsed by Dr. George Vasey, the eminent botanist of the Department of Agriculture at Washington, and it is supported by the best of all evidence, chemical analysis. It is, however, a very close relative of Quack grass, and as such must be introduced into cultivation with the greatest caution. If you examine the specimen sent round you will observe how closely it resembles Quack grass in appearance. It is, however, a better fodder grass, having finer leaves and more of them. This is the grass that above all others of our native species has been the support of the western cattle ranches. It grows through Manitoba and the North-west, but is wonderfully improved by cultivation. I have, therefore, distributed seed to farmers, even in districts where it grows naturally.

Another valuable grass of the same family is the Western Rye-grass (*Agropyrum tenerum*). This has given excellent results but has not the same running habit of growth, as it forms tufts.

By Mr. Roome:

Q. Is the Western Quack grass doing well here?—A. Yes, upon the experimental farm. Such a grass, however, is not required in this part of Canada, as we have others which will give a heavier crop of hay and will not give so much trouble to eradicate. Some of the Blue-joints will grow on the same land and produce far

more hay. We must not, however, make the mistake about our Eastern Quack grass of supposing that it has no good qualities. It is a nutritious grass and if we find that a field which can be used for pasture, has become overrun by it, we need not take much trouble to eradicate the quack as it will form a useful addition to the pasture mixture; and when the field is broken up, it will not give more trouble than the other grasses.

HOW BEST TO ERADICATE QUACK GRASS.

There is not, as I say, much trouble in getting Quack grass out of land if its habit of growth is observed, for the reason that it does not root deep. As a general thing, when a farmer wants to clean land of Quack grass he ploughs as deeply as he can; but this is the worst thing he can do for it only plants it a little deeper and gives it a better chance. You must plough shallow to destroy Quack grass. Plough shallow in the autumn; harrow or cross-plough in the spring, keep ploughing shallow and the surface rough and you will get Quack grass out of the land without much trouble.

SUMMER PASTURE GRASSES.

By Mr. Hughes:

Q. Are there any grasses or combinations of grasses that would be good for ordinary rolling dry lands in summer months when as a rule our pastures are now very bare? In the July, August and September months there is usually very poor pasture on dry ground. It would be a great advantage could some combination or grass alone, be found giving good pasture results for any seasons.—A. Of course that is the greatest difficulty in the grass problem, and is the contingency which has called forth the use of ensilage. We have found that among the 300 different kinds of native grasses there are some which will grow in dry districts. There are some which grow actually in pure sand. Of these dry land grasses a few occur to me now, Sheep's Fescue is one. The Canada Blue grass, or Wire grass (*Poa compressa*) is a very rich grass; species of *Andropogon* and *Sporobolus* are others. None of these dry land grasses produce a heavy crop of hay; but Sheep's Fescue and Canada Blue grass with a much smaller amount of foliage will give the same amount of nourishment, and the cattle will get fat on them. On the western plains the true Buffalo grass (*Buchloe dactyloides*) does not grow more than two or three inches high, but it is so thick that you can sleep on it like a bed. It is so palatable to stock that drovers bringing their cattle up from the south, find if they strike a patch of this grass, they can hardly drive the cattle off it, till it has been eaten down to the ground. This grass is essentially a dry ground species, and grows in patches from about as big as this room to 30 or 40 feet in diameter. It spreads from a central point as though all had started from one seed originally. Some kinds of Drop seed grasses are also dry land grasses in the west. We have wild Timothy grass in the benches in the west, one of the Mühlenbergias already mentioned. By careful cultivation and study of these grasses we shall, I think, discover before long those most suitable for the different soils and districts. Some grasses may be of value for special characteristics, as has been ascertained with regard to the habits of Chess. I have a letter from the botanist of the Oregon station in which he says Chess is there worth $8 a ton, while Timothy is worth $10. The hay is thus of almost the same value. It is a rich and heavy grass, and has a special value, from the fact that it will grow on alkaline land where Timothy will not succeed.

By Mr. McMillan:

Q. Have you succeeded with any of these grown in large quantities?—A. This year we are going to have one-eighth of an acre plots. We have had so far plots of one square rod.

By Mr. McMillan (Huron) :

Q. I think it would be well if you went into fields and experiment as a farmer would experiment ?—A. Results are checked in this way. We know that around the edges of a plot where you have cultivated you always get a better crop than in the centre. Allowance is made for this in taking our weights. We take that piece off and take the inside, and thus the luxuriance due to the effects of that outside cultivation does not interfere with our calculations. The figures are calculated from the square rod. In the United States, they have usually only a square yard of each kind, and it was in recognition of the fact that you could not get a true estimate from a yard that we adopted the size of a square rod. A rod would be about double the area of this table. I think it gives a large enough patch to test a species thoroughly and to arrive at a fair estimate of its value. The grasses have been kept growing on that same land now for five years. I have had no manure put on it until last spring, when it had a light top dressing of stable manure. Farmers do not, of course, as a rule, keep their land in pasture for that length of time.

DURATION OF HAY CROPPING.

I doubt if there is any part of Canada where hay should be cut more than two years running to obtain the most satisfactory results. Of course, it is done sometimes for convenience as in the case of a pasture near a homestead. In such pastures it is well to manure the land by top-dressing it, so as to keep up the yield.

Passing on from grasses, I will merely mention, *en passant*, that I have been making a special study of weeds and their eradication. There are one, two or three general rules for the eradication of weeds which I think every farmer in the country should know about. There is now, I am glad to see, considerable agitation for an agricultural education in the public schools of Ontario. There is a little book recently published, and although it sells for the small sum of 35 cents, it is worth far more than that to every one who reads it. This little book is the production of Professors Mills and Shaw of the Guelph College, and it is of such a useful character that any one who has any interest at all in agriculture will find it invaluable. This book is worth its weight in gold to farmers for the information they will find in it.

Q. What is it called ?—A. The Principles of Agriculture.

THE CHAIRMAN.—It has been adopted by the Education Department for the Ontario public schools.

MR. FLETCHER.—It is a capital little book, and touches briefly many of the practical questions which come in working a farm. It merely touches the essential principles, but a man or boy who will read it, will have his interest awakened, and will wish to know more. It is a splendid little book for this purpose. I think this is a good opportunity of mentioning it, although it might seem to some to be a little out of place.

By Mr. Kaulbach :

Q. Where are they to be had ?—A. Any bookseller will get them for you.

POTATO BLIGHT, PATHOLOGY AND REMEDY.

I will now refer to another subject of enormous interest to the whole country. I suppose it is not exaggerating to say that, year in year out, almost fifty per cent of the potatoes grown in the world are destroyed by the disease known as potato-rot, which has now spread to all countries where the potato is grown. It is the same disease which thirty or forty years ago was credited with being the sole cause of the frightful famine and fever in Ireland, which in one year carried off three millions out of eight millions of people. The life history of that disease has been worked out, for potato-rot is a disease, and a clue has been obtained to a remedy. Last year

I stated to the committee that experiments would be made in this direction, and during the last season those experiments were carried out. The results are such as to induce me to state to the committee that there is a remedy for potato-rot and that, if our farmers would try it, though I will not say they will save their whole crop, yet beneficial results, which will more than pay for the applications and the labour, will follow from the treatment which I suggest. Here is a stalk of an ordinary potato, of the variety Holborn's Abundance, a variety which has shown a great immunity from this disease. Of the two plants I hold in my hand, both grew together in the same row. One was treated and the other was not. The first was practically dead for six weeks while the other was well covered with green leaves, simply because it was treated with a solution which can be made without much trouble and at very little expense.

BORDEAUX MIXTURE—HOW TO MAKE AND APPLY IT.

This is known as the Bordeaux mixture and is a mixture of sulphate of copper and lime. I have found so far that the most inconvenient thing for the farmers to get is the fresh lime, and they actually write to me to ascertain where they can get lime. It did not occur to me that there would be a difficulty in this respect. They can get slaked lime without much trouble, but it is very difficult to get unslaked. We have found, however, that if one quarter more of slaked lime is added to the mixture it will do almost as good work as the fresh lime. The mixture is composed of 6 lbs. of sulphate of copper and 4 lbs. of lime added to 45 gallons of water. The sulphate of copper, of course, dissolves, but the lime is merely in suspension, when the whole is mixed together, it is sprayed over the foliage of the potatoes. The result is that the potato keeps the green leaves for six weeks longer when thus treated, than it does without treatment. It means that the potato plant is kept growing all the time, and that the leaves are preserved so much longer to perform their functions of laying up a supply of nourishment in the tubers.

By Mr. Carpenter:

Q. How much of slaked lime do you use?—A. One quarter more than of fresh lime.

Q. Is it mentioned in the committee's report?—A. I believe I referred to it last year. I tried eight different mixtures in all, and the one I have mentioned and which I suggested to the committee last year proved as satisfactory as any other. This is made as follows: Dissolve 6 lbs. of copper sulphate in 10 gallons of water; throw this into a barrel which will hold 45 gallons. In another tub slake 4 lbs. of perfectly fresh lime in 6 gallons of water. When all the lime is slaked, pour it slowly through a strainer into the copper solution; a coarse gunny sack tied over the head of the barrel answers well for this purpose. Afterwards fill the barrel up to the top with water, which will make 45 gallons; stir thoroughly, and all is ready for use. It is best to use powdered copper sulphate.

By Mr. McDonald (Huron):

Q. How do you apply it?—A. It can be applied with an ordinary watering can supplied with a fine rose, but much more easily and with less expense by means of a spray pump.

By Mr. Dawson:

Q. How often should the plants be sprayed?—A. I think about twice will be, as a rule, sufficient. I tried it last year, beginning the first of August, but I think that was a week too late. I would say that the first spraying here should be done about the last week in July.

By Mr. Roome:

Q. You would recommend it whether the potatoes are affected or not?—A. I would.

By Mr. McDonald (Huron) :

Q. What length of time should elapse between the two sprayings?—A. About a fortnight.

By Mr. Kaulbach :

Q. What would you consider to be the correct time for applying in the Maritime Provinces?—A. In Nova Scotia you are later than we are. I think the rule followed in France is to spray when the potatoes are about a foot high, but I do not think it is safe to lay down a rule. The proper time must be discovered by careful observation in each district.

By Mr. Dawson :

Q. How would it do to spray near the blossoming?—A. It would not be safe to make that a rule, because some varieties may vary much in the time of blossoming, and some do not show any blossoms at all.

By Mr. Carpenter :

Q. Will you suggest any stage of growth for the application?—A. In every locality, farmers know only too well what the rot is, and when it shows itself as rust on the leaves. They can smell it in the fields. I think in Nova Scotia, Col. Blair, our superintendent at the Nappan Farm, told me that it usually appeared towards the end of August. Here at Ottawa it is at the beginning of that month. In Western Ontario, I should think it would probably be the first week in July. I do not think it would be well to delay the first spraying in western Ontario later than the middle of July.

By the Chairman :

Q. Two sprayings would be sufficient?—A. I think so.

Q. At what intervals?—A. At intervals of about two or three weeks.

By Mr. Roome :

Q. You claim the disease is a parasite?—A. Undoubtedly. It is a disease due to a parasitic fungus which lives inside the plant. We sow it ourselves. When we sow the potatoes in the spring, the disease is inside the seed potato as dry rot. The most approved method of planting potatoes now is considered to be to take medium-sized whole potatoes, and not cut them at all. I would recommend the old plan of cutting up larger tubers, and for this reason: when you cut them, you are able to see whether they are affected with the rot or not. If this course be adopted, it will give an opportunity for discarding all such seed potatoes as are found to be diseased. If you plant affected potatoes, it is obvious that you are planting the disease. The parasite grows up inside the stems, and in this locality it shows itself about the first week in August in the shape of little brown patches on the leaves. If you examine them under a microscope, you will see a little mouldy growth, which is none other than the "rust" or summer form of the potato rot. There are now produced little spores or seed-like bodies which are carried from the affected plants to the other plants, so that the disease spreads from plant to plant, and some of the spores are washed down into the ground where, coming in contact with the forming tubers, they germinate upon them and cause the well-known autumn form, the wet-rot.

By Mr. McDonald (King's, P.E.I.) :

Q. In Prince Edward Island we had no rust last year until after the potatoes were taken up; but some of them afterwards rotted badly?—A. Perhaps they were put in the root house or shipped away in a damp state. It is better to leave them out in the open air for a day to get thoroughly dried. The spores from the diseased plants which are washed down into the soil attack the tubers and penetrate their tissues. There they may remain dormant until the next spring and not develop till the potato begins to grow. On the other hand, under favourable conditions of moisture and warmth, rot may appear in the same autumn, either before the potatoes are dug or after they are housed.

By Mr. McLean:

Q. Your remedy would prevent that?—A. Sprayed on the leaves it destroys the spores. In that way, it checks the spread of the disease by preventing its attacking other leaves.

By Mr. McDonald (Huron):

Q. Supposing the potatoes did not rot until after they were dug, would it prevent the rot if they were washed in that solution?—A. Probably it would, but I do not think it would be necessary if they were dried before they were put away. By leaving them out a day to dry, it would prevent the spores on the outside from growing as they must have moisture and warmth.

By Mr. Cochrane:

Q. If you are satisfied in your mind that you plant these spores and they are developed from the seed planted, did you ever test any operation on the seed?—A. Yes, experiments were tried and it was found that, the spores being inside the potato, they cannot be reached. A patch of dry rot will sometimes extend more than an eighth of an inch into the substance of the potato, but you can see on the outside only a little depression.

By Mr. Roome:

Q. Do you think that the disease will propagate in the potatoes after they are put away?—A. I do.

By Mr. McMillan (Huron):

Q. What about scattering a little dry lime on them?—A. It is a good plan. It dries them up. If you see that the potatoes are attacked by rust—and you can tell it at once, for you can smell the characteristic odour, at least I can detect it directly, if I go near infested fields,—it is advisable to dry the potatoes at once, and if you cannot market or use them, sprinkle dry lime over them; this is a far better plan than to leave them in the ground where they will surely rot. I will cite an instance of the rapidity with which this disease can spread. About the 10th of August I left Ottawa, and there was a patch of potatoes I was watching in a garden in Stewarton. I intended to have sprayed them, before leaving, but I forgot to bring the pump. I had to go off, and I said to myself: "I suppose they will be all right for a week." I really knew, however, at the time that it was running a great risk. I cheated myself, I should say. I came back and the whole plot was ruined. The disease started just at one little corner. There were just about two infested plants in one corner and the pest had spread from them all over the patch. I told the gardener to dig them, and starting from the end where we had seen the rust in the first place we found there were more rotted tubers there, and the number became less and less till we reached the other end of the patch. In short, by one week's neglect a good crop of potatoes was virtually ruined.

By Mr. Semple:

Q. I don't think it is the seed at all. I think it is the season. Parties planted potatoes early in the spring and the drought was pretty well over before the dry weather set in, and they had far less rot than those who planted later. There were other places in my neighbourhood where the bugs had eaten the potatoes pretty well off and the potatoes were small, but there was not as near as much rot as where the tops were fully developed, and the potatoes reached their full size.—A. It is quite possible in some of the earlier varieties such as Lee's Favourite, to secure the crop before the disease develops.

THE SOURCE OF POTATO ROT DEMONSTRATED.

The fact that potato rot is due to the attacks of a parasitic fungus has been clearly demonstrated, and also the development of the parasitic plant has been

traced, inside the tissues of the potato plant, from the tuber up through the stems to the leaves where the spores are formed; the spores under favouring conditions, infest either the leaves of neighbouring plants, or, falling to the ground, infest the tubers. The presence of rot in a crop, it is true, is largely affected by the meteorological conditions of the season, and we find that this is the case with all fungous diseases, but the season does not produce the disease; it only gives the conditions necessary for its development, provided that the spores are present; and unless these are there, the rot cannot occur. This is the reason why I have been advocating the use of preventive treatments which shall protect fruit and other crops against their fungous enemies whatever the season may be. With regard to the greater development of the disease where there is a heavy growth of foliage, I am not prepared to say whether this is the case or not; but if it be so, it is probably due to the same reason as causes a more probable occurrence of epidemics in densely populated places, where hygienic conditions and the food supply are not properly regulated.

By Mr. Semple:

Q. In the very dry season in Ontario there was scarcely any rot.—A. That is frequently the case; but on heavy lands of restricted area it will often develop when there is none in adjacent fields. In fact, some people, having observed this, say, though it is not actually the case, that clay lands cause potato rot.

MR. COCHRANE.—The rot never develops on loamy land; it is on the clay land.

MR. MACDONALD (KING'S, P.E.I.)—I quite agree with what Mr. Fletcher said about the disease developing under conditions of warmth and moisture. There was not a sign of rot when our potatoes were taken out of the ground; but as soon as they went into vessels they commenced to rot at once.

MR. FLETCHER.—Now, I should like to tell you, gentlemen, of an experiment we tried on a large area at the farm. I had six plots of potatoes, 33 feet across the head and extending 60 rows into a field. They were in the middle of the field, and were sprayed with six different mixtures. From the distance of nearly a mile we could see that plot in the field as a distinct green patch, while all the other potatoes around it which had not been sprayed were ruined. The effects upon the crop were also marked. Where the leaves had been preserved by the application, the potatoes were better and almost entirely free from rot. The improvement was far greater than would pay for the application—sulphate of copper (blue-stone) costs only four cents a pound, and the value of the lime is, of course, according to the distance from the point at which it is produced, but that is not large. It took about 60 gallons of the mixture to treat the six plots: so you see it is not very expensive, and it certainly paid. The chief primary expense is that of a proper spraying pump, but it is going to pay any one to get one. In the Ottawa district, last season all the potatoes were much diseased, except within a few miles of the farm. I anticipated that we should have a bad season here; last June was extremely wet and July was extremely dry. Our experiments were interfered with by the drought, which actually killed some of the potato plants before the time for treating them. I should have had otherwise exact figures to lay before the committee of the yield of these plots to allow comparison with the untreated plots. We are not likely to have such another season next year.

By Mr. Bowers:

Q. Would excessive use of this experiment be hard on the plant?—A. No, sir; I tried more than double the strength I have recommended and it had no bad effects on the plants.

By Mr. McMillan (Huron):

Q. How would it do to spray potatoes with Paris green to destroy the potato bug. How would it do to mix Paris green along with your solution?—A. Quite well—I did that, but you must use the Paris green which is far better than London purple. London purple is merely a subterfuge because it is a little cheaper. There

is no doubt that the colour green is now recognized as that of something poisonous or dangerous, and for this reason also the use of Paris green should be encouraged, by preference. It can be mixed with the Bordeaux mixture, and the lime in the Bordeaux mixture reduces the chances of injury from the Paris green. Probably one of the most important discoveries written, in the last two years, is the fact that where it is necessary to spray fruit trees with delicate foliage with Paris green, by mixing twice the amount of lime it materially reduces the caustic effects. We can now actually spray peach trees which we could not do before. Before we had to make the Paris green so weak that it had no effect on the insects. Now, by mixing twice the weight of lime with Paris green we can spray it on tender plum, cherry and peach trees without injury.

By Mr. Roome :

Q. Won't that destroy the poisonous effect of the Paris green on the insects ?—A. No, sir, we find that it does not. As a matter of fact, it does not affect the poisonous properties of arsenic putting lime in it, it only reduces its causticity. We found that the results of mixing Paris green in the Bordeaux mixture were most satisfactory.

By Mr. Roome :

Q. Generally you think the lime diminishes the disastrous caustic effects of the Paris green ?—A. Yes. Experiments have shown that this is the case, and the result is that Paris green can be used of double the strength in mixtures which contain twice as much lime as Paris green. Paris green is an aceto-arsenite of copper.

Q. It makes an insoluble mixture ?—A. Yes, practically, but still it has the effect of destroying fungi without injuring the plant.

By Mr. Macdonald (Huron) :

Q. Would it be sufficient to mix lime water with Paris Green. Would it be of sufficient strength ?—A. I don't know about that. I have never tried it and it would take a very large quantity of lime to make the lime water strong enough, but I have found that it is troublesome to mix the milk of lime because it is hard to get the lime so completely slaked that it is all kept in suspension ; but experiments with lime water with all the lime precipitated, were not carried out by me.

THE CATTLE HORN-FLY.

Now, there is just one more point I should like to bring before the committee. It is with regard to the cattle Horn-fly which has been introduced into Canada, during the past season. This is a fly, the origin of which has been traced back to Europe. It came to North America some five or six years ago and last summer during July, I received the first Canadian specimens, these were sent from Oshawa.

I have brought specimens with me this morning so that it may be known by sight to the members of the committee. It is a small insect but extremely injurious. From reliable data, I find the annoyance which the fly is capable of causing to cattle is such as to reduce the quantity of milk and flesh formed, in some instances, by 50 per cent. Cattle that were affected by it in one particular herd that I heard of, only put on the same amount of flesh in three months, that otherwise they should have put on in two. You will observe that it is a very small fly—about one-third the size of the house fly. Many false reports have been published about its boring into the horns of cattle. This is incorrect, it does not do so. This report, however, did a very good thing ; it thoroughly frightened the farmers all through the country, and induced them to take some steps towards remedying the injury. Generally it takes farmers three or four years to get stirred up, to fight against a new insect pest, but in this particular case, actually before the thing had been in the country a month they were all awake and applying remedies. Generally of course they ap-

plied remedies which were unsuitable or unnecessarily expensive. One was smearing the animals with tar, which got them into a horrible mess and did not do much good.

A WARNING TO FARMERS.

I fear that the pest is going to be troublesome all through Canada next year. It has already spread from Sarnia to Boucherville in Quebec, and it would be well for our farmers to know how to treat it. I worked out its history in Virginia with the Assistant U. S. Entomologist four or five years ago; but it was only at the end of July, last, that I got from an Oshawa farmer specimens of this fly. As a remedy it may be remembered that any greasy substance whatever put on the animals will prevent the flies from biting them; but it is not a very easy or cheap thing to get a greasy substance put on a large herd of cattle. It means considerable expense to everybody who has to use it. Of course it is necessary to go to some expense sometimes to meet unexpected injuries.

MOST ECONOMICAL AND BEST REMEDY FOR HORN-FLY—HOW TO MAKE AND APPLY IT.

The great question, however, is, what is the cheapest remedy to give the best results. The cheapest that we can get in this case, in the shape of a greasy substance obnoxious to the fly and not obnoxious to the animals, is a mixture of coal oil and soap suds, which we call the kerosene emulsion. It is made by taking half a pound of soap and boiling it up in one gallon of soft water. If ordinary soap is not used, one quart of home-made soft soap will be the equivalent. The whole should boil until the soap is thoroughly dissolved, and then it should be turned into twice its quantity of coal oil. This should be done by putting it into a washing tub or some other receptacle away from the fire. When the boiling soap suds have been added to the coal oil, the whole should be beaten together with a whisk, or what is better still, churned with a syringe until the whole takes the consistency of a thick cream. While it is still hot, you should dilute it with nine times its volume of soft water, which will give you thirty gallons in all. I mentioned this preparation to the committee last year. When the emulsion is warm, it mixes very easily with water. If not wanted for immediate use, it can be put on one side and the water added when it is required for use. When the emulsion has been diluted, it can be applied directly upon both animals and plants without injury: this is best done with a spray pump. It will also answer just as well as McDougall's and other dips for lice on cattle, and is cheaper. With a spray pump or syringe, one can cover an animal all over with a dew-like deposit which requires very little of the wash, but is sufficient. Then by turning up your sleeves and rubbing it into the hair with your fingers, all lice will be reached. The effects of the first application when used for the horn-fly will last four or five days, when it must be renewed at intervals of four or five days. After three or four applications the deterrent effects will last for a long time.

Q. It will not injure the animals?—A. Not at all.

By Senator Read:

Q. We do not find the fly interfering with our animals, only near the horns?—A. When they settle on the horns they are not doing any harm at all. They only gather on the horns between the shoulders and above the tail in those place where the animals cannot dislodge them. (Fig. 10.) Serious injury is sometimes done by the animals licking themselves on the sides of the udder and inside the legs until large sores are made. The fly worries incessantly and causes, as stated, great loss both in milk and in flesh. A convenient time to spray is after milking. One man with a pump can spray the animals. Prof. Atwood, of Virginia, has devised an ingenious method. He makes the application with a knapsack pump, fitted with a cyclone nozzle, and the work is done just after milking time. His method is as follows:—The animals are driven into an inclosure, through a gate which will only admit one

at a time. A man with a knapsack pump on his back stands at the gate and sprays one side of each animal as it passes; they are then driven out again, and the other side is treated in the same manner. The quantity of liquid thus applied is very small, but has been found sufficient. Previously, Prof. Atwood employed two men at

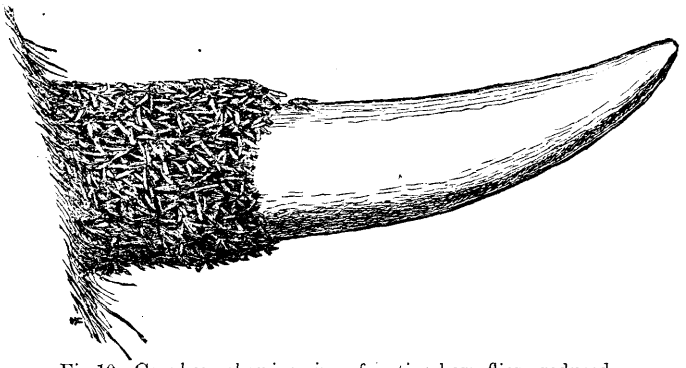

Fig 10—Cow-horn showing ring of resting horn-flies—reduced.

milking time, and used one or two pints for each animal. Care must be taken when milking that the teats are clean before beginning to milk ; but ordinary precautions would prevent any trouble on this score. This remedy is the cheapest and most effective means of keeping these flies off the animals.

By Mr. Dawson :

Q. And other flies as well?—A. Yes, other flies as well. I have used it satisfactorily this winter in treating cattle lice. There is hardly a herd to be found in which there are not some lice. It is most important to keep cattle free of lice. Some farmers think lice do not do much harm ; others will say that warbles are a sign of health, but both of these views are very erroneous. Warbles cause a large festering tumour inside, within which the large maggots, nearly an inch in length, with sharp bristles on their bodies, live, and every time they move they create great irritation, which produces pus upon which they live. There is in fact an angry inflamed sore, and the flesh underneath it is practically diseased from the irritation, and it is certainly a great injury to the animal, and in no way a sign of good health, but a disgrace to a farmer who allows his animals to be thus tormented, for he can get rid of them with comparatively little trouble and to his own great advantage.

By Mr. Carpenter :

Q. There is some little change in the details of that emulsion that you have suggested to-day. I suppose it will be in full in this year's report?—A. I will mention the exact formula. Take two parts of kerosene (or coal oil), to one of soap suds to make the stock emulsion; of this mix one part with nine of water when required for use.

By Mr. Roome :

Q. I suppose you are quoting it more fully in this year's report?—A. Last year I avoided giving the figures when speaking because they could be got in print in Bulletin 11.

By Mr. Kaulbach :

Q. The fly—is that not the ordinary black fly which is a pest in the spring of the year?—A. No, it is about the same size, but it is a different family altogether. The true Black fly is a water fly.

LIFE HISTORY OF THE CATTLE HORN-FLY.

I would like to give you in a few words the life history of this fly. The remedy of keeping the flies off the animals is very unscientific. If you merely drive it off your own cattle it will go on some one else's. The proper way is to prevent it breeding. It does not breed in the horns of the cattle, nor on the animal itself at all; but it breeds in the fresh dung. (Fig. 11.) Directly the dung is ejected the flies will fly down

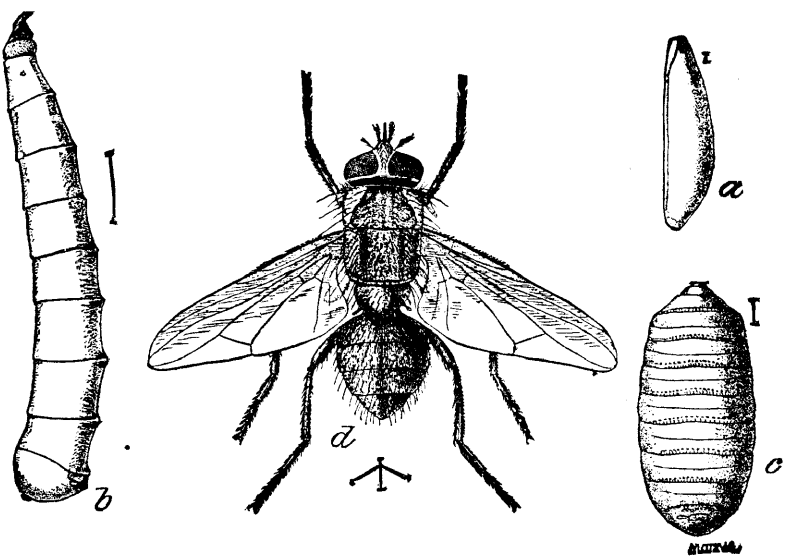

Fig 11—The Horn-Fly. *a*, Egg; *b*, maggot; *c*, puparium; *d*, adult fly in biting position—all enlarged.

and lay their eggs on the surface. From these eggs in 24 hours the maggots hatch, and in about a week they have gone through all their stages, and they are ready to leave the dung, which by that time is almost dry. They can live in it only while it is moist. By the end of a week they burrow into the ground to go through the other stages. They take altogether about a fortnight to pass through all the stages. Any means, therefore, by which we can reduce that manure to a dry state renders it unsuitable for the maggots to live in. This can be done by rolling or brush-harrowing the droppings. A brush harrow is not often seen in this country, but as its name implies, it is made of boughs of trees. In England, it is made of hawthorn from the hedges, and is dragged over the pastures to renovate them. In the same way such an implement would break manure pats, so that in hot weather they would soon dry up, or be washed away in wet weather by the rain. If this or a similar treatment were practised, the manure would not be long in a condition for these insects to live in it. One difficulty arises from the fact that the cattle are allowed to run on the roads, or are turned into large pastures where it would be difficult to treat the droppings; but we shall have to do as is done in the United States where cattle are infected with cattle ticks. It is now supposed that the cattle tick has some subtle connection with Texas fever, and it has been proposed to keep cattle out of large wooded pastures and in smaller closures until they have been cleared of those parasites. Similarly, we shall have to keep our cattle in small pastures, for a time, where we can treat them and the manure, for this fly is

going to spread and be a great pest for a few years. After that I hope from its history in the United States that it will reduce in number. In the meantime, it is well that all should find out as soon as possible the best way of treating it in the cheapest and most effective manner, and it was with this object that I prepared Bulletin 14 on the subject.

By Mr. Roome:

Q. Does that fly affect the sheep as well as the cattle?—A. No, it attacks only the horned cattle, not even horses.

By the Chairman:

Q. How would that emulsion do for treating horses troubled with the horse fly?—A. I have tried it on one or two occasions, but never systematically. I put it on the neck of a horse when riding through the forest and it certainly had the effect of keeping the flies from biting the animal. I dare say it would do very well. There is one thing about the kerosene emulsion, made as I have advised: it does not hurt the skin at all, nor the hair. Cattle that were treated for lice had a better appearance than the others. They had a far better appearance than when they were treated with the usual tobacco solution, for lice.

By Mr. Girouard (Two Mountains):

Q. I would take the liberty of asking you to repeat that recipe. Half a pound of boiled soap; boil with one gallon of water, and then add to that a double quantity of coal oil?—A. It must be mixed away from the fire. The coal oil must not be brought near the fire.

Q. And then you must add nine times as much water?—A. Yes; when the emulsion is made, you take one part by measure and mix it with nine of rain water.

By Mr. Dawson:

Q. How often will it be necessary to spray the cattle with this mixture to keep off the horn fly?—A. It appeared at Ottawa last summer late in the season. I applied the emulsion three times, and I found that the flies were kept off for a long time. The first application kept them off for about four days, when I repeated it, and the effect of this application lasted longer. I put it on a third time, and that brought us to the end of the season; but I think three or four applications will probably last for a long time, even earlier in the season; but this has to be found out next year.

Q. If the cattle were out in the rain would it wash off?—A. Not so much as the tobacco dust and the tobacco solution, because it is an oily mixture.

MR. FAIRBAIRN.—I understood you to say that the cattle were not affected about the horns by these flies. My experience was that is where they annoyed our cattle. We lost several cattle in our neighbourhood from that fly altogether about the horn. My own experience was that cattle running in the bush where they could rub their heads on the brush were not harmed, but out in the open field they were affected, and had it not been for rubbing this mixture of tar and coal oil on them, I am satisfied we would have lost all our cows last year. Several died from the effect of that fly, and it was altogether about the head and horn.

ERRONEUS REPORTS AND THEORIES ON THE HORN-FLY.

MR. FLETCHER.—I should like to ask, sir, if you actually saw this or merely were told of it, for I received probably 15 or 20 letters from people saying that they

had lost cattle. I wrote immediately to them, asking: "Did you see the dead animals, and can you tell me exactly how they were affected?" and in every instance the answer came back—and I may say that this has been the experience of the United States entomologists as well for four or five years: "It was not I who saw it; I heard of it; it was Mr. So-and-so. Somebody else told me," &c. I have not been able to trace up a single instance in which I could find the man who had actually had an animal killed by the flies. We know this, that they do cluster on the horns and make them in a very dirty mess with their excrement—a condition which is very unsightly, and which has given rise to the idea that they were bored by the flies, but I have never found a single instance where there was even severe inflammation around the horns. One ingenious theory was advanced that the horns were eaten away and became corrugated; but as I pointed out to a visiting farmer who told me this at the experimental farm, about half of our cows had their horns similarly furrowed. My contention is that the flies will settle where there is least possibility of the animal dislodging them, and this is on the horns and at the base of the tail.

Mr. FAIRBAIRN:—Of course, what I say was only what I was told. I did not see it myself.

By Mr. Cochrane:

Q. Do the flies lay eggs all the time?—A. Some insects lay eggs from a few hours after the time they assume the perfect state. In this instance they certainly lay eggs within a day. These eggs hatch within 24 hours; the maggot stage lasts a week or a little more, the pupal stage as short a time as four days in hot weather, and the insects will attain maturity in about 15 to 17 days. I have already published a bulletin, as I have said, on this subject, which is issued both in French and English. I shall be glad to send copies to any one who may desire them. It is a very important thing that we should tackle this pest at once, on its first appearance in the spring, before they begin to propagate.

By Mr. Bowers:

Q. This fly has not got down to the Eastern Provinces yet?—A. Not yet. In conclusion, I may say that I am very much obliged to you, gentlemen, for affording me this opportunity of appearing before you. As I have stated on previous occasions, I am always glad to be of service to you or your constituents whenever an opportunity occurs. And with regard to injurious insects, I would mention that out of about 100 of the worst pests that attack farm products every year, we can suggest remedies or give some useful information about at least 85 of them, so as to enable farmers to ward off or alleviate their attacks.

By Mr. McMillan (Huron):

Q. There is a gentleman in my constituency who discovered in the milk given from one of his cows, two or three little, white, hair-like worms. Have you any idea what that would be? I never knew of anything of the kind before.—A. No, I am afraid I do not recognize the species from your description. I should have liked much to see the specimens. There are some maggots which might occasionally get into milk by accident, but I know of none having been found in milk freshly milked from the teats. Specimens were sent to me from New Brunswick last year of maggots taken from the flesh of sheep that had been blown, and the maggots had eaten into the flesh of the sheep, but I never heard of such a case as you mention.

Having read the preceding transcript of my evidence, I find it correct.

JAMES FLETCHER,

Entomologist and Botanist to Dominion Experimental Farms.

COMMITTEE ROOM 46, HOUSE OF COMMONS,
THURSDAY, 16th March, 1893.

The Select Standing Committee on Agriculture and Colonization met at 10.30 a.m., this day, Dr. Sproule, chairman, presiding.

Mr. J. W. Robertson, Dairy Commissioner, was called and addressed the committee as follows:—Mr. Chairman and gentlemen,—With your permission I would like to put before the committee some aspects of four different branches of the work which is under my control as dairy commissioner and agriculturist. To save the time of the committee, I will abstain from a discussion of details of the work and try to present in clear outline some of the general principles upon which it is being conducted and the main objects sought to be attained through it. I desire to make a few remarks on my journey to Great Britain, and state what I tried to do there and what I was able to accomplish.

THE PURPOSES OF A VISIT TO THE BRITISH MARKETS IN 1892.

I went to sell the cheese and butter from our experimental dairy stations; to make such arrangements as might seem desirable for marketing subsequent shipments from the same sources; to look into the newer preferences and needs of the British markets in regard to our food products, such as butter, cheese, beef, bacon, eggs and poultry. Butter and cheese were the commodities in which I was mainly interested, but as opportunity offered and time permitted, I made inquiries in reference to these other articles. Besides, I had it in view to use the butter and cheese which had been sent from our experimental dairy stations, to advertise the excellent quality of Canadian products, to make known as far as I could the food producing resources of Canada, and to present information upon the educational and experimental work which the government is carrying on for the benefit of the farmers. I had these matters in view, as well as selling the products from the experimental stations. I had it also in mind to discuss with the merchants of Liverpool, London, Manchester and Glasgow, questions of trade concerning such matters as qualities, packages, branding, weighing methods, and the most convenient routes and means of shipping, in order that Canadian goods might arrive there in the most satisfactory condition. I was furnished with a large programme of work; and when I got to the end of my time of absence from home, I think I was able to accomplish most of what I had set out to do. Let me give a review of the different objects and a very short statement of what I was able to overtake.

PRICES REALIZED FOR BUTTER AND CHEESE.

In selling the cheese and butter, I got top market prices at the time, for all that was sold, with the exception of a small quantity of butter from New Brunswick, which we could not sell at the prices I wanted on account of the dulness of the markets. Some of it did not fetch satisfactory prices. A most demoralized condition prevailed in the butter market in Great Britain through January and February, from large shipments of cheap butters from Germany as well as oleomargarine. I was also able to sell the mammoth cheese which we made at the dairy station at Perth, in Lanark County; and I would like for a moment to vindicate my own course in connection with that. A good many farmers and others have said to me: "Wherefore the need, or wherein is the advantage or wisdom, of spending so large a sum as $3,000 or $4,000 on a mammoth cheese?"

I was able to sell the cheese for the full amount it cost, including the cost of the labour, the press, the hoop and the truck that carries it, with this additional advantage to the country, that the merchant who purchased it will spend $15,000 in

advertising it through the papers in Great Britain, and exhibit it in every large city of commercial importance in Great Britain and Ireland, at his own expense, as Canadian cheese. It will thus advertise Canadian cheese and call the attention of the great consuming public to the magnitude of our dairy business, and the resources of our country. After all, the investment of a few thousand dollars for a few months has not been a foolish move on the part of the department. I may state that Mr. Van Horne, president of the Canadian Pacific Railway, has been good enough to promise that he will arrange to send this cheese through to Chicago by special train and will have the facts advertised as to the date and the time of arrival at all stations on the road, so that the farmers and others, who may want to see the largest cheese in the world, may see it as it passes to the World's Columbian Exposition.

I made arrangements for the sale of future shipments in the four large distributing centres of Great Britain, viz., Liverpool, London, Manchester and Glasgow.

I venture to believe I was successful in awakening a spirit of interest and curiosity on the part of the retail merchants about our Canadian food products. There is an amazing ignorance on the part of the retailers of the sources of the food which they handle. The wholesale merchants know well the exact localities whence they come, but the retailers and consumers are densely ignorant regarding the countries and districts from which the articles come which they sell and buy from day to day.

The way in which their attention can be attracted is through the newspapers and public meetings. There is commercial virtue in the making of something concerning our country or its products, so unique and interesting as to graft them into the every day life of the people as topics of common conversation. A traveller who tried only to sell Canadian cheese would meet with little success in advertising Canada; but any one who can make the newspapers discuss the politics and philosophies of Canadian goods and foods, and can make them themes of conversation at the breakfast tables, can strengthen the demand for, and the consumption of our products, and thus help to increase the prices.

CANADIAN PRODUCTS IN RELATION TO ENGLISH PREFERENCES.

Another object of my mission was to investigate the needs and newer preferences of the markets. It is necessary that we in Canada, who live so far distant in miles from those who consume a large proportion of our more concentrated food products, should know their preferences. I have met a great many merchants as well as producers in this country, who say: "Well, let us send what *we* like, and let them take that or go without." The Englishman is not going to be bulldozed into unwilling obedience in regard to what he shall eat, no matter what he submits to in other respects. If he does not get exactly what he wants, put up as he likes it, in butter, cheese, bacon or beef, he will leave those foods and take to some other class of food. In Canada, we have been successful with our cheese trade, because our merchants have met the exact preferences of the consumers. Those countries which have not done so have been left out of the race. Let me give you an instance. In some parts of Canada it has been customary to produce a class of cheese which is not preferred by the consumers in London. It is of the colour that is not to their liking and the body is too soft for their taste. That class of cheese used to sell for a much lower price by the pound than cheese adapted for the London consumers. Recently discriminating selection on the part of our merchants has sent that class of cheese to Manchester, where it pleases very well. While our cheese from Quebec has been improved in reputation and quality, some of the advantage has resulted from directing that class of cheese to the markets best adapted for it.

In that regard my visit to Great Britain will help the Canadian producer by furnishing information which he might get from the merchant, and which, perhaps, has been tendered to him in the past, but which he had not heeded because of the feeling or suspicion that the merchant in giving advice might be influenced by selfish motives. Some cheese-makers and butter-makers have declined to act on the recommendations frequently given them by merchants. We have no time to educate the taste of the consuming public in Great Britain. One would need a few centuries

of leisure to do that. Over there, one cannot but be struck with the prominent and peculiar aspects of the life of the people. I took many opportunities of studying other aspects of life, than merely the consumption of butter and cheese. If you map out into six sections, the time and thought that an Englishman gives to all subjects, food, clothing, house, family, religion, amusements, politics, philosophy and literature, you will find that five-sixths of his conversation is taken up in discussing the one subject of what he eats, has eaten, or is going to eat. As a result he is a discriminating judge of what he should eat, and in selecting what he wants for his own palate. We who eat simply and innocently what is put before us, do not pay much attention to these matters, but an Englishman will go to a restaurant and select the particular chop or steak which he wants to have cooked for himself, and woe betide the cook if he does not prepare that particular one to his liking. When such a custom pervades nearly the whole community, it will pay us to learn what the people want, and to provide what they want and will pay the highest price for. The whole consuming public of Great Britain has a strong aversion to strong flavours in food products. The average Englishman dislikes strong cheese, and I have known many cases in which strong-flavoured cheese sells at 4 d. a pound less than mild cheese. They prefer mild-flavoured food of all kinds, and for that reason our Canadian dairy butter has gone out of consumption. The people who used to buy strong butter to spread on their bread, now prefer mild margarine. It is sold to them bright, clean-looking and sweet, and is displacing the use of pure butter on the tables of many of the people of Great Britain. If we make mild flavoured cheese and butter, and put them up in neat, attractive packages, I do not think that any imitation can compete successfully against the pure article. I can remember that within the last twenty years, the great masses of the working people in the large industrial centres in Great Britain found it difficult to get enough wholesome food to keep body and soul together. Now they are able and willing to pay for exquisites and delicacies for their tables. Shop-keepers have told me that the wives of workingmen in England are most fastidious in their choice of foods, and that they select the finer flavoured kinds, even if they cost high per pound. It therefore devolves upon us to do our utmost to please that class of consumers, and we can meet their requirements and preferences from the advantage which we possess in the matter of climate.

IMPORTANCE OF BRIGHT, NEAT PACKAGES.

The English people are critical also as to appearances of packages, and the merchant thinks nothing of knocking 2 cents a pound off his bid for a tub of butter, if the tub itself looks shabby. A shop-keeper wants three profits off any article which he introduces. For instance, the reputation of Canadian winter-made butter has still to be made. For the present there is a prejudice against it. On the Danish butter, which is no better than ours, the shop-keeper is satisfied with a smaller profit. One of them told me that with a new article like Canadian winter-made butter, he had to push it. "In order to make it go at the beginning," he said, "I want a large profit." The shop-keeper wants to buy cheap, because it costs him more trouble in pushing it on the market.

BRITISH PREFERENCES FOR NAMES.

The English people are conservative as to names. For "Best English" they will pay 20, 25 or 50 per cent more, under that name, than for the same article otherwise labelled. Sentiment has a great influence with them in that respect. There is a large share of sentiment combined with business in the ordinary consumer when he buys food. In some shops I found English cheese which was being sold at 22 cents a pound. Cheese of as good and in some cases of better quality than that (the best Canadian make) was selling at 14 cents per pound. There was a difference of 8 cents a pound due to the name. In some cases, I found that the cheaper priced goods were superior both in nourishing properties and flavour to those designated "Best English." Although "Best English" was fashionable as a label, the product was of only commonplace quality. We lose something in this

respect, by not having our own goods known under their proper distinctive name. In many instances I found that the finest Canadian cheese was being sold as "Best English." If our cheese was somehow indelibly branded as "Best Canadian," people, *in time*, would begin to look for it under its own name; they would ask for it as such, and eventually we would get a relatively higher price for it. The same observations apply with regard to beef. I found that the best Canadian beef was being sold in many places as the "Best English." A pound of the best Canadian beef would not command as high a price under its own name as if it were sold as English. One service I was able to render the Canadian producers in that regard was by calling attention through the ordinary channels of communication—the newspapers—that our Canadian products were excellent and wholesome; and I endeavoured to induce people to ask for them at the provision shops under their own name. I found also that some importers on the other side had rather deficient information concerning both names and qualities of Canadian dairy products. The Provision Trade Association of Bristol—one of the large importing centres—had under consideration a resolution stating that they would not accept cheese from "the French section of Canada," as they call it, as finest Canadian cheese, because they had the opinion that several years ago cheese from that district was not fine. I was able to answer that objection, and offered to supply them with cheese from the province of Quebec, which is now selling for as high a price as cheese from any other part of Canada. We want to impress upon the British consumer that he should buy by quality and not by name; that he should judge an article, not by what it is called, but by its intrinsic worth.

If we can make our own name, the name "Canadian," the synonym for excellence and honesty in our products, we will soon find the advantage. I found a difference in the qualities of cheese which are preferred in the different markets. Manchester wants a different style of cheese from Liverpool or London. I think I will be able to recommend certain districts to make cheese adapted to the preferences of these different markets. The faults that were complained of most in our goods were the shapes, sizes, and packages. In general appearance they are not nearly so attractive as those of the English-made cheese.

The style, as shown by the workmanship in finishing the article is often quite objectionable. These little things to which our people have not given attention, are magnified into great defects and cause a discrimination against us in regard to prices. We also find that our butter packages and cheese boxes have been telling against us. The cheese makers have been in the habit of buying boxes for one or two cents less than the price at which they can be made and nailed up sufficiently strong to carry their contents uninjured. Cheese arriving in broken boxes will sell for one-half cent a pound less than if the boxes were neat and undamaged. The good box costs 12 cents altogether, and it holds 60 or 70 pounds of cheese. There may be a loss of 30 or 35 cents for a saving of two cents in the price of the box. I had some boxes made in accordance with my own ideas as to strength, fit and finish; and there were six boxes a little bit broken out of a hundred, while in other shipments which I saw there were not more than six boxes whole in the hundred. That is a matter in which it will pay farmers to insist upon the cheese makers paying enough to get substantial and nice looking boxes. Our boxes from Ontario are better than those from the other districts in Canada and those from the United States. Yet there is much room for improvement.

The French people are the greatest sinners in this respect, as they send the most wretched looking of all the boxes I saw in the English markets. That is contrary to the traditions and practice of the French race in other affairs. In France, the people have the happy faculty of putting up what they manufacture in the most pleasing and attractive manner; but in the province of Quebec the people have been neglecting the appearances of packages.

IMPORTANCE OF BRANDING TO PREVENT FRAUD.

In the matter of branding, I think it would be advantageous to have the cheese made in Canada, branded "Canadian," on the cheese as well as on the box. The

making of this compulsory might be a little distasteful to some of the cheese makers at the beginning, but if it were made permissive for the first year, I think most of the cheesemakers would avail themselves of it. The members of the Produce Exchange of London made very strong representations to me on this matter, saying that Canadian cheese should be branded "Canadian" on the cheese as well as on the box, because they had good reason to believe that very frequently cheese were tendered to them on contract under the name of Canadian cheese, which was not produced in Canada. One way to guard against this misrepresentation would be to have the name "Canadian" branded on the cheese when made and on the boxes afterwards. I think we might do this with advantage. We should insist on having the name of the country where the cheese and the butter are produced, branded upon the outside of every box and package which is shipped from any Canadian port to any foreign port. I would not like to see any regulations made which would be harassing, and which would tend to restrict the trade which has grown to considerable magnitude in handling cheese from the United States through our country to Great Britain. This came up in the course of my investigation. I found that a large quantity of cheese from the United States, northern New York State and the Western States of the Union, went through our country in bond, and was bought in Great Britain as cheese from the United States. The bulk of the business is carried on honestly and honourably, in my opinion. There is very little misrepresentation. The business is done mainly by Canadian merchants, and it has grown up for the reason that Canadian merchants are the better judges of the quality of the goods their customers in Great Britain want. The men in this trade in Canada have grown up, having a practical knowledge of the trade in all its branches.

The trade in New York and Chicago is largely managed by men who are in a sense speculative business men, instead of being men who are personally practically acquainted with the qualities of the goods they handle. Therefore, our people are able to handle them with better results. Besides, ours is a cooler route than the other routes to the Atlantic seaboard. It is because we have these two advantages that I would not like to see any restriction imposed, which would make the trade difficult to be extended or any regulations harassing to those who carry it on. I think if it were enacted that the brand "Product of the United States" should be upon the outside of every box or package before it left a Canadian port for a foreign port, it would not interfere with carrying on the trade in a pleasant and satisfactory way. If the cheese should come to Montreal without bearing this brand the proper customs officer or any other official appointed to do so, could see that the brand was put on, making a charge of two cents a box. The transportation company should be required to pay the amount with power to charge it against the consignee as necessary expense incurred to comply with government regulations. That would be a simple way of doing it without any offensive regulations or irritating restrictions. I think also that some one in Montreal should be given charge of looking out for shipments of cheese and butter, when they go through in bond and go direct from the railway cars or local steamer into the ocean steamer, in order to see that the cheese and butter which are not warehoused or stored in bond, carry the brand that designates their origin. There is quite enough room and work for an inspector there to look after Canadian interests. I make this mention, in this regard, because I was favourable to a movement like this last year. The matter was discussed in western Ontario and from the published reports I received of those meetings, I found that the farmers were expressing hostility towards this departure, because it had been supposed that the inspector would be there to brand the cheese, grade it, and make himself disagreeable generally.

One buyer objected to an inspector at Montreal, apparently because the inspector could prevent any cheese going through from Chicago, from being put on the steamer without bearing a designating brand of the country of production. The hostility was on the part of those who have been reported as shipping cheese from Chicago and other western points quite largely through Montreal without any brand at all being on the boxes which designated where they were made. That was reported to me in Liverpool, London and also in Montreal.

I think we should brand on all cheese made from skimmed-milk the words "Skim-milk;" and on cheese made from whole milk the word "Canadian." I would leave the word "Canadian" off skim-milk cheese. We are not anxious to advertise it as from this country. We should have a regulation prohibiting the making of any filled or imitation cheese. There is none made in Canada now; but during the last winter a large joint stock company was reported as proposing to start this business, they were restrained from it by the statement that the government would certainly prohibit the making of filled-cheese as in the case of oleomargarine.

By Mr. McMillan (Huron):

Q. There was a Bill before the House last session to make it imperative to have a butter and cheese inspector at Montreal, and to have sales subject to that inspection?—A. I think that would be quite impracticable. Any food product which is perishable in its nature cannot be branded or graded like flour. Butter may be graded No. 1 to-day, and if exposed to hot weather in transit, it would be No. 3 to-morrow. In that way a government brand upon butter would be subjected to ridicule on the other side.

BRITISH IMPORTS OF CHEESE, BY COUNTRIES,—VALUES.

The imports of cheese into Great Britain in 1891 were as follows:—

Holland	£ 761,387
United States	1,779,260
Canada	1,991,597
New Zealand	74,257
	£4,606,501
All other countries	206,903
	£4,813,404

I believe there is a preference among the wholesale dealers over there for Canadian cheese over that sold under any other name; and if we maintain the fine quality we shall continue to retain a large share in the cheese trade with Great Britain.

BRITISH IMPORTS OF BUTTER, BY COUNTRIES,—VALUES.

The imports of butter into Great Britain in 1891 reached a total of £11,591,183, made up as follows:—

Sweden	£1,269,187
Denmark	4,865,842
France	3,038,063
Canada	187,398
Australasia	270,880
All other countries	1,959,813
	£11,591,183

It will be seen from the foregoing figures that Great Britain imports butter to the extent of two and a half times the value of the cheese. Her imports of margarine, in 1891, amounted to £3,558,203. It will, therefore, be readily observed what a capital chance there is for the extension of our trade in butter to the Mother Country. Considerable butter might be sent from Canada with advantage to ourselves, reaching there in October, November and December. Those who have any influence with the large transportation companies should endeavour to impress on them—the steam-ship companies especially—the need for providing refrigerator accommodation for our shipments of butter in the fall and early winter before the cold weather prevails.

THE QUALITY OF BUTTER WANTED IN ENGLAND AND HOW TO PUT IT UP.

The qualities of butter which the English people want are a fresh-made flavour, without any evidence of staleness. They also want a very mild butter—that is, not heavily salted. Further, they want it pale in colour. In our attempts to secure the market, much depends on the manner in which the butter is put up. Let me show this tub to the committee, for a moment. The British importer is a great stickler for requiring a nice-looking package. The tub which I now show to the members of the committee, I brought, in order that the gentlemen might, in their own districts, advise the shop-keepers to try and introduce a package like it. It is different from the tubs which are generally in use, and I will point out a few of those differences. In the packing of butter, where tubs have been finished with iron hoops in the past, these hoops have not been painted, and the rust from the hoops stained the wood and made the tub look nasty on the outside. The farmers and shop-keepers assert that paint on the outside of the tub will affect the flavour of the butter, but that is a mistake. The paint on the outside will never affect the quality of the butter inside. Butter might be kept in this tub for six months, and it will look as well as the first day it was filled. The English purchaser, if he finds the butter inside to be of good quality, will pay a good price for it. The ordinary butter package of to-day is made with a band on the cover, which extends over the side. In handling, it is often broken and the cover falls to pieces. This has a cover of double thickness, made with a shoulder which fits into the tub. The extra cost of the cover, the lining of paraffine and the painting outside, is about 12 cents per tub, or less than a quarter of a cent per pound of butter. The butter will bring, say from 1 to 1½ cents per pound more. We have also branded on the top of the cover, the words, "Dominion of Canada." I may explain that this is one of the tubs in which we ship butter from the Dominion dairy stations.

By Mr. Semple:

Q. What do those tubs cost each?—**A.** Nearly fifty cents apiece; but they are made of specially good wood.

By Mr. Hughes:

Q. Supposing you gave a contract for a large quantity of them, probably you would get them for much less?—A. No, that is what we pay for them in large quantities.

Q. Where did you obtain them?—A. From the E. B. Eddy Manufacturing Co., of Hull.

Q. How much will a tub hold?—A. About fifty pounds. There is no reason, however, why an ordinary cooper, who makes butter tubs, should not make them like this. He can apply the paraffine wax to the inside with a brush.

By Mr. Hutchins:

Q. Is a spruce tub as good as one made of ash?—A. It is not as good unless it is lined inside with wax or parchment paper. The Australian and New Zealand butter boxes are lined with paraffine paper. The result is that the butter, on arriving at Great Britain, has a sparkling appearance on the surface, and looks for all the world like fresh-made butter. Let me give an instance of how an Englishman chooses butter. It shows what may be gained by our people by paying attention to little matters. The British retailer goes to buy butter from the merchant in his warehouse. He will use a shilling or the end of a knife or a key to take a very little off the very surface of the butter. If he uses the butter trier he will run it down close to the side of the tub. In each case, the butter is judged at its very worst points. Then, having tried the butter and fixed the standard in his own mind, he will endeavour to purchase the whole quantity he wants on the verdict of that examination. On the other hand, the man who wants you to buy butter and invites you to examine it, will bore down the middle of the tub and ask you to judge the whole from that point. In commerce, the man who wants to buy, tries to reduce the standard of quality to as low a point as possible, while the man who wants to sell

desires to make the standard as high as possible. Now, if we pay attention to these little points, it will be money in our pockets. We want a nice, clean looking tub, with good cover and proper lining. When we use these it will be to our material advantage.

By Mr. McMillan (Huron):

Q. What price did you get for the winter butter sent to the old country?—A. We only sent butter made in the summer.

Q. Did you not sell any of the butter made at the winter station—the Mount Elgin one, for instance?—A. That station had only been started for two weeks before I left.

Q. There is a statement in the report of the butter sent?—A. That is for the winter before—the winter of 1891-92. I reported upon that last year.

Q. I see it only brought 19 cents a pound, according to the Auditor-General's report?—A. I have not looked at that; it certainly brought more than that.

Q. That is the statement in the Auditor-General's report; the average price realized was $19\frac{37}{100}$ cents per pound. I was a little astonished when I saw that, because, in going over the dairy reports, I found that 24 and 25 cents a pound had been realized on the butter which went from the Ingersoll station?—A. I will look into that. I think this may be the reason of the apparent discrepancy. Some of the accounts of the sales did not reach us until late in the season, and perhaps they were not paid in to the credit of the receiver-general until after the close of the fiscal year, but will appear in this year's accounts.

Q. Some of the cheese you bought must have been shipped this last year?—A. The cheese was all shipped.

Q. I observe that in the Auditor-General's report that 22,000 were shipped but 79,000 were bought?—A. That is a misprint, as only a small quantity was carried over. In 1892 a quantity of cheese was bought from June onwards. It was held and sold in London and Liverpool last fall and winter. There was a margin of profit in the handling of that cheese.

Q. Shall we get a detailed statement of that?—A. Certainly, in my annual report.

By Mr. Hughes:

Q. Might I ask the price the finest butter retailed at in London?—A. Thirty-two cents a pound when I was there.

Q. What was the average cost of delivering it there from here?—A. Two and a quarter and two and a half cents, including freight, commissions and everything else. The butter I took from New Brunswick, made in the summer time, sold all the way from 116s. to 95s. per cwt., which would net from 23 cents down to about 18 cents for summer butter.

By Mr. Featherston:

Q. That would be for 112 pounds?—A. Yes.

By Mr. McGregor:

Q. The market varies there as it does here?—A. Yes. Last January it was one of the worst markets in butter, for many years.

Q. And cheese?—A. The market was strong, and what we took over from this side was sold at from 49s. to 56s. 6d.

Q. Did the cheese from the experimental stations bring more than the ordinary cheese?—A. It sold at the same price as the best cheese there.

Q. It shows we are making good cheese all round?—A. It sold a good deal higher than the average price, and it sold the same as the best cheese.

By Mr. McMillan (Huron):

Q. What prices on the average did you realize from the butter you took over last summer?—A. That is not all sold yet. It ran from 116 shillings down to 95 shillings per 112 pounds. Excepting one shipment, (one lot of cheese made at

Perth, Ontario), the butter and cheese we handled were handled for the farmers who furnished the milk, and they are to get the prices which were realized net. Whatever is handled by us is handled as trustees for the patrons, and not as government property. There has been one exception to the rule. A portion of the butter made at Mount Elgin, during the winter of 1891–92, was sent to Liverpool and held there by the consignee contrary to my instructious, and against all the advice I could send. It was sold at the end of May, against grass-made butter, having been kept in his warehouse two and a half months there. That butter sold at a low price, and the fault was not that of the farmers, and not mine, except in so far as I sent it to a man who did not carry out my instructions. I recommended to the Minister of Agriculture that that butter be paid for at the same price as the other butter which was sold promptly on arrival. The loss to the department from the whole transaction was about $250. The farmers were not paid any fictitious values, as a statement of the facts was made in the circular which was issued to them at the time.

CANADIAN SWINE PRODUCTS IN GREAT BRITAIN.

In the matter of swine products I have only a few observations to make. I found an active demand in London and Liverpool for Canadian fed and Canadian cured bacon; it stands next to the Irish and Danish swine products which have the highest reputation and fetch the highest prices. I have nothing to say that would look like a complaint of the conduct of the men running the packing houses in Canada; still it is my duty to say this: That Canadian cured and Canadian fed bacon was selling in London and Liverpool for within five or six shillings as much per 112 pounds as Danish fed and Danish cured bacon; whereas the Danish farmers last summer are reported to have realized from 2 to 3½ cents per pound more, live weight, than the Canadian farmers, and the freight rates from Denmark are not much lower than the freight rates from Canada. The packing house men and the farmers can draw their own deductions. As our Canadian name gets better known our products will be sought after at such enhanced prices that the men who cure them and handle them will be able to pay higher prices to the farmers and still make a good profit. In fairness I must state that at the Danish packing houses, a larger revenue is realized upon the offal and by-products; and the wages of the workmen are lower than in Canada.

By Mr. Featherston:

Q. Were these prices for live weight?—A. My reports are from the men who have been in the trade in Denmark, where swine fetched 9 and 9½ cents per pound live weight.

Q. Did you get on the track of any of our live hogs?—A. I saw no live ones from Canada, I confined my inquiries to bacon and hams. Considerable quantities of our bacon and hams are slightly retrimmed for the trade, washed, smoked and sold as the "best Ayrshire" and the finest Irish. We can get over that by continually agitating and impressing the fact upon the mind of the public that our goods are excellent and not inferior to any. The consuming public will ask for them under their own name.

By Mr. McGregor:

Q. Do you find any difference from how the animal was fed?—A. What is called corn-fed bacon will not fetch within from ten to fifteen shillings per hundred weight as much as the bacon fed on mixed cereals and by-products from the dairies such as we send from Canada.

By Mr. Cochrane:

Q. Do you know anything as to how they feed swine in Denmark?—A. Yes, largely on mixed grain; and barley is fed with by-products from the dairy, such as skim milk and buttermilk. For several years they have been going in for a breed of swine like the Chester white or Improved Large Yorkshire crossed with the Berk-

shire. My information is that these are the breeds most used in Denmark now; I have heard of some Tamworths also being there.

BRITISH IMPORTS OF SWINE PRODUCTS, IN 1891.

The imports into Great Britain of swine products in 1891 amounted to £11,760,469 stg. We can increase our output of swine products very much by turning our coarse grains that way. We might double the output in one year.

By Mr. McGregor :

Q. Do you think it would be a greater profit than selling grain ?—A. Yes, very much.

By Mr. Temple :

Q. The prices sometimes drop so low that the people stop raising pork ?—A. One reason has been in this that there has not been a regular supply. Swine products cured properly and exported regularly to the English market will pay. There have been only two packing houses in the export trade until recently, and there is a good demand for Canadian-fed and Canadian-cured bacon.

MR. MCMILLAN (Huron.)—One of the great impediments to fattening hogs is where they keep them in large quantities disease is apt to make its appearance amongst them.

By Mr. Tyrwhitt :

Q. Did I understand you to say that pigs were worth $9 a hundred live weight in Denmark ?—A. That was the price reported last summer.

Q. And the freight is no greater from Canada than from Denmark ?—A. Practically no greater.

By Mr. Featherston :

Q. The net hundred pounds ?—A. The net hundred pounds.

CANADIAN BEEF IN THE MARKETS OF GREAT BRITAIN.

Now in the matter of the beef trade. To discuss the live stock trade satisfactorily would absorb the whole of my time this morning and I must be content to present only one or two aspects of it. At the large agricultural conference which I attended while in London, it was stated from the platform by a member of Parliament who said he could furnish the data required to prove his statement, that one retail butcher in the Midland counties of England had accumulated a fortune in five years, of £200,000 by selling the best American and Canadian beef as the "Best English." The gentleman who was speaking was addressing the conference as an English farmer, interested in getting the best prices for the British home products; but it struck me that if a man could acquire a million of dollars in five years, by handling our beef under a wrong name that Canadians ought to get a larger share of the ultimate retail price. A rightful share of the profits would come here if we got the purchaser to know that when he is buying so-called "Best English" beef he is really purchasing the "Best Canadian." Let me give you an instance of how this works. I went in to an average butcher shop in a country town where I was visiting. I praised his shop and asked the butcher about his trade. Then I put the question to him, "Do you sell American or Canadian beef?" to which the reply was: "You can find American and Canadian beef only in the rough shops where the cuts are cheap." Beef was being sold in his shop at 10d. to 1s. 1d. a pound, or from 20 to 26 cents per pound. A little later, a livery man of the same town drove me a few miles into the country. He was not averse to talking; in fact he was very communicative and wanted to talk. Presently I brought the subject round to the trade of the village butcher, whom I had interrogated a little while before. I asked the livery man if the butcher received any dressed beef in canvas from Liverpool. "Oh yes," he replied, "half a railway truck full every week." I pursued my line of investigation until I

was convinced that the man who only sold the "Best English," according to his own statement was really selling three-quarters of the best American or Canadian-fed beef and selling the whole under the name of "Best English." Now, I think the English farmer has good reason to complain; and we have a right to complain also that we do not get the excellence of our beef brought fairly before the English public.

A good many articles and letters have appeared in the newspapers over there, on the part of Scottish farmers especially, in which an ardent desire is expressed that our trade in stockers should be resumed in the summer. They are not at all pleased with the action of the Imperial Government in putting restrictions on the shipment of our cattle after they are landed in Great Britain. The Scottish farmers have been making a good deal of money by fattening our lean cattle. As one instance of this, let me mention it as illustrating the folly of sending lean cattle to Great Britain. I use those words advisedly. A good many farmers have not, as yet, facilities for fattening cattle; and it will be a hardship to them if the stocker trade is discontinued. But if our farmers could fatten cattle to a finish they would make more money. I met one man in Aberdeen County who had just returned from the city. He had just bought a quantity of Canadian hay at £7 per ton with which he was going to feed the lean steers which he had got from Canada awhile ago. He had bought Canadian steers, intended to feed them on Canadian hay and will make money out of them.

By Mr. Cochrane:

Q. If I had finished my cattle to the same state of perfection that he did, would I have got the same price?—A. No, hardly that.

MR. MCMILLAN (Huron).—My experience is, that if the Scotch buyers get satisfaction from one particular Canadian exporter, they will go to him a second and a third time. Last year I sent over a lot of 70 head, and Mr. Swan, the commission man of Edinburgh, said thirty of them were equal to the best British-fed cattle he had seen for a twelve month. Every farmer who fattens cattle ought to be careful as to the quality. If he does that, the same purchaser will come to him year after year as they have come to us for four years.

MR. ROBERTSON.—And give you an advanced price?

MR. MCMILLAN.—Yes, an advanced price.

THE SELECTION AND PACKING OF EGGS FOR THE BRITISH MARKET.

The next matter I have to mention is the trade in eggs. I found, particularly in Manchester, that Canadian eggs bore an excellent reputation in the trade. In London also, the reputation stood well. The only circumstances that I heard mentioned against them was the fear that some of them might be stale and rotten. When a feeling of timidity like that spreads through the trade, it takes a long time to eradicate it. If we want to get our eggs to that market, it will pay our farmers to get them to the local merchants and packing houses regularly and quickly.

The eggs should be collected once or twice a week and put at once into refrigerating compartments. Gathering them in that way we will have a large and a steady demand for our products.

By Mr. Cochrane:

Q. The handlers are more to blame than the farmers?—A. They are both in some measure at fault.

By Mr. Hodgins:

Q. What proportion would be spoiled?—A. The wholesale merchants told me that if half a dozen or fewer eggs in a case were spoiled, it destroyed the retailers' confidence in them and they would not buy them at all under any name. It was not the percentage of spoiled eggs; it was the fact of their being there at all that destroyed confidence and brought prices down.

By Mr. Roome:

Q. Are you of the opinion that we can make it a paying investment to ship to England?—A. A good many merchants asked me to find them the names of merchants in Canada who could supply them regularly. They consider that they can make a profitable business out of it.

By Mr. Cargill:

Q. Eggs are graded over there, are they not? That is, graded as to the different sizes and sold accordingly?—A. They are not sold in specific, defined grades. They are sold according to their size and quality.

DEMAND FOR CANADIAN POULTRY IN GREAT BRITAIN.

I think in the matter of poultry, Canadians may develop a large trade with Great Britain. That market seems a long way off to be reached with fresh poultry. In Liverpool I examined a shipment of turkeys shortly after they arrived. The feathers had been left on the birds, and they were not even drawn. They were shipped in rough boxes, and these turkeys arrived in most excellent condition. I plucked the feathers from the breasts of some of them, and the flesh was as firm, fresh and sweet as the day they were killed. They were being sold like hot cakes at 9d. per pound. It was reported that the shipper made £600 sterling out of that small shipment. I found on inquiry that instead of there being an active demand only before and after Christmas, that there would be a capital demand for Canadian turkeys up to March. I think we might develop a trade in this with great advantage, because Canadian farmers can grow turkeys quite as exquisite in flavour, as tender in meat and as cheap as they can be grown in any country. The men who buy turkeys now, properly fattened and prepared for market, can handle a larger quantity with profit.

HOW TO PREPARE POULTRY FOR SHIPMENT.

By Mr. Featherston:

Q. What sort of boxes?—A. About two and a half feet long by two feet wide by less than one foot deep.

Q. Small boxes?—A. Yes.

Q. Do they put anything in the crop?—A. I am informed that a solution of borax is used to prevent any small quantity of food which may be there from fermenting. They are pretty well starved before they are killed.

By Mr. Roome:

Q. Why don't they draw them?—A. The English customer in the Liverpool market will not buy them, and they keep better with the feathers on.

By Mr. Cochrane:

Q. That was 9d. per pound with the feathers on. They sold them as they received them?—A. Yes.

By Mr. Featherston:

Q. Did you notice any in barrels?—A. I did not see any in barrels, but I noticed that birds picked and drawn were not wanted in Liverpool. The feathers acted as a preserving protection, and gave the flesh a really nice clean appearance.

By Senator Perley:

Q. Were all the feathers on them?—A. Yes.

By Mr. Featherston:

Q. They ship them in barrels with their feathers on?—A. I did not see them in barrels.

Mr. FEATHERSTON:—They starve them a day. They bleed them and bring them in with their feathers on and allow them to cool nicely, and when properly cooled they barrel them up and head them up the same as you would apples.

By Senator Perley:

Q. How long will they keep in that way?

Mr. FEATHERSTON:—Splendidly till they get them there. Mr. Dawson, of Brampton, does that every year.

MR. ROBERTSON'S RECEPTION IN GREAT BRITAIN—A SUCCESSFUL MISSION.

There are only a few matters more to mention in connection with my English trip, because, as I said in opening, I must not detain you with details. One of the objects of my mission was to reach the public ear and eye with an intimation which would be remembered, of the excellence of the qualities of the Canadian products; to announce to British farmers what the government was doing in the way of agricultural education through the experimental farms and dairy commissioner's office, and to give some information on the food producing resources of Canada. I might mention to the committee that I had a unique privilege and advantage in reaching England, being the bearer of letters from His Excellency, Lord Stanley of Preston. I mention this because in half a dozen ways and on many more occasions, His Excellency has done very much to promote the interests of agriculture in Canada—(Hear, hear)—for which he has not received, so far as I know, full credit in public. While I was able to get a large amount of space in the English and Scottish journals for Canadian affairs in connection with agriculture, a considerable share of that came from the advantage I had in carrying letters from His Excellency. While I have been congratulated on all hands for the success of my mission, it is my duty to say that, in this case the power upon the throne deserves most of the praise.

I need not speak of the meetings beyond the fact that both in Liverpool and in London I was given most enthusiastic receptions from the merchants there. Time did not permit me to accept further invitations which were extended to me from Bristol, Manchester and Glasgow. The Liverpool merchants had arranged to have the proceedings of the meetings thoroughly reported, and let me say that although some have supposed that the articles which appeared in the British press must have been paid for to a pretty loud tune, there was not a single cent of money spent in that way. It was all done by the editors and reporters as a matter of courtesy, and in the interest of their own readers. This aspect also may be worthy of notice, seeing that the committee have to do with colonization. While the reports of my addresses in Great Britain were quite full, these reports were also copied largely in the continental papers of Europe.

I have received recently papers from Sweden and Denmark giving a translation in full of a report of one of my addresses in Great Britain published for the benefit of the farmers in Sweden and Denmark. I think that will have a decided influence in the direction of getting the best class of emigrants from these countries to come to Canada, in view of what is being done here to enable the farmers to better their circumstances and follow their business in the most successful way. The reports of the meetings themselves were quite lengthy. I have twenty sheets here of clippings of original reports in the best papers in Great Britain. The whole multiplied by the number of copies issued foots up some 550 miles in single column length.

There are a great many matters which I must leave out to-day. I attended the great national conference which met in London to discuss agricultural depression. I have been twitted since I came home of either ascending or descending into the arena of political party discussions by expressing opinions upon protection in Great Britain. Some of the newspapers have honoured or abused me by basing editorial articles on my references to that unprotected subject. I discussed protection in this sense in England. I attended a large conference in London, where every reference favourable to protection—(a protection against Canadian butter, cheese, beef, wheat and other products)—was received with uprorious applause. Every kind of food product we send from here was to be taxed for the benefit of the British farmer and land owner; and in the intensity of my desire to serve Canada, I objected to that kind of protection. Besides, most men will find on going to Great Britain, that if they desire to secure any public attention to the work they are trying to do, they must

introduce into whatever they write or say, something relating to the burning questions of the hour, there. If I could introduce something intimating the excellence of Canadian cheese, butter and beef to a larger and more interested number of listeners or readers, I would talk on any lawful subject. This was all I had done. I had used this word and subject, which have been vilified and deified in political discussions, as I thought best to serve the interests of the Canadian farmer.

THE DAIRY COMMISSIONER'S WORK IN CANADA—PROGRESS.

Let me offer a few observations upon the dairy commissioner's work in Canada, to show that while we are trying to do something to discover the preferences and wants of markets abroad, we are also trying to help the producers to suit these markets with products which will fetch the highest prices. In my own branch of the department, last year, 313 meetings were held, 132 cheese factories and 27 creameries were visited. I attach more importance than most men to the holding of meetings of and among the farmers. The farmer's occupation is one which tends to make him rather despondent as to the outlook for the future. I am somewhat of an optimist. I like to go among the farmers and try to imbue them with a spirit of hopefulness, courage and thoroughness. If you can touch the heart and hope of the people, that means a good deal. If a man is hopeful, it means that he will do better for himself. If he is downcast, it means that he will probably be discouraged and may not succeed.

Last summer there was one cheese factory under our management in Prince Edward Island. When it was suggested down there that one should be started, the people were reluctant to go into the dairy business—fearing that it would not be successful. The experimental dairy station which was started, however, has proved so satisfactory to the farmers of New Perth, that the farmers in other districts have established no less than six or seven new factories themselves. They are equipping them themselves and asking the dairy commissioner to manage them. If this be done, the dairying industry will be promoted and the government will be at no loss, as a charge for manufacturing will be made, sufficient, or almost sufficient, to meet expenses. This instance alone will show the marvellous and rapid advancement in a portion of Canada, which is well adapted for dairying.

In Nova Scotia we had a travelling instructor at work all summer, who achieved excellent results in instructing the people how to improve the quality of their cheese and butter, how to build silos and provide the best foods for their cattle. He held twenty-seven meetings altogether in that province.

In New Brunswick we have two stations—one at Kingsclear and the other at Sussex. The one at Sussex is being operated this winter for the purpose of teaching the people how to produce winter-made butter and to extend that phase of their business. In the province of New Brunswick we have worked jointly with the provincial authorities. The provincial legislature voted $10,000 for the extension of dairy work; and they asked my department to spend some of it for them in the most advantageous manner. In other words, the provincial government agreed to pay the bills and the expenses incident to the additional work done under my direction in that province. It was a gratifying recognition of our work as carried on for the purpose of aiding the farmers and developing the resources of New Brunswick.

In Quebec, the assistant Dairy Commissioner, Mr. J. C. Chapais, addressed seventy-eight meetings, (mostly in Quebec), and visited a large number of factories. In addition, a new dairy school was established at St. Hyacinthe and placed under my direction. It was fully equipped by the provincial Dairymen's Association without any charge to our department; and that organization also pays a subsidy of $1,000 a year towards maintaining it. The reason why this establishment was placed under my charge, was, because the knowledge that it was under the charge of the Dominion Dairy Commissioner, would add to its prestige in the province of Quebec. Already one class of forty learners has passed through the school. At the present time a class of forty-three is receiving instruction, and 100 names are on the list waiting their turn. The pupils we take there are practical cheese and butter makers, and they receive from ten days to two weeks drilling in the various branches of the business in which they are most deficient.

In Ontario, a good deal of information has been gained by the experiments at the experimental dairy station at Perth, as to the results from making cheese from milk of different qualities as to percentage of fat. A bulletin is now in course of preparation, which, when issued, will enable factorymen to pay for milk according to its quality and quantity. There may be as much difference in the real value of a thousand pounds of milk as there might be with cattle. We have now reached a conclusion whereby we expect to be able to distribute the proceeds from sales of cheese at a co-operative factory upon an equable plan.

In Manitoba, a travelling instructor was employed. I was sorry that I was not able to extend in person any help to the province of British Columbia. I had fully intended to provide a travelling instructor there, but for want of time and limitation of funds, I was not able to make the necessary arrangements. I trust, however, that this will be remedied this year.

By Mr. Featherston:

Q. How do you account for the difference in the quality of milk?—A. Largely by the individuality or breeding of the cows.

Q. Not on the feeding?—A. I discussed that question last year. I may state, however, that we repeated our experiments as to the effect of feeding upon the milk. We found that extra rich feeding, that is over rich feeding, makes extra poor milk. A man should feed in such a manner as to keep his cows in the very best of health. After doing that he can increase the quantity but not the percentage of solids in the milk. Experiments extending over five years in Denmark, on over 1,000 cows give exactly similar results. We can get a good deal more milk from the same animal by feeding richer food, but the milk does not contain a larger percentage of butter. Certain kinds of feed increase the quantity of milk, and improve the quality as to flavour and colour, but we get no more butter fat. If the ordinary farmer can keep his cows in good health and give them succulent feed, he will get better results than if he feeds rich or concentrated, dry feed.

By Mr. McMillan (Huron):

Q. Do you not think that experiments should be carried on with cattle to demonstrate this point for a number of years?—A Yes, for many years.

Q. Rich feeding might improve the quality of the milk after a lengthened period?—A. I think it would have a perceptible effect, probably in the second generation. If the animal be kept in good health, the quality of her product is usually at its maximum; but the quality of product from the progeny may be improved by keeping her in such a vigorous condition of health that the constitution of the young animal will be more robust and potential than hers.

Permit one word about our winter dairying movement. In Ontario this winter we have four stations in operation. One each at Mount Elgin, at Woodstock, at London and at Wellman's Corners. At the two stations which were in operation last year three times more milk has been furnished than at the same period last winter; and the farmers are thoroughly satisfied with the results which have accrued to them. There are a good many advantages derivable from winter dairying which the members of the committee might place before the farmers.

WINTER DAIRYING—EMPLOYMENT OF IDLE CAPITAL.

Winter dairying is not opposed to summer dairying, but rather, is its legitimate complement. Milk is dearer in the winter than in summer; the same remark applies to its products. A large amount of capital is invested in cows, barns and factory buildings. One of the members of the House speaking the other night, said that there was $175,000,000 of capital invested in lands, buildings and dairies in Ontario. That is too large an amount of capital to be unproductive for five or six months every year. Our object then is to obtain some return for this capital during the winter period. There are hundreds of men employed as cheesemakers during the summer, who are unwillingly idle during the winter. There is no reason why the ability and capacity which they possess should not be applied to butter making in

the winter. Many men on farms spend a good deal of time in winter to no purpose; and that, to my mind, is the main reason why the boys leave the farms. I do not wish to give a popular address on that point. Some blame it on our educational system, others on the attractive aspect of town and city life and there are a score of other opinions. I think the boys leave the farms because they find they are often kept busy fiddling at things which have no remuneration of any kind in them. They are kept doing chores for which there is no direct profit.

By Mr. Cochrane:

Q. And their fathers always grumbling about their calling?—A. Sometimes. This I want to define. The farm chores have to be done, cattle must be fed, and if a direct revenue can be got out of that every month, the work will be done with better grace. A boy will not object to do work on the farm, in the way of chores, if he finds it is paying, but attending cows all winter without a revenue is a most discouraging, joyless occupation. A point in connection with winter dairying is that the value of the by-products is very considerable for rearing swine and raising young stock for fattening. There is much more butter got from the cows by making the herd milk all the year, and each individual cow ten months of the twelve. If you desire more details on winter dairying you will find them quite fully treated of in our annual report, and in the reports of the addresses I have delivered. The result of winter dairying in two factories last year was that eighteen other creameries were started in Ontario last autumn, and I expect a large number more will be started in 1893.

By Mr. Featherston:

Q. Have you any knowledge of a patent for extracting butter from milk? They make as many pounds of butter as they do of cheese from the milk?—A. That is perfectly impossible. It must be a fraud. (Hear, hear.)

Q. They claim to have an American patent for it?—The point is simply this: There are on the average less than four pounds of fat in one hundred pounds of milk.

By Mr. Cochrane:

Q. We are sending to Great Britain about one-half of the amount of cheese they are importing. Would it not be better, don't you think, from your point of view, to develop the trade along the line of butter more extensively than along the line of cheese?—A. I think it would be better to have our increase of dairy products in butter, and to hold our own in cheese. That is a point we ought to pay more attention to.

A DIFFICULTY IN DAIRYING, SOLVED.

Let me mention one point more to show the work we have been trying to do. A difficulty in the way of winter dairying has been that the ordinary farmer could not obtain suitable food for milking cows cheap enough to make it pay him well. A good deal has been said in favour of the silo as an adjunct to successful winter dairying and too much sometimes has been expected of silos. A silo like this jar is constructed for preserving its contents, but it does not improve them and it does not create anything To get the quality of ensilage adapted for feeding cattle the farmer must put into his silo food which contains the constituents which his cattle need. The corn plant is the best for getting a large amount of nourishment per acre for cattle; but the corn plant does not contain all the elements which cattle need for sustenance and production. For nourishing the human body an individual needs a certain amount of heat-producing material like starch or sugar, and also the fle-h-forming substances or albuminoids, as well as some fat. Potatoes are not a satisfactory food when taken alone. They do not contain sufficient albuminoid. But in potatoes and buttermilk you have an excellent combination. Take this other illustration:—Bread contains albuminoids and starch, but not enough fat to make it palatable and acceptable; therefore we spread butter on our bread.

THE ROBERTSON COMBINATION FOR ENSILAGE,—HOW TO MAKE IT.

The object of the new Robertson combination for ensilage was to get the heat-producing parts, the flesh forming parts and fat together in such proportions that the cow would get at every meal a perfectly balanced ration. In this new combination we have Indian corn, horse beans and sunflowers; and it appears to be a perfect combination which will give cattle a food containing all the nourishment required.

Ensilage has come to mean any kind of fodder which is cured and preserved in a succulent state for the feeding of domestic animals. The silo has no power to add any nutrient to the fodder which is put into it for preservation. Its contents may become more digestible and palatable by the changes which proceed slowly under the action of ferments, or they may become less pleasant and wholesome if fermentation goes too far. Fodder, which is deficient in nutrients before it is put into a silo, will experience no regeneration there. Degeneration into offensive material is the only and constant tendency, and that can be arrested.

To prevent deterioration and decay is the function of the silo; and to that end it should be constructed to exclude the atmosphere. To do so requires the use of building material of adequate strength. The fastening of its parts, at the foundation and at the corners of the silo, should be secure. I have found one ply of sound one-inch lumber, tongued and grooved, nailed horizontally on the inside of studs two inches by ten inches, or two inches by twelve inches, to be sufficient.

Indian corn—the great sun-plant of this continent—is undoubtedly the most serviceable crop which has been used for ensilage; but although it be ever so well preserved as to succulence, odour, flavour and colour it is an incomplete food for cattle. With a marvellous proclivity for storing up starch, gum and sugar out of the elements of the air, the corn-plant becomes a veritable accumulator of sun, strength and energy. Its carbo-hydrates or "heat-producing parts" are largely in excess of its albuminoids or "flesh-forming parts." These latter are present in no mean quantities in fodder corn per acre; but, for a wholesome, economical, complete food, they are out of correct proportion to the other constituents.

A main function of intelligent men on earth seems to be to put and keep things in their right relationships to each other, and therefore the intelligent farmer has been putting carbo-hydrates and albuminoids, in the rations for his cattle, in the right relationships and proportions to each other—even at the expense of his purse. That has been done commonly by adding ripened grain, such as oats, barley, wheat and pease, to the bulky-fodder part of rations, or by buying for that purpose oil-cake, cotton-seed meal, or some other feeding commodity which is rich in albuminoids.

For a few years, I have been seeking to find and put out the silo, with Indian corn, some other plant or plants which would furnish the necessary quantity of albuminoids in a form which would cost very much less than ripened cereals, or concentrated by-products. Clovers and pease have been tried with indifferent success, and the climbing or pole beans have been grown, with cornstalks for trellis, without appreciable advantage.

The horse bean or small field bean (*Faba Vulgaris*, var. *Equina*) seems to meet the needs of the case. This plant grows with a stiff, erect stem of quadrangular shape. It attains here a height of from three to four feet; and it grows in England and Scotland to a height of from three to six feet. It bears pods from within six or eight inches from the base of the stalk to near its top. The ripened beans are of a grayish-brown colour, and of an oblong, round-shape, about $\frac{1}{2}$ inch long diameter and about $\frac{3}{8}$ inch in short diameter.

With us the plants have carried ripened beans in the lower pods, while the topmost ones on the same stalks were hardly out of bloom. By growing the horse beans as a fodder crop, in rows 3 feet apart, with 3 or 4 plants per foot in each row, we obtained an average yield of 6 tons 1,610 pounds per acre of green fodder. Representative samples of the crop were analysed by Mr. Frank T. Shutt, chief chemist of the Dominion Experimental Farms, and from his analyses it is established that the horse beans contained 370 pounds of albuminoids and 94 pounds

of fat per acre. They were preserved in a silo in a layer by themselves, and also in mixture with Indian corn plants. They were grown also in alternate rows with Indian corn—and moreover, were grown in the same rows with Indian corn —the beans and corn being mixed before they were put into the planter. I have not exact data for the yield of beans in the latter case, but I estimated (and I think correctly) that the yield of bean-fodder was at the rate of 4½ tons per acre, in addition to the Indian corn, and without causing any less yield of corn than where no beans were grown with it. It will suffice at present to say that the cattle relished the Indian corn and horse beans ensilage.

Although albuminoids and carbo-hydrates (in the form of starch, gum, sugar and fibre) may be contained in an Indian corn and horse bean mixture in nearly correct proportions, it is still an incomplete food, from deficiency in fat. The sunflower (*Helianthus annuus*) grows luxuriantly over the whole of the temperate zone of this continent, and the seeds contain a large percentage of fat. The variety known as the "Mammoth Russian" was grown in rows 3 feet apart, with the plants from 3 to 18 inches distant in the rows. There did not appear to be any appreciable difference in the weight of the crop per acre, where the plants were grown close or more distant in the rows. They yielded at the rate of 7½ tons of sunflower heads per acre. From the analyses made by Mr. Shutt, it was established that they contained 352 pounds of albuminoids and 729 pounds of fat per acre.

The combination for the feeding of cattle may be prepared as follows:—

Half a bushel of horse beans are mixed with one-third of a bushel of Indian corn, and are sown or planted on one acre, in rows 3 feet to 3½ feet apart. The method of cultivation to be followed is similar to that for the culture of fodder corn When the corn reaches the glazing stage of growth, the product from two acres of the mixture, (which being grown together is necessarily handled as one crop), is cut and put into the silo, together with the heads from half an acre of sunflowers. The sunflower heads may be reaped with a common sickle, carried to the cutting-box on a cart or wagon, and put through it, on and with the Indian corn and horse beans.

The following table shows the quantities of the nutrients which are contained in the crop from two acres of Indian corn and horse beans grown together, and in the heads from half an acre of sunflowers grown separately:—

	Albuminoids.	Carbo-hydrates and fibre.	Fat.
	Lbs.	Lbs.	Lbs.
Indian corn : 15 tons per acre = 30 tons	1,092	10,302	324
Horse beans : 4·5 tons per acre = 9 tons.	490	1,361	125
Sunflower heads : 7·5 tons per acre = 3·75 tons	176	1,186	364
	1,758	12,849	813

The 666 lbs. of albuminoids in the horse beans and sunflowers are the equivalent of the albuminoids in 115 bushels of mixed cereals (barley, wheat and oats.)

Two acres of fodder corn, at 15 tons, per acre, furnish 1,200 single feeds of 50 lbs. each. The albuminoids, in the horse beans and in the heads from half an acre of sunflowers, are the equivalent of the albuminoids in a quantity of mixed cereals sufficient to give 4½ lbs. with every feed of the 1,200. It is to be expected that further experiments will demonstrate that the albuminoids in the horse beans and sunflowers, being in a succulent condition, will be more easily and fully digestible than the ripened cereals. The cost to produce the "Robertson Combination for Ensilage" from 2½ acres, is $15 more than the cost for growing two acres of indian corn alone. The extra items are:—Sunflower seed for half an acre; labour of planting, cultivating and reaping half an acre of sunflowers; and horse bean seed for two acres, total, $15. Against that outlay of $15, the return in albuminoids is the equivalent, for the feeding of cattle, of 115 bushels of mixed cereals. I have made no estimate of the value of the large quantity of fat in the sunflower heads.

A group of milking cows are being fed on a ration, of which the ensilage part is made from mixing the heads of sunflowers from half an acre with Indian corn fodder from two acres. The cows of another similar group are being fed upon a like ration, of which the ensilage part is from Indian corn alone, with 2 lbs. of grain per head per day more than is allowed the cows of the former or sunflower group. The milk from the two groups, is set in deep-setting pails in ice water under the same conditions; and the following results are apparent from an average of nine tests:—

	From ration with sunflower ensilage.	From ration with ordinary Indian corn ensilage.
Percentage of fat in skim-milk	·35	·51
Churning period, minutes	30	20
Percentage of fat in butter-milk	·25	·40

The butter from the cows, which are fed on the ration with sunflower ensilage, has a richer flavour and a slightly higher colour than that from the other lot.

The sunflower ensilage has developed a most agreeable odour, and the cattle are greedily fond of it.

Besides the points which have been mentioned, it should not be overlooked that horse beans belong to the family of plants which have the faculty of appropriating free nitrogen from the atmosphere for the formation of the albuminoids which they contain. It is possible to increase the fertility of soil rapidly and to a remarkable degree, by growing the crop and feeding it to dairy or fattening stock. Protection to the land and profit to the pockets of the farmers are the two fruits to be expected. These form a capital combination for Canadian farmers, and no personal propriety right restricts the use of it.

As an instance let me mention this point:—The number of cattle exported last year, 1892, from Canada was given at 107,180. We find at the Experimental Farm that we did not require to feed more than an average of 4½ pounds of mixed grain per head per day with ensilage. At that rate, in feeding all these cattle which we exported last year, at the rate of 4½ pounds of grain per head per day for 20 weeks, the cost would be $675,234, for grain alone counting it at one cent per pound.

By growing this mixture the farmers will obtain what will give the cattle an equal amount of nutrition for $187,419,—a clean saving of nearly half a million dollars on the grain fed to the cattle we export annually. That is a most important matter to the men who feed cattle, viz., to reduce the cost of feeding.

Let me point out an aspect of this as applied to the dairy business. In the Dominion of Canada there are some 75,000 patrons of cheese factories and creameries. The Minister of Agriculture has given permission to send out seed at cost price for this new mixture to plant two and a-half acres to 100 farmers who have silos, in different parts of Canada. When any one of the 75,000 patrons of co-operative cheese factories and creameries, grows two and a half acres of this mixture, he will be able to save on the cost of feeding cattle a sum equivalent to $37.50 a year. Multiply that $37.50 by 75,000 persons, and you get a total possible saving in one year of $2,812,500. I know the theory of a man keeping hens, getting so many eggs from each, hatching so many chickens, and all that. But in this case there can be no question as to the results. The man who grows this mixture is able to save the grain which otherwise he would have to take out of his bins to feed to cattle. If he can feed cattle without going to his grain bins, he can either sell the grain or use it in some other more advantageous way. Since all the patrons of these factories have to feed their animals some grain during the year, if it shall be grown in the form which I have suggested, a clear saving will be effected of nearly $3,000,000 at once.

By Mr. Featherston:

Q. Do I understand you to say that it cost $15 for the two and a half acres?—A. No, that is the extra expense for growing the half acre.

By Mr. McMillan:

Q. Would you plant them together ?—A. I would plant the beans and corn mixed together, and the sunflowers separately.

By Mr. Rowand:

Q. Have you tested that sufficiently? Should the farmers go into it as a crop or simply as an experiment?—A. As a crop for experiment, which I am sure will be a success, and I will tell you why. Every farmer knows the value of corn as a wholesome food. Every farmer (particularly so if he has fed cattle in England or Scotland) knows the value of the horse bean fodders. But every farmer does not know the value of sunflower heads. We have been feeding these mixed with Indian corn for four or five weeks and the cattle like the mixture very much. I have samples of butter which show an improvement in the quality from the sunflower ensilage.

By Mr. Hughes:

Q. How do you plant this seed?—A. We plant it in rows three feet apart. We have already planted beans in alternate rows with corn. I think, however, experience will reveal a better means of doing this work, perhaps some cheaper way of planting. The one important thing now is to get the product from the three, Indian corn, horse beans and sunflowers into the silo to feed the cattle. Let me mention a few facts about sunflowers. The Russians, who grow sunflowers most extensively, have in one province alone, 102 mills in operation making oil from sunflower seeds. The residuum from the seeds—sunflower cake—has been going to England to feed cattle and taking the place of oil-cake or cotton-seed meal. The only fear I had when I commenced the experiment was that the petals of the sunflowers would give an unpleasant flavour or injurious principle. Experience has shown that the animals eat it freely, are fond of it, and thrive on it. The Indian corn and sunflower ensilage gives us the nicest odour in feed and the nicest flavour in butter we have ever had.

By Mr. Cochrane:

Q What effect do the sunflowers have upon the soil?—A. They are rather exhaustive, I think, but the bean plants obtain or can obtain free nitrogen from the atmosphere.

By Mr. Boyd:

Q. How do you mix it into silo?—A. All go though the cutting box first,—the heads of the sunflower going through the cutting box along with the corn and beans. They are all mixed together.

By Mr. McMillan (Huron):

Q. Have you grown the corn and beans in the same drill?—A. We did on one part of the farm, in alternate rows on another plot and separately in other plots. I think it is best to grow them together in the same rows. The beans grow from three to three and a half feet high when they grow with the Indian corn.

Q. Would you let the sunflower ripen pretty well?—A. As far as possible; but not to let the seeds fall out.

Q. Would you use any portion of the stem ?—A. No, the stems do not contain much nutrition. We have made ensilage from about 20 tons of the stalks this year to see how they will turn out, but I don't expect much from them.

By Mr. McGregor:

Q. How far apart do you keep the drills when sown with alternate rows of corn and beans?—A. Three feet apart.

Q. You do not get the weight which you did off corn alone?—A. We got 6 tons 1,610 lbs. of bean fodder per acre. I put our average crop at between 15 and 16 tons of corn fodder per acre, and that is the estimate upon which I have based my statements to-day.

By Mr. Cochrane:

Q. When is the right time to plant the sunflowers?—A. As early as possible in the spring.

Q. When do you mix them?—A. We put the heads of the sunflowers on the corn stalks as they are running through the cutting box.

By Mr. McGregor:

Q. Do these elements from the sunflowers have an injurious effect upon the animals? Do they not physic the animals?—A. Not at all. If there be any tendency that way, it would be safe to feed cut straw or hay to give more bulk to the ration. The action of the oil on the animals' system seems to be very beneficial. The sunflower heads gave us a crop of seven and a half tons to the acre and out of that there were 728 lbs. of oil to the acre according to the analyses of Mr. Shutt, the chemist at the Central Farm.

By Mr. Dawson:

Q. Is it not a very slow process to harvest the sunflower heads?—A. Not particularly. A man cuts them off quickly with a common reaping hook.

Q. And you obtained seven and a half tons to the acre?—A. Yes.

Q. Would it not be better if the heads were not put through the cutter, but were specially mixed?—A. The sooner they are put into the silo the better, otherwise they are apt to grow mouldy. I think it will be found that this combination gives the best flavour, conduces to the health of the animals, so far has led to the production of the best quality of butter and makes it possible to feed cattle at a very much less cost than formerly.

By Mr. Cochrane.

Q. Do you cut away any of the stalk of the sunflower or only the heads?—A. We take only an inch or two of the stalk. At the present time we are feeding two sets of cows at the Central Farm. One is being fed on ordinary feed, the other with this Indian corn and sunflower ensilage. The test will doubtless give us some further information of value.

COST OF FATTENING STEERS—GAIN PER HEAD PER DAY.

I had some other notes to speak of on the fattening of steers, but that I must leave over. You will find the conclusion I formed in my report. In fattening steers upon the ordinary ensilage and meal, up to yesterday, we found that the animals fed on that ration cost us 9·3 cents per day for a period of over fourteen weeks, and up to date they have gained on an average 1·71 pounds per head per day. That takes in our yearlings, our two-year olds and those coming three years old. The gain has been all the way down from 2·3 pounds per head per day to 1·21. For feeding animals of almost similar quality on the opposite side of the passage on hay, roots and meal, the cost has been 12½ cents per day and the gain has been 1·17 pounds per head per day. The gain was more than half a pound per day less on the average, and the cost has been more than 3 cents per day more.

By Mr. Cochrane:

Q. Feeding the ordinary way, what was the expense per pound of flesh made?—A. I have not that figured out on this table.

By Mr. Dawson:

Q. Are any steps being taken to induce the ship-owners to supply sufficient refrigerator accommodation for butter for our trade?—A. In the past, the practice has been for shippers to get a square block of space in the midst of bacon that comes out of the refrigerator. In any new line of steamships which may be subsidized the regulations should call for cold storage on the steamers. That is very necessary.

By Mr. Featherston:

Q. Is there not a smoky odour from the bacon?—A. The bacons are not smoked on this side.

I have to thank you, gentlemen, for your patient hearing. I will mention this one fact before I sit down. We have one main object in view and we are leaving many details undone. Our efforts are directed to produce such an impression on the minds of the farmers as will induce them to turn out animals and their products of the kind that the consumers are willing to pay the highest prices for; and, in addition, to keep them to a knowledge of how to do that in the most economical way by growing the best and cheapest of feeds, so that the cost will be as low as possible, the price as high as possible and the result a good profit to themselves. When any one criticises our work apart from these lines of endeavour, I am willing to let him wait and wisdom will be justified of her children.

By Mr. Innes:

Q. In reference to the quality of the stockers sent from Canada was there any complaint with respect to the inferior quality sold to them there. Are they rather deteriorating than improving?—A. I think any deterioration was in a measure blamed upon the extension of dairying; our farmers in seeing to the extension of dairying raised the kind of stockers the Scottish breeders did not want. Besides, when the trade in stockers was small, the best were picked for export, now everything goes.

MR. INNES:—I have just received a letter from a gentleman in Scotland and I would like to lay it before the Committee at its next meeting. I think it is of importance that the quality of our stock should be kept up not only for the sake of the farmers here, but also for the reputation of our farmers at home in the mother country.

MR. MCMILLAN (Huron):—I believe it would be of great benefit if the Experimental Farm would keep a small herd of cows, in the first place, and give us the total cost per twelve months and the total result for the twelve months. It is something I think the farmers are looking for all over the country. It is all well enough to give the results of certain experiments to the farmer, but what we farmers want to know, is what can be made off a small herd of cows. "Don't give us anything we have to figure up ourselves." There are many farmers in the country who can understand a plain statement if they don't have to figure it. Then in the next place I think it is imperative that at all the different stations a record of the fattening of the different breeds should be kept to show what can be done with the different breeds.

PROF. ROBERTSON:—These feeding cattle I have spoken of to-day were mostly bred on our farm.

Having read the preceding transcript of my evidence I find it correct.

J. A. W. ROBERTSON,
Dominion Dairy Commissioner and Agriculturist.

COMMITTEE ROOM No. 46, HOUSE OF COMMONS.
MONDAY, 20th March, 1893.

The Select Standing Committee on Agriculture and Colonization met this day, at 10.30 a.m., Dr. Sproule, Chairman, presiding.

THE CHAIRMAN:—We have with us this morning, Mr. Craig, horticulturist to the Dominion Experimental Farms, who will give us some information in reference to his particular work.

Mr. CRAIG addressed the committee as follows:—Mr. Chairman and gentlemen of the committee. It affords me a great deal of pleasure to have the privilege of again appearing before you. You may not realize that we regard as a privilege, this opportunity of giving you an account each year of our work but I assure you we do. Speaking personally I regard it as an especial privilege and one of much value to me because the kind of information which we are allowed to present to you here is not just the kind nor of the same nature that we incorporate in our official reports and bulletins. Copies of the evidence which you have kindly given us in the past, under separate covers has proved of great value to me, by enabling me to distribute certain kinds of information to farmers and fruit-growers throughout the Dominion, which does not appear in any other form, as well as saving a large amount of correspondence. I therefore desire to emphasize and to bring before you the particular value to me of this privilege of being allowed annually to give testimony before this committee.

I propose, with your permission, Mr. Chairman, in the limited time at my disposal to touch briefly upon some of the principal lines of my work. In regard to the season of 1892 as a fruit year, I would say that the crop throughout the Dominion was a particularly uneven one. In some parts of the country, especially in Northern Ontario, the crop of fall and summer apples was very heavy. In other parts it was a total failure. On this account it was very difficult for shippers to get a correct idea of the probable fruit yield of the Dominion upon which to base the purchasing price. This unevenness of production affected both the local and foreign markets and in many cases lessened the shipper's profit. In the northern portions of Ontario there was a large crop of summer and fall apples, but I regret to say that the fullest returns were not realized in a great many cases owing to lack of shipping facilities, lack of knowledge of the best methods of packing, and the distance or want of a market for this class of fruit.

IMPROVED METHODS OF PACKING FRUIT.

I will refer to some of the newer methods of shipping and packing which I hope in the near future will render this class of fruit more remunerative to the growers and by which they will be able to save a larger share of the more perishable summer and fall varieties. First of all I think it is advisable for growers and shippers to adopt smaller packages than they have hitherto been using. A very suitable kind of package for distant shipment of perishable kinds of apples of first quality has been adopted by some of the growers near Montreal, during the last two or three years and with a good deal of success. It is a kind of package which approaches in point of construction and form that used in the egg trade with the same system of paste board compartments inside, each compartment as in the case of the egg box being of the same size. Of course this kind of a package costing between forty and fifty cents is only suitable for what is known as "gilt edged fruit," that is fruit of a first quality. In order to obtain paying returns the fruit must be carefully selected in regard to size as well as quality, because their safe carriage depends somewhat on the manner

in which they fit the compartments. These packages of fruit have been shipped with great success to the British markets during the last three years by Messrs. R. W. Sheppard and Wm. Nivin of Montreal. The package in question will hold about half of an ordinary apple barrel, and the returns of sales of fruit put up in this way have approximated in the average the prices received for a full barrel of apples packed and shipped in the ordinary way. As I remarked a moment ago, only the finest grade of fruit can be handled and disposed of in this manner. It is plainly better however to sell part representing the best of our fruit, that is a portion of the crop, in this way than let the whole go to waste on the ground.

GENERAL PROGRESS IN CANADIAN HORTICULTURE.

It is very gratifying to be able to report a gradual movement in the line of horticultural progress over the whole Dominion. It has shown itself in different ways. By the apparent desire of fruit-growers to get more and better information with regard to the means of checking fungous pests; a desire to obtain information as to the success of varieties in different localities; and by the gradually increasing orchard area. In most portions of the country, growers are manifesting an inquiring spirit in regard to the varieties and classes of fruits the climate and soil of their particular localities is best adopted for growing. For instance, this is illustrated in the Essex district by the rapid extension of peach culture. In other districts where apple orchards formerly largely existed—Grimsby for example—these are being transformed and the cultivation of other classes of fruits, such as pears and peaches, for which that locality is better adapted, is rapidly extending; showing that intelligence and the natural law of adjustment is working to the future advantage of the fruit-grower of Ontario.

IN THE PROVINCE OF QUEBEC,

considerable interest is being manifested in apple growing which is being rapidly extended, because that province is more particularly adapted to the growth of apples than any other of the tree fruits. We are experimenting with certain classes of hardy fruits of other varieties which no doubt will be introduced in time, but our knowledge of their qualities thus far, does not warrant their immediate distribution.

IN NEW BRUNSWICK,

small fruit culture is receiving considerable attention. By reason of the climatic situation of New Brunswick the fruit-growers there have been able to ripen and place upon the markets of Boston and New York small fruits after the crop from the Eastern States has been exhausted. Coming in after the home crop has disappeared, the product from the Maritime Provinces has entered these markets and has accordingly commanded very high prices, having little or no competition. The returns received by fruit-growers near Fredericton have in many cases been really astonishing, exceeding anything I have heard of elsewhere.

IN NOVA SCOTIA,

a province which I had the opportunity of visiting during the winter and of meeting with the provincial Fruit-growers' Association at Wolfville in the Annapolis Valley, the movement is largely towards a more diversified style of horticulture. In the past, fruit-growing in Nova Scotia has been confined almost exclusively to the cultivation of the apple in the Annapolis Valley, which as you know has been the great apple growing region in that province, having a continental as well as an European reputation in regard to the excellence of its apples.

CANADIAN HORTICULTURE.

Of late years, however, there has been a movement towards a more diversified kind of fruit culture and recently a few of the more progressive fruit-growers have commenced to turn their attention to peaches and pears, as well as the early varieties of grapes, and I can see that in the near future with the equable climate and excellent soil which exist in many portions of Nova Scotia there will be a large output of peaches and pears as well as of other fruit from that province.

In this connection it will be a wise policy to begin by planting early ripening varieties, and those which are known to be hardy in fruit bud. The following varieties have been recommended to planters in the Annapolis Valley: Early Crawford, Hynes, Surprise, Hill's Chili, Early Rivers, and Crosby. I am also of the opinion that the intermingling and alternating of peaches in apple and plum orchards can in this section be advantageously practised. By the time that the apples began to bear the peach trees would have passed their most productive period and could then be removed. The ground in this way being doubly cropped should of course receive adequate applications of manure, to make good the corresponding loss.

Experimental Horticulture at the Central Farm.

I will now speak more particularly in regard to my own work at the Central Farm at Ottawa. This work may be divided into two principal branches. The first may be designated as that of testing varieties. As the farm at Ottawa is supposed to answer horticultural questions for Ontario and Quebec, by the co-operation of the fruit-growers in these two provinces, we try to determine which varieties are best suited to the different localities within their borders. It is of the utmost advantage to the fruit-grower to have exact information as to the adaptation of certain varieties of fruit to his particular section—in short, knowing whether a certain variety is likely to succeed or whether the planting of it is likely to be a waste of money. With the co-operation of the fruit-growers of the two provinces we are endeavouring to solve these problems and to collect information which will serve as a guide to planters in the future.

Through the fruit-growers of Ontario, a distribution is being made this year of a number of ornamental shrubs and a selection of Rocky Mountain evergreens which we think will prove desirable. This distribution is made through the Ontario Fruit-growers' Association, and includes 100 *Rosa rubrifolia* and 75 *Spiræa rotundifolia*. Of evergreens there are 500 *Picea pungens* (Colorado Blue Spruce), 500 *Pinus ponderosa* and 500 Douglas fir. Thus, through the medium of the Fruit-growers' Association we are able to reach the men who are most likely to do these plants justice and who will give the most accurate returns.

During the last three years that I have been before the committee, I have referred to our work of originating new fruits at the Central Farm. This year we have sent out about 150 plants of new varieties of black currants. These have been propagated and tested at the central as well as branch farms, and are the first fruits which we have thought worthy of trial throughout the various provinces.

Then we have also sent out 300 apple trees of new varieties to Ontario, which we think are superior in certain qualities to other varieties now in cultivation. This work can only be carried on to a limited extent, as the work of propagation and distribution is quite expensive.

In the province of Quebec, in order to awaken interest there, in this same class of work, we are distributing fruit trees through the Provincial Department of Agriculture, which is this year initiating a line of work somewhat similar to our own, by establishing a small testing station in each county of the province. In order to further this good work, the horticultural division of the experimental farm is supplying them with certain classes of fruit which we think will be well adapted for cultivation in the province of Quebec. This distribution includes 1,000 apple trees of twenty varieties. As some of each variety will be sent to each county, accurate knowledge of the range of their usefulness will soon be obtained. This work of testing

varieties will, you see, cover pretty well both Ontario and Quebec, and in the course of a few years we expect by this means to get a great deal of valuable information as to the adaptation of certain varieties of fruits to particular localities, and thereby obviate the necessity of the individual testing. We have begun to reach results along this line of work at Ottawa.

One of our first results is before you in the form of the bulletin on Cherries, of which copies have been distributed to the members of this committee. In this pamphlet I have given our experience on the subject of cherries, which I touched upon two years ago when I spoke in regard to certain varieties of cherries being tested at the experimental farms which we thought would be valuable in most fruit-growing districts of the Dominion, and would replace some varieties now in cultivation. Last year it was decided that sufficient information on this point had been collected to justify the issue of a descriptive bulletin covering the subject as fully as possible, with recommendations in regard to the most valuable varieties. The cuts used in the illustration of the bulletin have been made from fruit grown at the farm, and the experience which it contains is based not only on our work at the experimental farm but on that which I acquired at the Iowa Agricultural College, where I had the opportunity of observing these varieties for four years prior to 1890. I think, therefore, you will find that the opinions expressed in this bulletin are well founded.. At the close of this bulletin I have recommended certain varieties for cultivation where the climate and soil are suitable for the pear. These are: Amarelle hâtive, Strauss, Griotte Imperial, Olivet and Gros Gobet.

I desire to bring this matter before the members of the committee in rather an emphatic way, and beg leave to say that we are prepared to distribute scions of most of the varieties which I will mention, and shall be glad to send them to anybody who has propagating facilities. By this means it is hoped that these new and valuable varieties may soon, through the ordinary channels of trade, become widely known and more generally planted. The expense of propagating young trees of this class is greater than could thus far be undertaken by the experimental farm. Another class which I have mentioned are hardier than the first mentioned, and wherever the Wealthy apple can be successfully cultivated I think these will succeed. The following varieties are among those recommended in this assortment: Spate Amarelle, Fouche's Amarelle, Minnesota Ostheim, Brusseler Brauss and Orel.

I have made a third division, including varieties which I believe to be harder than any of the preceding. Without doubt they are hardier than the Wealthy apple and we usually consider this as a type or standard of hardiness in apples. The varieties mentioned here are: Riga No. 18, Vladimir, Bessarabian and Schatten Amarelle. These may be looked upon as rather uncouth names, but it is difficult to make satisfactory translations from the Russian and Polish. In this bulletin will also be found instructions and general remarks on the propagation of these cherries. The propagating methods spoken of I have practised for some years myself and know that cherries can be successfully grown in this way.

GRAFTING.

Root grafting as ordinarily practised when applied to the propagation of the cherry is attended with little success.

Crown grafting, which is inserting the scion in the crown or collar of the stock, or at a little below the surface of the ground, is in the experience of the writer a much more successful method. This may be done in winter, using stocks which have been stored for the purpose but is not so successful as if done early in spring, upon stocks already established, and undisturbed in the ground for a year. Prof. Budd claims satisfactory results when the stocks are taken up in the autumn and grafted in the graft room during the winter. Careful comparisons have been made here for the past three years with a view of determining which plan was attended with the best results. The average returns show a gain of over fifty per cent in favour of *crown grafting*, early in spring, upon stocks in the ground, which had been planted the year previous. A strong growth is obtained the first year, at the end

of which the graft may be taken up, and part of the old root cut away. The yearling graft may then be replanted setting it deeper than formerly, so that the scion is brought under ground and offered conditions favourable to the emission of roots. The principal objection to the method is that at the time—early in the spring—when the work should be performed, many other duties engage the attention of the fruit-grower, making it difficult to accomplish in a limited time a large amount of this kind of grafting. The method is one, however, that can always be practised to some extent. It will prove of special service to amateurs for whose benefit the following instructions are given:

The stocks should be planted in nursery rows the year previous to the date of the grafting. Cut well matured scions in autumn of the growth of the same season, keep these in a dormant condition over winter by packing in forest leaves, or damp sawdust. In this locality the best time for out-door grafting is usually during the first two weeks of April. The scion should be cut wedge shape, a slanting cleft is made in the stock for the reception of the scion, the scion is then placed in position, and firmly bound with waxed thread, and after which the joint completed by a covering of grafting-wax, to exclude the air.

In the case of out-door work the process is essentially the same, except in the manner of tying. Instead of binding first, and waxing afterwards, a firmer joint is made by applying the wax first, and covering this with a cotton bandage which adheres to the wax, and holds the scion in position. It must be remembered in the case of stocks which are in the ground, that the top is cut off as soon as the scion is inserted, after a little practice this is easily removed by an upward cut, which can be made without disturbing the scion.

Before leaving this topic, Mr. Chairman, I shall be glad to explain any points which have not been rendered sufficiently plain by my statement.

By the Chairman:

Q. Have you had fruit from any of the varieties which you have introduced?—A. Yes, nearly all have borne fruit the last two years. The samples before you on the table were all grown at the farm last season. The Ostheim has been very prolific. I might mention that the jars of fruit before you on the table are samples of the different classes, from the exhibit that has been prepared for the World's Columbian Fair. Of grapes we have in jars well preserved 175 distinct varieties, 35 or 40 varieties of raspberries, almost as many plums and cherries. The sample of gooseberries which you have been admiring was grown by Mr. R. B. Whyte of this city and illustrates what may be done in growing the English gooseberry when skill and judgment are exercised. We have also been successful in preserving a large collection of currants.

PRESERVING FRUITS FOR EXHIBITION.

By Mr. McGregor:

Q. What is the liquid around them?—A. We have not found the same liquid to be equally successful in preserving all kinds of fruit. The name of the liquid is given on the tag attached to the cover of each jar. In a general way boracic acid with the addition of 5 per cent of glycerine has been the most useful. Zinc chloride to which we have also added 5 per cent of glycerine, has proved a good preservative keeping the form and colour of the berry, and as well as keeping the berry from bursting. We have been very successful in preserving nearly all varieties of grapes, as you will see the samples before you are about as natural in form and colour as we can have them.

By Mr. Hughes:

Q. These are merely for exhibition purposes. They are not good for table use?—A. Yes, merely for exhibition purposes.

By Mr. Roome:

Q. What strength is the boracic acid?—A. The formula I have used is one part of acid to fifty parts of water.

By Mr. Bowers:

Q. Is that the correct name for these gooseberries?—A. Yes, the "Snowdrop."

Q. We know them by the name of "Mammoth crystal"?—A. It is difficult to distinguish between many varieties of English gooseberries, especially looking at them through glass.

Q. I think we grow the same as you have in that jar?—A. They no doubt look very much the same as those you refer to, but one can easily be deceived in looking at them in this way. Possibly the principal differences in the two varieties may exist in little characteristics of the bush, its habits of bearing and growth, that distinguish them. Yet when samples of the fruits are bottled like these it would be almost impossible to distinguish them.

By the Chairman:

Q. Are these English gooseberries prolific varieties?—A. Yes, if well cared for the Snowdrop has done very well. They must be sprayed to prevent mildew. I wish now, sir, to speak of other lines of work which I have given a great deal of time and attention, these come under the head of original investigation.

By Mr. Hughes:

Q. Before you leave this fruit business, did you make any experiments in regard to modes of preserving and canning fruits other than the ordinary methods resorted to by the housewives and others?—A. Our fruit crop at the farm has not enabled us to reach that line of work yet. The orchard has only had four years' growth and is just coming into bearing, thus far we have been able to obtain a number of specimens of the different kinds but not sufficient to institute canning experiments. Of course grapes and small fruits have been fruiting heavily during the last two or three years. The canning of these has now become a well established industry, and so nothing has been done in that line. The samples of fruit in the jars before you as I have explained, grew out of the attempt to make a creditable exhibition of fruit grown at the Central Experimental Farm, at the World's Fair at Chicago.

FUNGOUS DISEASES IN FRUITS—REMEDIES FOR.

Returning to the subject of fungous diseases, I would like to speak most emphatically of the necessity of united action, and I wish to impress upon you the immediate desirability of combating these diseases. I have placed before you a circular covering in condensed form, the latest information on this subject. This was issued on Saturday last and will be distributed amongst the fruit-growers of the Dominion, bringing before them in a plain and practical way the best methods of destroying these diseases.

GENERAL CONSIDERATIONS.

Spraying with arsenites for the prevention of insect attacks has, by progressive fruit-growers, become a recognized necessity and is now widely practised. Spraying with copper compounds for the prevention of fungous diseases is rapidly gaining in favour and the value of the remedies recommended has been demonstrated by the orchardist, as well as the experimentalist.

Fungous diseases will in all probability increase in proportion as the food plants upon which they prey are multiplied, and as climatic and other conditions are favourable to their development. Spraying, therefore, must be resorted to, and in order to derive the greatest benefit, it should be generally practised. The value of the efforts of one man who faithfully sprays his orchard is greatly lessened if his

neighbour neglects preventive measures and so allows his orchard to serve the purpose of a breeding ground for the spores of fungous diseases, such as pears and apple "scab."

The law relating to Peach Yellows and Black Knot of the plum are based on the necessity of united action on the part of fruit growers in order to rid themselves of these pests. These statutes have not, however, been as rigidly enforced as their importance deserves and may be said to have been beneficial just so far as the letter of the law has been complied with.

In consideration of the importance of making a united and persevering effort with the object of keeping in subjection those parasites which prey upon our fruit trees and plants, thus diminishing their vitality and lowering the quantity and quality of products, this circular is addressed to the farmers and fruit-growers of the Dominion with the hope that they will follow out as far as possible the suggestions contained therein.

HOW TO SPRAY.

As the treatment is entirely preventive, in order to make spraying effective it must be commenced early. All parts of trees or plants must be reached with the preventive agent. Drenching is not necessary and is expensive. A thin film or coating of the fungicide deposited upon the foliage will prevent the development of the spores as well as a complete soaking; but it is important that all the leafy surface should be wetted at least on the upper side. For orchard work a good force pump, which may be fitted into a barrel—side or end—will give satisfaction. It must be of sufficient strength, and fitted with a nozzle which will project the spray in a fine state of division, yet with sufficient force to enter the deeper recesses of the foliage. More expensive pumps drawn and operated by horse power may be purchased, but are seldom necessary except for large orchards. The Vermorel nozzle is a very satisfactory instrument for distributing the liquid.

CO-OPERATIVE SPRAYING.

Some factors which act as deterrents to the progress of spraying may be enumerated as follows: This work, like the introduction of spraying for the prevention of insect enemies, on account of involving new lines of thought and action, is sometimes regarded by the farmer as impracticable on a large scale. It *must* be done at certain periods of the year—otherwise it is ineffectual. It involves the purchase of implements and materials which are sometimes difficult to obtain just when required. The success of the work depends also on intelligent adaptation of the treatment to the climatic conditions existing during the spraying period.

To obviate some of these difficulties I would suggest the adoption of a co-operative plan of spraying.

First, where orchards are not large, a few farmers might combine and purchase a spraying outfit, which would serve the community, and if it were possible to have it continuously operated by the same individual, whom practice would lend superior facility in using it, an additional advantage would be gained. Another arrangement could be made as follows:—

A complete spraying outfit, including chemicals, might be purchased by a person who would be prepared to spray under contract, by the acre, or at a stated figure per tree. If this system of combating fungous and insect enemies was introduced, it would obviate much of the prejudice and inconvenience now connected with the work, and spraying would probably in a few years, to the great benefit of orchardists, become the general practice.

Our remedies all fall under the head of copper compounds mixtures, because they are all largely derived from copper in some form or other. Two of the principal mixtures were studied last year, and, I may say, that heretofore we have been working with a large number of them, my endeavour was to find out which of these could be most confidently recommended as giving the best results.

COMPOSITION OF LIQUIDS FOR SPRAYING.

The results of these experiments lead me to recommend the two following mixtures, which are not expensive, and are not difficult to prepare or apply.

SPRAYING MIXTURES.

1. *Diluted Bordeaux Mixture.*

Copper sulphate	4 lbs.
Lime	4 lbs.
Paris green	4 oz.
Water	50 gallons.

This may be prepared by dissolving in a barrel four pounds of powered copper sulphate. In another vessel slack four pounds of fresh lime with as many gallons of water. Spread a piece of coarse sacking, held in place by a hoop, over the top of the barrel in which the copper sulphate has been dissolved. Strain through this the creamy mixture of lime and water. Paris green may then be added, after which the barrel should be filled with water. This forms an excellent insecticide as well as fungicide, and therefore useful to destroy codling worm, bud moth, and canker worm. It should be used soon after being prepared.

2. *Ammoniacal Copper Carbonate.*

Copper carbonate	5 oz.
Ammonia	2 qts.
Water	50 gallons.

This is more expensive than the former, is more easily applied, and is used as a substitute, especially in the case of grapes, where the Bordeaux mixture might, by adhering to the fruit, injure its sale.

It is prepared by dissolving the copper carbonate in the ammonia and diluting with water to 50 gallons. The concentrated solution should be poured into the water. Care should be taken to keep the ammonia tightly corked in glass, or stone jars. The Bordeaux mixture, as you will see by the formula, is a mixture of bluestone and lime; last year being a very rainy season, this adhered to the foliage better than the ammoniacal copper carbonate, and accordingly gave the best results, and led to the conclusion that during a rainy season the Bordeaux mixture would be the most serviceable, as it is a combined fungicide and insecticide for spraying certain fruits late in the season, like grapes, however, it adhered to the fruit in such a way as to injure its market value. The Hudson River fruit-growers last year had large shipments of grapes confiscated and thrown out of the New York markets by the health officers because they came in there showing stains of having been sprayed with the Bordeaux mixture, yet the amount of copper deposited on them did not render them injurious or unhealthful in any way. The health officers were, as chemical analysis afterwards demonstrated, a little over officious, and certainly too arbitrary in their action in throwing their grapes into the bay without careful examination. To obviate any difficulty of this kind, I have recommended the use of this ammoniacal copper carbonate in making the later applications for the prevention of grape mildew, because it does not stain the fruit or injure its appearance or market value, and is also quite efficacious. In some of the experiments for the prevention of grape mildew, which I conducted at the farm last year, where the same variety was sprayed with different mixtures, I found that I had an average return from the Bordeaux mixture of 11 lbs. of grapes per vine. From the Noah, sprayed with copper carbonate, 18 lbs. of grapes were secured per vine, while the untreated vines of the same variety only gave me 3½ lbs. of grapes per vine. And this at Ottawa, where mildew is not nearly as bad as in some portions of the province. Another variety, the Pearl, treated with Bordeaux mixture gave 4 lbs. of grapes per vine; while those treated with copper carbonate gave 3¼ lbs. of grapes, the untreated only yielded half a pound of sound grapes per vine.

TREATMENT OF GRAPE DISEASES.

Downy Mildew, Black-rot, Anthracnose.

Spray the canes with copper sulphate 1 lb. to 50 gallons before growth begins. Follow this solution with diluted Bordeaux mixture (omitting Paris green) or ammoniacal copper carbonate immediately after the fruit sets. Repeat at intervals of three weeks, till the bunches begin to colour. Ammoniacal copper carbonate should always be used for the later applications. This treatment can be applied at a cost of between $3 and $5 per acre for the season, so that it is a very small proportion of the total value of the crop.

Chemicals for spraying can now be obtained from most druggists, and a few firms whose advertisements may be found in the Canadian Horticulturist, and other journals, are making specialties of these materials.

Pumps of all sizes are offered for sale by the leading seedsmen, dealers and manufacturers, at prices ranging from $3.50 to $10 or $12. The barrel pump may be mounted on a stone-boat, cart, or wagon as convenience or circumstances may suggest. Such a pump may be fitted to a barrel and made ready for use at a cost not exceeding twelve dollars. The copper Knapsack pump, so called because it is carried on the back of the operator, has a capacity of four or five gallons, and furnishes a convenient means of spraying low growing plants such as grapes, currants, gooseberries and potatoes. As the original Knapsack pump designed by the Department of Agriculture at Washington was not patented, there is nothing to prevent its manufacture in Canada. I have with me this morning a new pump which has just been sent to me, which is the best thing that I have seen in the way of a small hand pump. Most small hand pumps have to be held in the pail with one hand or by means of a foot stirrup when the piston is being drawn upwards, but with this one you simply push it down and it is then thrown up by means of a spring, so that you can work the piston readily with one hand and direct the spray with the other. It is the invention of a Canadian, but is manufactured on the other side of the line—at Oak Point, New York.

By the Chairman:

Q. What is the cost of this pump?—A. The manufacturer's price is $3.50.

Q. Are they on sale in Canada?—A. Not that I know of.

Another disease which I wish to speak of is that known as the plum-rot (*Monilia*). All plum-growers in Ontario know this disease too well. It affects the peach and apricot as well as the plum and some seasons it is particularly destructive in the peach and plum-growing regions. It manifests its presence on the plum by grayish or whitish patches appearing on the skin at the time or just before the fruit is ripe. When a plum affected in this way is examined, the pulp is found to be entirely disorganized and decayed. These gray patches are made up of little tufts, which may be likened to pustules or pimples. A closer examination of these pimples reveals the fact that they are composed of a number of minute spores. It has been asserted that a single affected peach or plum would furnish spores enough to infect a large orchard, so easily and so quickly do they disseminate and develop. The tissue of the plum is ramified with little threads called mycelium, and when these come to the surface they bear spores which are very small and very numerous. These are carried away by the wind, and falling on a moist surface of a peach or plum they soon germinate, boring down through the tissue into the fruit, which is soon infected, and multiplication takes place rapidly. It has been demonstrated that these spores live over the winter on the dead fruits. You may notice on plum trees clusters of dead fruit—fruit which has been diseased and therefore has not been picked. These decayed specimens provide a means of completing the life cycle of this fungus by carrying it through the winter. With this knowledge in our possession one remedy naturally suggests itself and is that no infected fruit should be allowed to remain on a tree over winter. Therefore it behooves fruit-growers to see that all infected fruits be picked from the trees in the autumn, because by allowing it to remain it acts precisely in the same way as a contagious disease and forms a

centre from which the malady spreads as an additional preventive, I would recommend spraying with diluted Bordeaux mixture, which is spoken of as No. 1 in the circular referred to. This mixture contains Paris green, and therefore serves the double purpose of a fungicide for the monilia and an insecticide for the curculio, one of the most injurious insects to plum culture. By adding Paris green to this Bordeaux mixture we are thus able to cope with the two enemies using a single mixture. Mr. Murray Pettit, of Winona, Ont., last year at my suggestion in treating this disease, tried the simple bluestone solution, which is used for killing smut in wheat, but at the rate of three ounces of copper sulphate to forty gallons of water. He sprayed one part of his orchard with this solution while another part was left unsprayed. He writes me that the trees which were treated were very much freer from the fungus than those which were untreated. That is a remedy very easily applied, but is not doubly effective as is the Bordeaux mixture.

BLACK KNOT, AND REMEDY FOR.

While speaking of plum diseases, I would like to call your attention to another disease, which you all know very well, viz., the black knot. I merely refer to this in order to emphasize the necessity of united action in stamping out this virulent disease. Many fruit-growers supposed formerly that these gnarly growths on plum and cherry trees were caused by insects, simply because a mature knot when cut open, would frequently be found to contain the larvæ insects. More recent investigation has shown that the disease is not caused by insects, and has elicited the fact that the insects have simply made the affected limb a housing place after the knot had been developed. In the case of these knots the precise time of infection does not seem to be exactly known, but as the early growth takes place in the spring, it would appear that the spores find lodgment on the branches during the winter and develop when favourable circumstances present themselves. We first of all notice the branch beginning to swell, it soon increases in size and takes the form of the peculiar knotty excrescence, so well known to fruit-growers. Spores may also be disseminated in summer, and these, like the plum rot I have just referred to, have a most prolific way of reproducing their kind, so that it has been estimated that a single tree badly infected will furnish spores enough to infect a whole county. We can therefore well see the absolute necessity of cutting out and destroying by fire these plague spreading centres.

It is on this contagious principle that the peach yellow and the black knot laws providing for the destruction of infected trees, have been based; these laws have been useful but in proportion as they have been enforced. I am sorry to say that in many localities they have not been as rigidly enforced as their importance demands.

By the Chairman:

Q. If you found trees affected with black knot in certain limbs would you advise the cutting off of the limbs?—A. I was just going to speak of the remedy. Where the tree is badly affected with the disease, it is difficult to tell just how far below the knot to cut in order to get all the spores out, and I would recommend in a case of that kind to chop down and destroy the whole tree. It must be remembered that it is not sufficient to cut off the limb from the tree and throw it into the fence corner or on the brush heap, but it should be burned and completely destroyed without delay. In any instance where the knots have affected only one or two of the branches on the tree, cut the branches off six or eight inches below the knot, which if promptly done will be all that is necessary and will prove effectual.

By Mr. Roome:

Q. Are there any varieties of plums which are not susceptible to curculio or knot?—A. There is no black knot proof variety. We frequently hear of varieties called black knot proof, but there is no such thing in reality.

Q. Are there not varieties less susceptible than others to curculio?—A. Yes, but none that enjoy complete immunity from the attacks of these pests. I could not say

I ever saw a variety that had not been affected to some extent by the curculio wherever that insect abounds; in the same way certain varieties are more susceptible and more frequently attacked by black knot than others, but I know of none that are entirely exempt or might be considered proof against attacks of these enemies.

By Mr. Bowers:

Q. Some four or five years ago I found it in a few trees in my garden. I at once cut the limbs off and burned them and have never seen any knots since that time, which illustrates the value of prompt action ?—A. You took the right course at the right time.

By Mr. Hughes:

Q. How is the disease disseminated—from tree to tree ?—A. By means of spores which may be carried by the winds or other agencies. Being very light and thus can easily be carried along in the winds. This might be successfully treated with copper compounds if the season of spore development were shorter, but as it covers a considerable portion of the year, it is not easy to find a spraying treatment which can be considered practicable. It is also difficult to determine the time of infection and as it only makes its appearance after it has become firmly imbedded in the trees, after which any course of external treatment is entirely useless.

ANTHRACNOSE OF THE BEAN.

The annual loss to farmers and market gardeners in this vicinity for the past three or four years has been very considerable. The experiment herein described was suggested by the results of laboratory investigations conducted by Dr. B. D. Halsted, an eminent authority on fungous diseases of plants, of the New Jersey State Agricultural Experiment Station, at New Brunswick, N. J. Dr. Halsted states that the fungous "most frequently attacks the pods of the bean when they are only partially grown, and causing the formation of deep, dark pits which materially lessens the yield of saleable beans from the field infested. The disease spreads rapidly from pod to pod in the market place, as has been shown by repeated inoculations in the laboratory, where, under the most favourable conditions a spot may be established upon an otherwise healthy plant in thirty-six hours." (See Annual Report N. J. Exp. Station, 1891, p. 284.) Acting on the belief that the seed beans themselves furnished the principal means for the perpetuation of the anthracnose from one season to another, samples of infected seed were soaked in copper solutions of varying strengths. Plants raised from soaked seed showed very little anthracnose in comparison with other seed untreated. Dr. Halsted obtained the best results, seed soaked for one hour in a solution of "three ounces of copper carbonate, and a quart of ammonia to four and a half gallon of water." The following experiment was designed:—1. To show the effect on the germinating power of seed beans of soaking them in solutions of copper carbonate and copper sulphate. 2. To test the efficacy of soaking seed beans in solutions of copper carbonate and copper sulphate to prevent "anthracnose" or "pod spotting."

The experiment comprised the treatment of 48 samples, each containing 100 seed beans. These were sown in rows of 25 feet each. When the pods were fully formed but yet green, they were picked and sorted, the first grade consisting of "sound pods," the second of pods "slightly spotted" and the third of those which were "badly spotted."

SUMMARY OF RESULTS—AMMONIACAL COPPER CARBONATE.

1. The best results with regard to freedom from spot were in most cases correlated with a low germinating percentage.

2. The results in almost every case were favourable to the treatment of the seed by ammoniacal copper carbonate.

3. Seed soaked for half an hour in the 1 oz. to 1 gallon preparation gave the lowest percentage (58 p. c.) of healthy pods, and the highest percentage (37 p. c.) of vitality.

4. Seed soaked for one hour in a solution of 3 oz. to 1 gallon gave the highest percentage (82 p. c.) of healthy pods, and the lowest percentage (43 p. c.) of vitality.

5. As a general rule the percentage of healthy plants was in inverse ratio to the percentage of germination, showing the fungicidal effect of strong solutions, as well as their weakening effect on the vitality of the seed.

6. The most satisfactory results were obtained by soaking the seed for 1 hour in a solution of 1½ oz. of copper carbonate in a pint of ammonia, diluted to 1 gallon with water. This gave 79 per cent of healthy plants, with a germinating vitality of 73 per cent, as against 43 and 84 per cent respectively for the untreated.

COPPER SULPHATE.

1. The best results were obtained by soaking the seed for 1 hour in a solution of ½ an oz. to 1 gallon of water, which gave a percentage of 69 healthy plants; vitality of seed, 60 per cent.

2. The average results were considerably lower than with the ammoniacal carbonate of copper treatment.

BEST TREATMENT OF SEED BEANS.

1. Seed beans can be treated for anthracnose cheaply and advantageously by soaking in copper compounds.

2. Soak for 1 hour before sowing in a solution made by dissolving in a pint of ammonia 1½ oz. of carbonate of copper and diluting to 1 gallon with water.

3. When carbonate of copper is not easily obtained, use copper sulphate (blue vitriol) ½ an ounce to each gallon of water.

EXPERIMENTAL FORESTRY.

You are aware of what has been accomplished in the past by the experimental farm in the work of distributing forest trees of the most suitable varieties in Manitoba and the North-west Territories. I may say that each year is adding to our knowledge in regard to the possibilities of tree cultivation in that country, and the work was continued again the past season. Last year it was varied by including a number of ornamental shrubs and conifers in each package, to meet a growing desire on the part of most farmers of the North-west who wish to adorn their lawns, and to cultivate a taste for the beautiful as well as for the useful, and to ascertain what kinds of shrubs were best adapted to that country. Some 983 packages containing a collection of trees of this class were distributed, and of those 550 went to Manitoba, and 375 to the North-west Territories. Further, in order to stimulate an evident desire on the part of settlers to get shelter belts for their gardens and stock yards as quickly as possible, we have been sending out packages of cuttings, fast-growing varieties of poplars and willows, each containing about 100 cuttings. Of this collection we sent out one thousand packages, and as they were most useful to the North-west Territories, the largest share was sent to that region, viz., 638 packages, and the remainder to Manitoba. In connection with this I might say that some of these poplars and willows which are being distributed to the North-west are worthy of recommendation to farmers in Ontario as well as in Quebec. In either of these provinces where a wind-break or shelter belt is desired very quickly, they will be found to be exceedingly valuable. They will also succeed in low or moist situations and upon nearly all soils. They will make more wood in less time than any other tree which I know of, and are sufficiently hardy to succeed in the climate of Assiniboia and Alberta.

By Mr. Bain:

Q. Will the poplars grow in moist places?—A. Yes, they show equal adaptation to moisture and dryness. Among those recommended is one called *Pop. Certinesis*, and another one is called *Pop. Nolesti*, and a third *Pop. Bereolensis.* They are all Asiatic or East European varieties, and coming from the Steppe region of Asia or Russia.

By Mr. Wilmot :

Q. What is the form?—A. In habit of growth they are generally upright, but are much less so than the Lombardy in this respect, and are usually quite branchy. Among these we have types resembling the Lombardy, but these have not been distributed to any extent. They also grow larger than the native poplar in Manitoba.

By Mr. McGregor :

Q. The poplar in Manitoba is hardy?—A. Yes, but these varieties will grow more rapidly. In our work of attempting to increase the interest in forestry in Manitoba, I have made the following recommendations based upon our experience up to date, in my report for this year: 1. That it is best to rely on our native trees; (2) that trees can be grown with the greatest advantage and the best results when the seed has been collected and sown where the trees are designed to grow; much larger trees can be grown in this way in the same length of time than by transplanting. When possible and where possible procure cuttings of Russian poplars, already described. These cuttings are procured in the fall and should be buried in the ground during the winter, and can be set out where they are to grow in the spring. They will give shelter in a short time, and I had as much as five feet of growth from cuttings set in the ground the first year, so that it is possible to make cuttings for setting out next year from the cuttings that were set in the ground the same year; in this way they can be very rapidly increased. Having a shelter of native trees or Russian poplars they can begin to plant such hardy small fruits as currants, gooseberries and raspberries.

I have referred to the advantage of growing trees from the seed. The distribution, this year, will be largely of seed and cuttings. Here is a bag of Manitoba maple, or, as it is more generally called, Box Elder seed, which was collected in the province of Manitoba. We are sending out a large quantity this year. It is being distributed to applicants, over the whole country, about 3,000 bags, each containing from seven to ten thousand seeds, so that if each recipient gets a fair percentage to grow he can thus obtain a shelter for stock yard or garden in a very short time.

By Mr. Bergeron :

Q. Where are they sent to?—A. To Manitoba and the North-west Territories.

By Dr. Roome :

Q. Does the box elder grow well here?—A. They grow rapidly here, but we have more valuable native timber trees in Ontario. A notice of this distribution has been inserted in the papers in the Territories, and the seeds are sent to applicants who respond to this notice. The names of the applicants are preserved, so that each party who receives this seed is known, and then we are able to call upon them for the results of their experience at any time. It is intended at some future time to forward a circular to the recipients of these seeds, with a view of obtaining full and complete information as to their success or their reverses.

Q. They are shipped down here and back again?—A. Yes. We return them by mail from the farm. As well as the seeds distributed we have grown about 35,000 Manitoba oaks (*Quercus robur*) grown from acorns collected two years and intended specially for distribution in that province, we have also a quantity of native ash seedlings and a considerable number of young trees of box elder grown from seed. We have also tested special forms of the Rocky Mountain firs. Of all the evergreens they will be found to be the most suitable for planting on that western plain country. The varieties growing on the eastern side of the Rocky Mountains, we find differ

widely in hardiness and ability to withstand drought from the same variety growing on the other side. This is due to the difference existing in the climatic conditions of the two regions. On the western side it is more or less moist and much milder than on the other While on the eastern side we have the dry arid conditions characteristic of and similar to those we find on the plains.

PRESERVING APPLES IN NATURAL CONDITIONS.

By Mr. McGregor:

Q. How do you keep these apples which are on the table?—A. The samples of apples on the table are of the Wealthy variety, which is usually considered a fall variety. The end of December is generally the extent of the keeping season of the Wealthy. These have been kept under conditions which can hardly be termed strictly cold storage, but a cool even temperature. In this way I think they can be easily kept until the end of April. The temperature of the cellar in which they are stored has been kept as near freezing as possible without variation. The cellar in this case is simply a cave covered with earth on top. They have been kept in bushel boxes at a temperature of about 33°. I don't think it has varied more than three or four degrees during the winter, which is the secret of keeping fall varieties.

By Mr. McMillan:

Q. Is it dry or a little damp? A. It is a little damp.

By Mr. McGregor:

Q. Have you an idea they would keep in cold storage and then keep after they came out? A. They will probably keep for two weeks after taking them out.

I wish to refer to one other point in connection with the keeping of apples and a point of considerable importance. Of Wealthy I had about two barrels which were picked at two different periods. The first period of picking was when the apple was well coloured but not what might be considered thoroughly ripe, that is, as ripe as most pickers take them from the tree. This lot was put into a cellar alongside of another lot picked about two weeks later or were thoroughly ripe, five per cent of this first packing up to date have decayed, while of those picked at the full period of maturity about twenty per cent have been lost. The inference from this experiment is that if apples are allowed to remain on the trees to the fullest period of maturity they are more liable to deterioration than those picked at an earlier period. This fact is of considerable importance to shippers.

Q. What is the date for picking the apples?—A. A certain amount of judgment has to be used in picking the fruit. You cannot give any particular date. A variety of apples might be ready on the 1st of September in one year and not till the 15th the next year. Generally if you take the apple in your hand while on the tree by giving it an upturn, if the apple will break off readily, the fruit is ripe for pulling. When seeds have become well coloured may also be accepted as a general indication.

By Mr. Bain:

Q. Do the same conditions as those you have just mentioned apply to the keeping of winter fruit?—A. Not to the same extent; they are particularly applicable to the more or less perishable of the fall varieties.

By Mr. McGregor:

Q. Red apples sell better on the stand. Is there any difference between them and the greenings in their keeping qualities?—A. I think if you were to put all the red varieties together and all the green ones together in two separate classes, you would probably find a greater number of keepers among the green ones than among the red varieties.

Q. Do you keep grapes under the same conditions? The same conditions of cold storage apply to grapes also. A. These grapes were packed in cork dust in rather a dry athmosphere.

Q. What variety are they?—A. They are Vergennes.

I thank the gentlemen of the committee for their kind attention to my remarks.

Having examined the preceding transcript of my evidence, I find it correct.

JOHN CRAIG,

Horticulturist Dominion Experimental Farms.

The CHAIRMAN.—Mr. Gilbert, Poultry Manager at the Central Experimental Farm, will now give us some information on his particular line of work.

Mr. GILBERT responded to the call, as follows:—Mr. Chairman and Gentlemen of the Committee, I have to thank you most cordially for giving me this opportunity to appear before you to represent the poultry interest of the country, an interest of very great importance to the farmer, and one which has been too long neglected. As this is the first time I have had the honour of appearing before you, perhaps the first time that an official has ever represented a government poultry department before your Committee, I trust you will bear with me for a few minutes while I speak of some of the points which make poultry of very great importance to the farmer and to the country.

VALUE OF POULTRY AS A FARM PRODUCT.

First of all—why is poultry of great importance to the farmer? I answer, because from the time of the first investment, it yields him a quick return. You will admit that the farmer requires something to make money out of quickly. The best step you can take to benefit the farmer is to place in his hands an industry that will yield him a quick return. While I attempt to show you that the poultry interest is one of great importance, I do not wish to be understood as depreciating any other department of farm work. Let me ask your consideration then of the following points: If you take small fruits, it will be three years before any return is obtained; seven to ten years for an apple orchard to yield a return; two or three years for a heifer to give milk in paying quantities, while it requires half, or, nearly a whole generation for a forest to mature. On the other hand, the farmer who goes into raising poultry may have his cockerels ready for the market in three or four months, from time of setting the eggs; the pullets—which are the young hens—ought to begin to lay in five or six months, and thus within one short season from time of investment, he has his return for his money. A return of what is always marketable and commands a good price. There are other reasons why poultry are valuable to the farmer, and some of them may be summed up as follows:—

What would otherwise be wasted, or in other words what would probably be thrown away, can be turned into poultry and eggs and a valuable manure. The worth of the manure alone will go a long way to pay for the feed of the hens.

It is an occupation in which the farmer's wife or daughter can engage in and leave the farmer free to attend to other departments.

During the winter season the farmer as a rule has plenty of time on his hands and it is at that period that eggs are scarce and bring high prices.

While it may take considerable capital and labour as a business on a large scale, it can be made a valuable adjunct to the farm with little cost.

Where there are large quantities of skimmed or sour milk, no better fattening diet can be found for the chickens intended for market, nor a better food as an egg producer.

In stating this much I wish to draw your attention to the fact that the field is an undeveloped one, and one to which the farmer has never given the attention it deserves. It is equally certain that he has not looked at its value from the different stand-points I have just mentioned. He has long looked upon his poultry department as a sort of a thing that could take its chances. His hens are supposed to look after themselves in the winter. In the great majority of cases they are not comfortably housed, nor are they properly fed. As a result the farmer gets no return at a time when his poultry should pay him well. Ask a farmer if he expects to get a crop from a frozen field, and he says, no. Ask him if he leaves his crops out in the field until they are frozen and he will resent the insinuation as an insult to his intelligence. Yet he allows his laying stock to be almost frozen and that at a time when he ought to, and would receive 50 cents a dozen for his eggs, from good customers. As to the money in poultry, some men will make more profit than others. One man will be more adapted to poultry than another, just as some are more adapted to the raising of small fruits, while some would find a greater revenue in horses and cattle.

INCOME AND EXPENDITURE.

I will give you some figures and I do not think you will find any exaggeration, for I take the lowest values. Say a hen lays 100 eggs in a year and they sell for one cent each, you have $1.00; 10 chickens hatched out at 10 cents each, $1.00; body of the hen to eat or sell, 25 cents—a total of $2.25. The cost of the hen per year I put down at from 60 cents to 75 cents, the profit being $1.50. The manure I let go to pay for the time and trouble of taking care of the hen. Now the time is rather limited, and I have numerous notes; indeed it would be unreasonable for me to expect you to give me time to go over the experimental work of four or five years.

COMPARATIVE MERITS OF BREEDS.

I would say, however, in a few words that we have found the Plymouth Rock to be the best all round fowl we have yet tried. We have found the White Leghorn to lay the most eggs and we have so far made no cross as a market fowl to come up to the Plymouth Rock. I have had development in the Plymouth Rock of one pound and one and a quarter pounds per month. That has been by forced feeding, but with no material that the farmer has not got on his farm.

REARING FOWL FOR MARKET.

This brings me to the subject of how best to make a valuable market chicken. The farmers, as a rule, do not know the fact that the future fowl is either made or impaired in the first five weeks of its existence. A chicken that is stinted during that period will never make a large fowl, for the reason that it is during that period the feathers are being grown and it requires extra nourishment to supply the demand on the system for feathers, bone and muscle and growing frame generally. That fact, I am sure you will bear me out in saying, is known by comparatively few farmers.

There is another fact which the farmers do not realize and that is the keeping of their hens until they are too old. After two years there is no money in a hen. Why? Because after that age she moults so late that before she begins to lay she will have eaten up all future profit. Some breeds such as the Leghorns may be kept for three years, because they are peculiarly egg producers.

FEEDING OF POULTRY.

By Mr. Bowers:

Q. What feed do you find most suitable for the chickens during the period you have just mentioned?—A. I find that to put a chicken firmly on its legs, which is an important object, that stale bread soaked in milk either sweet or sour and squeezed dry, is the best. Vary this treatment with a little boiled rice, stale bread crumbs, scraps of table food or granulated oatmeal for ten days and then, but not till then, feed, wheat. I had a gentleman, who has several times been a judge at county shows in the vicinity, visit me at the farm early in the season, and when he saw me squeezing out the stale bread and giving it to the chicks, he said: "Do you feed the chickens that?" I said: "Yes." He replied: "I gave mine wheat." I remarked: "You must have killed them." He said: I have not raised a single chicken, but I did not know what killed them." He had fed the chickens wheat from their hatching and it killed them, because the grain is too large for their digestive apparatus. Whole wheat should not be fed, till after ten or fourteen days. There are thousands of chicks lost every year from just such treatment as this, and thousands are lost from getting no treatment at all.

By Mr. Roome:

You don't give them a regular ration then?—A. Well, not exactly, but they should be regularly fed. When a farmer takes to raising poultry as a means of revenue, and gives to it the same intelligent consideration he does to the other departments of the farm, he will become an inquirer. I think he will find much information in our experimental reports, about the proper treatment of young chicks. I have made the information, which I have given to the farmer from my first report of 1888, to the present, as elementary as possible. I have taken the farmer as a man who knows nothing at all about the poultry business (although not so in many cases) and have given full details as to the management of the setting hen; how to treat the chickens after they have been hatched, and have shown their growth per month, to maturity. I have given him everything I could think of necessary to instruct him in that line. I have a rapidly growing correspondence showing great increase in the interest taken by farmers in poultry, and I have had letters also saying that they are finding it a means of making money much easier than they had anticipated. I need not tell you, for I am sure you know the enormous value of the poultry interests of Great Britain, the United States and other countries.

The United States Secretary of Agriculture, last year, estimated the poultry interest in that country at $200,000,000. I cannot tell you what the poultry interests of Canada are, until we get the census figures, but Mr. George Johnson, the Dominion Statistician, informed me that they are enormous, that they are of proportions little realized. For instance, he says there are in a district near Lunenburg, N.S., 49,000 hens, yet the people living there would hardly believe there were 4,900. I only mention this to show the vast number of poultry in the country.

By Mr. McGregor:

Q. On the feeding question. Raw corn meal and cooked corn meal is a good food, is it not?—A. I think the cooked food is the easiest to digest, and consequently the best for the young stock.

Q. How do you like crushed corn?—A. Crushed corn is a good food for the growing chickens, particularly so for their last feed in the evening. The object is to keep their crops filled as long as possible during the night. In the case of laying hens in winter, they should go to roost with a crop full of hard grain.

Q. What do you think of whole Indian corn as a food?—A. Indian corn is a good evening meal for what we call the Spanish family, that is such breeds as Leghorns, Minorcas, Andalusians, &c., but it is too fattening for the Asiatics, viz., Brahmas, Cochins, and for the Plymouth Rocks. The experience of the past has taught that what is a good egg producing food in some breeds, will make other breeds so fat that they will not lay at all. It is always to be remembered that fat is a disease in poultry.

By Mr. McMillan (Huron) :

Q. Would you not feed them on roots or something of that kind as well as grain ?—A. Certainly. I only mentioned previous lines as grain foods.

By Mr. McGregor :

Q. The green food would be cabbage or something like that?—A. Yes, or whatever vegetables happen to be grown on the farm. Where you have different departments on the farm—where you keep cattle or pigs, the food you would give to the one or the other is generally suitable to the poultry. You cannot give poultry anything better than turnips, carrots, mangels, or cabbage, but sometimes it is not convenient for the farmer to feed the latter. Steamed clover hay makes a capital green food. It should be cut and dried, where you cannot put it into a silo. In winter it should be put in a basin or bucket, and hot water thrown over it. Boiled oats or barley are also good and easily obtained. While on the subject of feeding and caring, permit me to say that farmers do not need go to very great expense in bettering the condition of their fowls. I find that when you talk to a farmer about thorough-bred poultry, he at once becomes alarmed at the very great cost. Of course a breeder of fowls will ask a good price for his birds, so will a breeder of thorough-bred horses or cows for his stock. We sell spare thorough-bred males at the farm at $1 each, in order to encourage farmers to get such stock. A farmer can improve the condition of his hens without much difficulty. If they are small in size let him introduce a Brahma, Plymouth Rock, or a Wyandotte male. The next generation will be larger in size and better layers. If his stock is large, let him procure a Leghorn or Black Minorca male. He will have progeny smaller in size, but better layers and a more active fowl. There is another fact, the importance of which the farmer does not seem to realize, and it is that, with few exceptions, he does not endeavour to get eggs when they are very much wanted, viz., in winter. He is seeking outlets for his surplus products, but here is a market at his own doors which he makes no attempt to supply. I could count on the fingers of one hand the farmers who have brought eggs into this city during the winter, although eggs were sold at 50 cents a dozen. It may be said the farmer does not get that price, because he has not time to look for his customers, but he will obtain a paying margin. There are milkmen and market gardeners who come into town every day, and are among the best people of the city. Surely they would have no difficulty in getting a good price and at the least possible trouble. If our farmers would only devote more attention to the getting of eggs in winter, their efforts, I am sure, would be well recompensed.

Q. How would you house your poultry in winter?—A. In a house on the southern side of a barn or other building; it need not be a very expensive affair. A sawdust lined house is cheaply made. The windows ought not to be large as what admits sun and light in the day also admits cold at night. The object should be to have a house that can keep the temperature three or four degrees above freezing, so as not to allow water to freeze. It is well to remember that where the hens are subject to many degrees of cold, the food that should go into eggs is drawn upon to supply animal heat.

By Mr. Roome:

Q. How would it to do to keep the hen house warm ?—A. You might do that. I know a gentleman who has kept his poultry house at 60 or 65 degrees, with excellent results. I find however, that where the temperature is about 40 degrees you can keep the layers warm with plenty of exercise. I might say while I am on this subject, that I do not like stove heat. My experience is that a stove does a great deal more harm than good. At the very time you want the stove most,—from 12 at night until 7 o'clock in the morning, the fire is very low and so is the temperature of the house. The hens are kept busily scratching during the day; at night when they jump on their roosts they require a warm temperature, and that is the time the stove is going down. My opinion is that poultry require more heat at night, for they are not as busily employed as they are during the day.

By Mr. McGregor :

Q. How many fowls would you suggest should be kept together ?—A. Poultry do better in small colonies.

Q. And in small yards as well ?—A. Yes, sir, but in the case of a farmer, where he has only one breed of fowls, they do very well in larger flocks.

Q. What would you call "larger"—a couple of hundred ?—A. A couple of hundred is a large flock. It would depend altogether on the amount of range a farmer could give them.

Q. Well say three acres ?—A. Three acres would give ample accommodation for 200 fowls.

POULTRY MANAGEMENT.

Q. Do you wash your roosts with lime or use coal oil ?—A. Coal oil is the best, because it will penetrate into the crevices where the whitewash does not reach. The whitewash should be used at any rate.

Q. Are you troubled much with roup ?—A. I have been.

Q Can you give us a remedy you can send out to the country ?—A. I have always tried to impress upon the farmers that prevention is far better than the cure, which is always troublesome. I have given different remedies.

Q. What is the cause ?—A. The cause is exposure to draughts. The draughts from broken windows at night is principally how the mischief is done, foul premises, improper ventilation, &c. The fowl gets roup and communicates the *virus* to the others by dipping the infected nostril in the drinking water.

By the Chairman :

Q. What breed of hens do you find lay the largest eggs, and in the greatest number ?—A. I find after an experience of four years, that popular prejudices are very incorrect in this. I find that the Black Minorcas, Andalusians, White Leghorns, Red Caps, Wyandottes and Plymouth Rocks lay the best in winter.

Q. With regard to the size of the eggs, the white Leghorns lay a small egg ?—A. Some strains lay a small egg, and others lay eggs of 2¼ ozs. each. The Black Minorca lays the largest egg of the Spanish family. Andalusians lay large eggs.

By Mr. McGregor :

Q. Would you not think that the average is more than a hundred eggs to a hen per year ?—A. Yes, I put a hundred down as being a low figure. A good hen should lay 140 eggs a year. Dr. Wyckoff, of Croton, N. Y., says he has a flock of Leghorns that lay for him 200 eggs each every year, but he has done this by special selection and after years of careful breeding.

Q. He feeds meat ?—A. Yes, it is necessary to feed meat in some shape during the winter.

Q. You feed a little meat along with your other food ?—A. Yes, green bones, which you can get from the butcher at little or no cost, cut up by a mill, is one of the best incentives to egg laying that I know off.

Q. How would the farmer get it in a form to use ?—A. In the case of a farmer who cannot get bones I would recommend him to use the offal of any animals he may kill, and boil it. If he had bones they could be burned, rather than not fed at all. If he had a bone cutter it would be better. You see the trouble about these things is that there is little or no consideration ever given to the poultry department of the farm and few appliances have been made to answer the necessities.

Q. Burned bones, would you break them with a hammer and throw them in with the other ?—A. I would burn them and break them up in that way rather than not give them any at all.

By the Chairman :

Q. By burning you destroy the animal food in them ?—A. Yes, but the farmer has really got no means of breaking up bone except by hand.

Q. Would meal be good ?—A. Yes. The cost of these preparations is getting cheaper every year to the farmer. The Hamilton Fertilizer Companies supply bone and animal meal at $1.50 per hundred pounds.

By Mr. McGregor :

Q. That is certainly cheap enough to be within reach of the farmers.—A. A short time ago we had to pay $4 per hundred pounds for ground meat. Comparatively a small quantity of this bone and animal meal is required to mix in the morning ration and it may not be necessary to feed it every day.

Q. You have to supply lime, sand, &c. ?—A. Yes, these are all necessary. I have not gone into the winter treatment of the laying stock because time does not permit, and there are a thousand and one little essentials known only to the poultryman. The hens should also have fine sand, coal ashes, &c., for a dust bath. It is their means of keeping their bodies free from vermin. A point in winter treatment that should not be forgotten is to keep the drink water from freezing when possible. The chill should be taken off at any rate. Where you have only one flock of hens to look after, the treatment is much easier than where you have fifteen different breeds of fowls to attend to, as in my case. With one breed the farmer can open his door on a fine day and let his hens out, but I have to keep them side by side from November till the following April. That entails a great deal of close attention. It has this advantage that it affords opportunity to find out what vices the different breeds are predisposed to develop in confinement.

By Mr. Sanborn :

Q. Have you had any trouble with them eating their eggs ?—A. Yes. I have a number of letters on that point. I find that it is greatly owing to close confinement. Very often the egg is frozen and cracks and when a fowl gets the taste it is hard to cure. There are other causes such as laying eggs with soft shells, eggs becoming accidently broken, eggs too much exposed in nests, &c.

By Mr. McGregor :

Q. But will not bone, ashes and sand overcome that largely ?—A. Certainly they are preventives. They all go to make the shell harder.

Q. Egg eating is one of the difficulties in winter laying, then ?—A. Yes, very often it is a morbid taste developed by too close confinement.

By Mr. Sanborn :

Q. Do you ever feed ground oyster shells ?—A. Yes. Allow me to say that the winter treatment of fowls may be summed up as follows: supply the hen artificially in winter with what she would get if she was running about outside.

By Mr. Grieve :

Q. A great many hens are fed on egg shells. Has that a tendency to make them eat their eggs ?—A. It is likely to have that tendency if given in small quantities. Unless you can furnish them in large quantity it is better not to use them.

By the Chairman :

Q. Do you know anything about the average weight of a dozen eggs of the White Leghorn breed ?—A. Yes, of the White Leghorn breed a dozen eggs would weigh one pound ten ounces.

Q. The Black Spanish ?—A. Of Black Spanish the weight is $2\frac{2}{3}$ oz. each or one pound eleven ounces to the dozen.

Q. Therefore that would be a more suitable egg for the English market than the White Leghorn ?—A. Yes, but both breeds lay eggs of a suitable size. The far-

mers as a rule do not know much about the breeds that lay large eggs. It costs no more to feed a hen that lays a large egg than it does one that lays a small one.

Q. What is the weight of a dozen of eggs of the Wyandotte breed?—A. One pound seven ounces.

Q. How many do they lay in a year?—A. They will lay probably 130 to 150 in a year.

Q. Now then, we come to the larger breeds—the Brahmas, do they lay a large egg?—A. They lay a large egg when they run outside and a small egg when confined closely to the barn. The close confinement makes a great difference. When confined a single egg weighed two oz. and a fraction and the dozen 1 lb. 9½ oz. but the same hens when they got outside laid eggs which weighed 1 lb. 13 oz. per dozen.

By Mr McGregor:

Q. They want exercise?—A. Yes.

By the Chairman:

Q. The number they lay is much less, I understand, than the Black Spanish?—A. Yes, that is a characteristic of the breed. One hundred eggs a year under ordinary conditions is what they are credited with.

Q. Taking into account the cost and feeding and the other conditions you would not advise the Brahmas for the farmer in preference to the Black Minorcas or White Leghorns?—A. No, sir, I would not. They may do very well when crossed.

By Mr. Tyrwhitt:

Q. Where do Langshans come in?—A. They come in as medium layers, but they are a fine table fowl on account of their white flesh.

By Mr. Roome:

Q. In making your calculation of costs, do you take into consideration the expenditure on each kind of food?—A. I calculate the price of the grain used by me at the poultry establishment of the farm at a cent a pound, and a hen will eat on an average one bushel of grain in the year.

By Mr. Macdonald (P.E.I.):

Q. What kind of grain do you refer to?—A. Well, wheat, but of course it is advisable that there should be a diversity of diet. What a hen is fed on in the morning it might not get at night. I prefer to give to my laying stock soft food in the morning and grain at night.

Q. What would the mash be composed of?—A. It would be composed of bran, ground wheat or other ground grains. Ground oats and shorts mixed up with bone meal and clover hay, make a very filling diet at a cheap cost.

By Mr. Roome:

Q. Did you ever study any particular ration by which to make hens lay at times more than others?—A. I have been trying different rations for over two years. I refer to them in my annual report. I may say, however, that we cannot arrive at any definite conclusions, because many foods have lately been introduced which are of value to poultry. Lately cut green bones have been recommended as the best food which can be given to laying hens in winter. Heretofore little value has been placed on such food and what has been supplied in the shape of bone material has been furnished by the chemical works, with all the nutritive part taken out. The winter food of to-day is very different from what it was five years ago.

By Mr. Tyrwhitt:

Q. How do game fowls compare with other breeds?—A. They are not as good layers.

By Mr. Smith:

Q. You would recommend to the average farmer that he should raise Plymouth Rocks?—A. Yes, they are the best fowl for the farmer. Closely following comes the Wyandotte. Mr. Bedford, superintendent of the Experimental Farm at Brandon, writing to me recently, said that from his experience the Plymouth Rock was the best fowl for that country, being nearly as hardy as prairie chickens. A friend of his during the past winter had Plymouth Rocks laying right along in an hen house little better than an open shed, with the thermometer sometimes down to 50 degrees below zero.

HOW BEST TO KEEP EGGS FRESH.

By the Chairman:

Q. Have you given any attention to the best means of keeping eggs?—A. Yes. We find that eggs will keep two months if they are placed in a cool dry cellar.

By Mr. McGregor:

Q. But it must be dry?—A. It must be dry or the damp will make the eggs musty. They should be placed where evaporation will not take place. I think an unfertilized egg keeps better in a warmer temperature than a fertilized one. It takes a temperature of 102 degrees to hatch a chicken. In the summer time, the farmer keeps his eggs until he gets a quantity to take to market. In the meantime they have likely been subjected to a temperature of 75 or 80 degrees. It may be two weeks before sufficient eggs have been collected. During that period the fertilized eggs have undergone a greater or less change according to the greater or lesser temperature, and when they reach the purchaser they are anything but fresh eggs.

Q. He does not charge any more for them on that account?—A. No, he may not charge extra for them, but the man who buys them thinks he has been taken in and declares the farmer to be a fraud. The farmer retaliates that his eggs were perfectly good and that the city man does not know what a fresh egg is. I think it is safer to keep the eggs from being fertilized.

Q. You mean to have the eggs unfertilized by keeping the male bird away from the hens?—A. Yes.

By Mr. Boyd:

Q. Will the hens lay as well when the male bird is not with them?—A. Yes.

Q. You would advise to keep the male bird away from the laying stock?—A. I would, when possible to do so.

Q. How would you manage with the breeding stock in spring?—A. I would put the male bird with a certain number of hens in the spring. It would not be difficult for a farmer to reserve a certain number of hens for breeders in spring. I would not have the male bird with the breeding stock during the winter. Prof. Wesley Mills of the Physiological Laboratory, McGill University, Montreal, one of the leading authorities on the continent on poultry, emphatically advises the separation of the male bird from the breeding stock during winter.

Q. You think unfertilized eggs better for shipment?—A. I think they would be if they could be had in sufficient numbers. It is important to have the eggs for shipment as fresh and of as fine flavour as possible. It does not make much difference whether the egg is fertilized or not, if eaten a day or two after being laid, but when stored up for future use, as they ordinarily are, I think it is a matter of some importance.

Having examined the preceding transcript of my evidence, I find it correct.

A. G. GILBERT,

Manager Poultry Department, Dominion Central Experimental Farm.

The CHAIRMAN:—Mr. Shutt, the chemist of the Dominion experimental farms, is here to-day, and will now address the committee on his line of work. This is one of the most important branches in connection with the experimental farm system.

Mr. SHUTT, in response, addressed the committee as follows:—Mr. Chairman and gentlemen,—It will be my endeavour this morning in addressing you to bring before you very briefly some of the more important results of the chemical work of the Dominion experimental farm accomplished during the past year

THE CHEMICAL DEPARTMENT IN EXPERIMENTAL FARMING.

With the time at my command, it will be quite impossible to even enumerate all the results that we have obtained in our laboratories, much less treat them with any great detail. The past year, I may say, has been an exceedingly busy one for us. The chemical work in connection with our own experiments has increased very much. Analysis and chemical investigation are required for many of the field experiments, and experiments conducted in other departments, such as the horticultural and the botanical departments. This chemical work is constantly and steadily, year by year, assuming larger proportions. And all this comes in addition to work originated and carried out by the chemical department. In the remarks I made before this committee last year, I showed that chemistry was the foundation science of agriculture. It is owing to this fact that frequent calls are made upon our time and energies, and that the results of our work often are incorporated and published by other departments of the experimental farm system.

In addition to this work, there has been a large number of analyses made for farmers. Requisitions for analyses of soils, fertilizers, cattle-food, &c., are becoming more and more numerous, so that every year we are obliged to restrict to a greater extent this branch of our work. Besides the analytical work of the department, there has been a correspondence which is, as I pointed out last year, annually increasing. Questions are being asked in all the branches of agriculture, some of which, of course, necessitate a considerable amount of time in answering.

FARMERS' INSTITUTES.

Another branch of the work which I also consider a useful one, is the addressing of farmers' institutes and dairy conventions. There seems to be a greater desire than ever on the part of our agriculturists to *hear* what we have to say about the results of our experiments. The preparation of these addresses and the time necessary for the attendance upon these conventions make inroads upon the time at our command. In addition, I may mention that the press of Canada—not only the agricultural, but the daily, weekly and monthly press—has during the last two or three years taken a great deal of interest in our work, and we are continually being asked for matter which will be of interest to the farming community. We look upon the publication of our work in this way as a valuable means of bringing before our people the information which we have to give. It puts it before them in such a way, being as a rule in short and pithy articles, that it can be easily digested. Consequently we endeavour, whenever possible, to afford the newspapers this material for which there is a demand by their readers. Of course, this extension of the work in all these ways must be gratifying to all who have the interests of Canadian agriculturists and the Dominion experimental farms at heart, and it is also exceedingly encouraging to me, since it shows an increased appreciation by our people of the value of chemical work in connection with farming.

PROSPECTIVE RESULTS.

At the same time it points to the necessity of enlarging our chemical staff at no very distant date, if we are to keep pace with this very great desire of our farmers for more knowledge of that distinct and definite character, which is only obtained from chemistry. I, myself, am firmly of the opinion that greater strides towards more systematic and more economical methods of farming will be made during the next five years than have marked the last quarter of a century. The use and value of scientific knowledge in connection with farming are fast becoming recognized from the Atlantic to the Pacific in our Dominion. This appreciation of our work is spreading fast, and people on all sides are clamouring for more information. One result is that education in the public schools in regard to agriculture, as you are aware, is being demanded, in order that the sons of farmers may be better equipped for the work of the farm. For themselves the farmers are asking for assistance, more particularly in the way of information and instruction in the methods and practice of efficient and economical farming.

EXPERIMENTS WITH ALKALINE SOILS.

With these few words of introduction, I shall now proceed to give you an outline of some of the more important features of our work and results that have been obtained in the laboratories during the past year. I wish first to draw your attention to some experiments that I have made with regard to the improvement or amelioration of certain alkaline soils in the North-west Territories and Manitoba. It was on a previous occasion that I said we had commenced these experiments, and they are still in progress, but we have, however, reached a stage in which I can speak definitely with regard to the results. My attention was first called to the question of so-called alkali in the soil of certain districts in the North-west Territories, by the fact that analysis of waters from these areas showed a very large proportion of mineral matter of a peculiar character. These waters were rich in saline matter, which consisted chiefly of sulphate of magnesium or Epsom salts. The next step was the analysis of samples of soil supposed to be barren, and supposed to be saturated with alkali, that had been forwarded to us for examination from these districts. I found that the chief ingredient or rather impurity in the majority of these soils, as in the case of the waters already mentioned, was Epsom salts. The analysis of the water had indicated correctly the character of the soil.

EXPERIMENTS WITH SALINE SOILS.

It then occurred to me that most probably the barrenness of the soil was due to the presence of Epsom salts in large quantities, and not from true alkali, that is to say, the carbonate of soda or sulphate of soda, as is very often the case in California and some others of the western states. Further analyses of these soils show this to be the case. Several of the soils manifested an almost entire absence of salts of soda or true alkali, but at the same time, the examination proved the presence of considerable quantities of Epsom salts.

I then instituted some experiments with ordinary potting soil, adding to it certain percentages of Epsom salts, and I found the effect on vegetation (wheat, corn and pease were used in the experiments) was extremely disastrous. I came to the conclusion then that there were probably certain districts in the North-west Territories in which the soil was rendered barren to a greater or less degree by supersaturation with sulphate of magnesium or Epsom salts. The problem of counteracting the effect of this Epsom salts that crops might be grown on the land economically then presented itself to me. In the endeavour to solve it a number of what we call "pot" experiments was inaugurated. It occurred to me that the addition of calcium carbonate, or chalk, in other words, would be effective to that end; that there would be a chemical reaction between the Epsom salts and the chalk, which would finally result in the production of insoluble magnesium carbonate and

gypsum or sulphate of lime, which as we know is not deleterious to vegetation. These experiments were carried on with wheat, pease and corn, since these plants represent some of our more important farm crops. Very accurate records were taken of the germination and the extent of growth of the plants under these conditions, and at certain intervals photographs were taken. I wish to show you, in the first place, the photographs of the experiments, in which are depicted the results of adding carbonate of lime, or ordinary chalk or marl to the soil already impregnated with Epsom salts. The amount of magnesium sulphate added to the soil amounted to 5 per cent, and to such soil in one pot sufficient carbonate of lime was added to theoretically cause the final decomposition of the whole of this magnesium sulphate. The photographs were taken at an interval of some weeks after the germination of the seed and represent the relative growth of the plants of the same age in the different soils.

THE EFFECT OF CARBONATE OF LIME.

In pot No. 1, which appears in the centre of the photograph, we have wheat grown in ordinary potting soil. To this soil no chemical had been added. It may therefore be considered as the standard of the growth.

In pot No. 2, the same number of seeds were sown, but to its soil was added and intimately mixed 5 per cent of Epsom salts.

In pot No 3, there were planted also the same number of seeds, and to the soil 5 per cent of Epsom salts was added plus an amount of carbonate of lime sufficient to neutralize or cause the decomposition of the Epsom salts. Though the growth in pot 3 does not equal by any means that in No. 1, it is patent at once from the photographs that comparing Nos. 2 and 3, the carbonate of lime has had a beneficial effect in neutralizing or overcoming the deleterious action of the Epsom salts on vegetation.

Now, with regard to pease. In the photograph No. 4, we see the pease growing in the ordinary potting soil. To the soil in pot No. 5 was added a quautity (5 per cent) of Epsom salts; while in pot No. 6, we have the ordinary potting soil plus the Epsom salts and the carbonate of lime in the quantities already mentioned. The effect of the sulphate of magnesium on the pease has been more disastrous than in the case of wheat. When these photographs were taken there was no sign at all of the pease in the earth mixed with the Epsom salts, *per se*. However, in the soil to which the carbonate of lime had been added to counteract the magnesium sulphate the plants have made a very successful effort to grow, and we see that although they do not equal in luxuriance the growth of the pease in the ordinary potting soil, yet they have made a very fair atttempt towards that end. In the case of the corn we have exactly the same arrangement, and much the same result. The centre pot (No. 7) shows corn growing in good potting soil. Pot No. 8 shows a very diminutive plant, the result of the action of the magnesium sulphate or Epsom salts; in pot No. 9, we see by increased growth the beneficial action of the carbonate of lime when added to the soil containing the Epsom salts.

THE EFFECT OF LIME.

These experiments, while pointing to a certain line of work for the future, were not entirely satisfactory to me—the beneficial results were not sufficiently marked. On thinking the matter over, therefore, I deemed it well to try another series of experiments. I need not here go into the chemistry of the question to the committee, but I came to the conclusion that better results would possibly be obtained by using lime rather than carbonate of lime. As a result the magnesium sulphate would be converted into magnesia and gypsum. I will now show the committee photographs taken of pots in which the experiments were conducted on these lines, namely, by substituting lime for the calcium carbonate or marl. The first photograph gives the results with wheat. (*See* Fig. 1.) Pot No. 1 shows the wheat plants growing in good soil. Pot No. 3, we have the wheat growing in the same soil, to which has been added 5

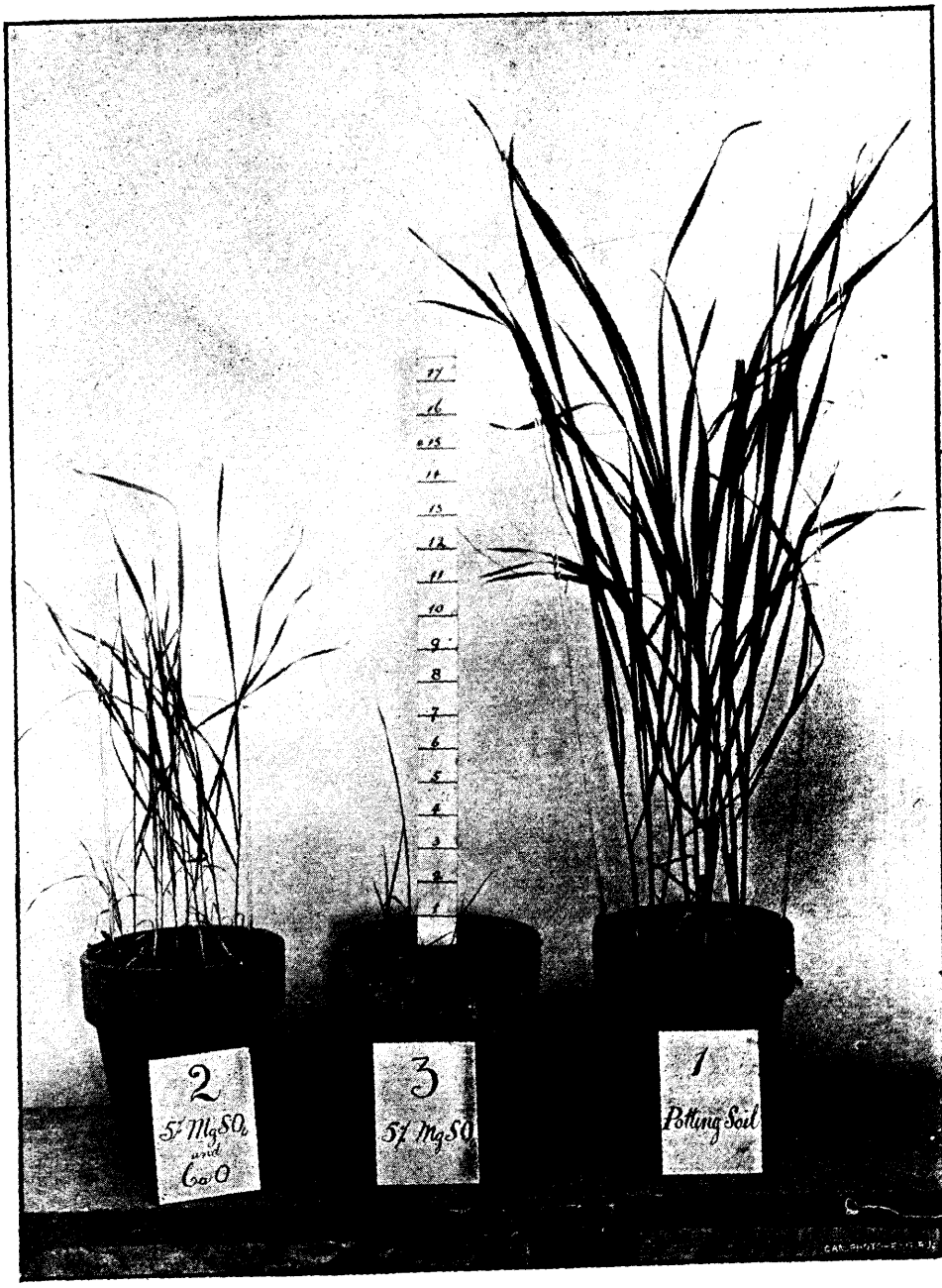

PLATE I.

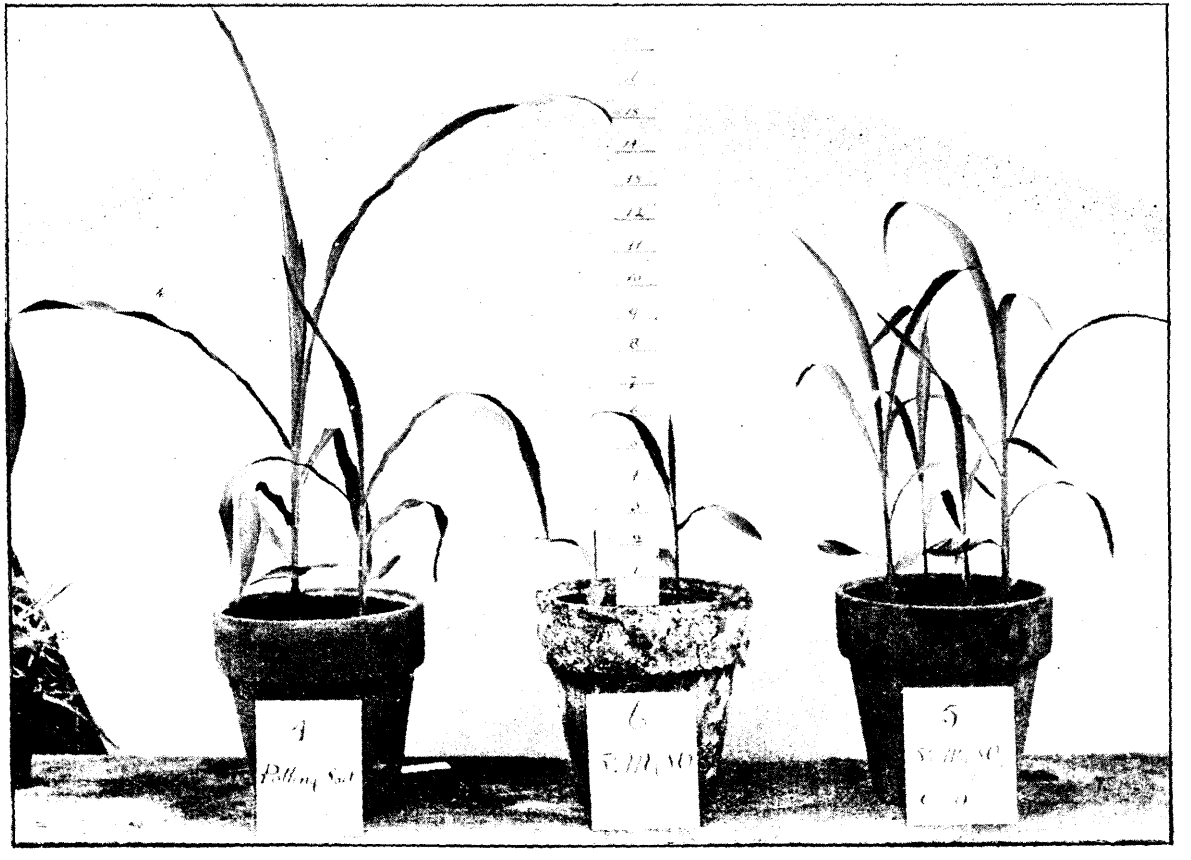

PLATE II.

PLATE III.

per cent of Epsom salts. In Pot No. 2, we have the wheat growing in the soil to which has been added 5 per cent of Epsom salts, plus sufficient lime to theoretically neutralize the effect of the magnesium sulphate or Epsom salts. The highly beneficial effect of the lime upon that soil will at once be perceived. The committee will notice also that this beneficial effect has been very much greater than where the carbonate of lime was used.

By Mr. Carpenter:

Q. Have you made an estimate of the probable cost per acre of reclaiming the alkaline lands of the North-west Territories in this manner?—A. No. I should require to know the cost of lime in the particular district. I simply bring this before the committee now to show you the stage the experiments have reached.

By Mr. Roome:

Q. How do you account for the power of pease to germinate in sulphate of magnesia?—A. It is certainly difficult to explain why certain chemicals should be beneficial and others injurious. It is well known, however, that some chemicals, in a particular form, are injurious to our system, while in another form, they are not injurious, and it is much the same with the vegetable as in the animal world. Sulphate of magnesia is poisonous to vegetation, and being a soluble salt its injurious effects are in direct ratio to the amount present. Carbonate and oxide (magnesia) of magnesium are practically insoluble and are consequently inert as regards plant life—since they cannot be absorbed into their systems.

Q. I can see how the plant would be affected if once it had germinated, but from the photograph the pease do not appear to have germinated at all.—A. Most probably all the pease germinated, but while some made sparse growth, owing to the presence of the sulphate of magnesium, others can hardly be said to have done so much but gradually succumbed and finally died. So that at the time of photographing—some 5 or 6 weeks after the sowing of the seeds—there appears but traces of vegetation above ground. I think it quite possible that many seeds that germinated did not appear above ground, but of this, without all my data, I cannot now speak more definitely.

In the case of the pease we have here a photograph of the same series of experiments (*See* Fig. 2.) Pot No. 7 contains the plants in untreated, rich potting soil. In Pot No. 9, the soil to which had been added Epsom salts, no plant appears at all, those that had appeared have died down. In No. 8 we have the soil to which had been added five per cent of magnesium sulphate and a sufficiency of lime. From the photograph you will notice the beneficial effect upon the pea plant. There is a very fair growth, though not equal to that in Pot No. 7.

The third experiment of this series is with corn. (*See* Fig. 3.) This photograph I now show you illustrates the condition of the plants at the same stage but under different conditions of soil. No. 4 represents the corn plant in potted soil. Pot No. 6 shows the corn plant grown in the soil to which 5 per cent of magnesium sulphate has been added. Very diminutive growth is here apparent. No. 5 is the corn plant grown in soil containing both the magesium sulphate and lime.

The same beneficial effect of the lime is again to be noticed. The growth in Pot 5 is almost equal to that in No. 4 and the difference between that in Pots 5 and 6 is very well marked.

The question of the amelioration of barren soils is a very important one for people living in certain districts of our North-west Territories and Manitoba; and at the same time it is an exceedingly difficult problem to solve. I thought you would be interested in learning that some work had been done in this direction and that some really good results had been obtained. However, I only bring this before you as showing what our initial experiments have brought forth, hoping that in the future I shall be able to speak more definitely upon methods of treating alkaline lands.

ANALYSES OF FERTILIZERS AND BARNYARD MANURES.

A considerable amount of work has been done in our department during the past year in the analysis of fertilizers. This included, first, the examination of barnyard manure. I thought it well to pay special attention to this matter, since we must recognize the fact that barnyard manure is the manure that Canadian farmers use and probably will use for some time to come. That is to say, that the sale and use of commercial fertilizers is not as yet large. I thought it well, therefore, having this in view, and also recognizing that we have in barnyard manure an exceeding valuable fertilizer, that our people should know as much as we can tell them regarding its composition and the treatment of it that would give the best rssults. I thought that certain experiments should be inaugurated to throw light upon certain moot points. In the report for the year, which has just been issued, you will find a chapter which deals at considerable length upon this subject. There is an experiment related there that I should like to bring the results of before you this morning. The common opinion, I think, among the farmers is that when fairly well rotted manure is spread upon the field and there allowed to become dry before being ploughed in, say for a week or two, that a considerable loss of fertilizing material is caused by volatilization. I instituted some experiments to ascertain the truth or otherwise of this wide-spread opinion, and if possible to settle the question. To do that, I took two samples of manure, one of which was in an active degree of fermentation and still quite hot; the other was a sample which had passed its most active stage of fermentation. These manures were produced on the farm and consisted of the mixed excrements of both the horse and the cow. These samples were thoroughly and carefully analysed. Portions of each were then spread out thinly on panes of glass and exposed to the sun, at the same time being sheltered from rain. This manure consequently dried up. After exposure for one month, they were again analysed, with a view to ascertaining what loss of ammonia had taken place by volatilization. These experiments were conducted under such conditions as to make the results of value to our farmers; the conditions under which I exposed the manure would be very similar to those upon the ordinary farm, as far as the volatilization of the ammonia was concerned. I will very briefly give you the results of these analyses. The well rotted manure, that is, the manure that had gone through its most active stage of fermentation and again became cold, contained before exposure 10·3 lbs. of nitrogen per ton. After one month's exposure this same sample of well rotted manure, contained 10·1 lbs. per ton of nitrogen. If we value nitrogen at 17 cents per pound, we find that the manure before exposure was worth for nitrogen $1.75 and after exposure $1.72 per ton, a depreciation in value of only 3 cents.

The second sample was taken during fermentation, and contained before exposure 9·8 pounds of nitrogen, and after exposure 9·3 pounds per ton. This valued at 17 cents gives the value before exposure $1.67, and after exposure $1.58. You will notice that in the first case there was a loss of 3 cents only per ton, and in the second case when the manure was spread while in active fermentation, there was, after a month's exposure, a loss in value of 9 cents per ton. We can, therefore, I think, safely infer from these experiments that the loss of ammonia due to volatilization while the manure is spread upon the field previous to being ploughed in is extremely small, and may for general practice be left out of consideration.

Since it is often a matter of convenience and saving of money for the farmer to spread his manure sometime previous to its being ploughed in, I cannot see that such should not be practised. This, of course, does not affect the question with regard to the loss of ammonia in the manure heap, nor the amount of fertilizing matter that can be washed out of manure on the field or in the heap. It only touches the question of loss due to the drying up of manure whilst spread in thin layers upon the fields.

Q. You think the drying up does not cause much loss?—A. No. The manure is very much less, of course, in bulk, but our experiments have shown that owing to the fact that the fermentation ceases the moment it is spread out in thin layers, there is but very little loss of ammonia.

Q. What about exposure to the weather?—A. If manure on the field is exposed to the rain, a certain proportion of its valuable constituents will be washed out, but (unless the ground is flooded or frozen), it is washed into the soil, and there the fertilizing qualities retained. Consequently, I say the conditions under which I tried the experiment and under which loss might occur, were, as far as possible, identical with those in the field.

Q. How is ammonia retained in the manure?—A. As a rule there is extremely little ammonia in a free condition in manure, but it is all the time developed by fermentation in the heap or in the soil. There are manures in which, as we have seen, a loss takes place, but it is not a very significant one.

By Mr. Tyrwhitt:

Q. Is not the best mode of applying manure by either top dressing or ploughing under lightly?—A. That is a difficult question to answer in a word or two. The right application of manure depends largely on the character of the soil and the class of crop which you intend to grow. Most certainly it is no use burying manure so deeply that the roots of the growing crop do not reach it. Shallow feeding crops respond best to a top dressing of a well rotted or soluble manure. For the majority of crops, however, it is perhaps best to plough the manure in—though not at too great a depth. The physical condition of the soil or tilth is usually very much improved by the presence of the ploughed-in manure.

By Mr. Carpenter:

Q. Do you recommend drawing the manure directly from the stables and spreading it out upon the land, or piling it, as most of us do, in small heaps? Would you recommend that it should be drawn out during the winter and then ploughed in in the spring?—A. This question of the economic fermentation of the manure and the application of it is an exceedingly difficult and lengthy one to answer. Manure should be managed according to circumstances. We must understand this, that the plant food in manure goes through certain stages of fermentation before its constituents are available for plant food, therefore we wish to induce fermentation either before the manure enters the soil, or after it has been mixed with the soil. With some soils and crops this fermentation should take place partially, at least, before the manure is applied; with other crops and soils, the manure is best ploughed in while fresh.

Q. Is it not better after being mixed with the soil; is the soil not benefited by it?—A. Yes, with certain soils, such as heavy clay soils. I think that not only on account of the mechanical effect, due to the presence of unrotted manure, but also to the fact that the soil itself is of a retentive character, it is often a wise plan to apply the manure quite fresh and allow it to ferment in such soils. But in dealing with light soils which easily leach, and with crops which have a short season of growth, and consequently must have food supplied to them in a readily soluble form, I think it would be better economy to apply the manure in at least a semi-rotted condition. Then, again, with very light soils, I would aim rather to manure for the coming crop than to permanently improve the soil. With regard to the application of manure to the field, we may say that it is well in the majority of cases that the manure should be partially rotted before it is applied, and to that end it is often most economical of labour to pile it up in the fields in tolerably large piles previous to ploughing. If placed in small heaps during the winter, and the field is subject to floods in the spring, by which large quantities of water are carried off from the surface of the field, undoubtedly there is a great loss of fertilizing material due to the washing out action of the melted snow and the spring rains. Much plant food is thus carried off the surface of the soil before the frost has left the ground. If, in such a case the manure has been kept in the pile till just before ploughing, the fertilizing material would have been retained.

Q. This is a vexed question, and if we could give instructions to our farmers in regard to the best use of manures it will be of great benefit to them?—A. I do not think it will be possible to advocate any one system which is going to be of

equal value to all our people. We shall have to educate them in the principles that underlie the care, manufacture and application of manure. When these principles are understood, they will then be able to apply the manure with the greatest advantage to themselves according to the character of the soil and the crops to be raised.

COMPARATIVE VALUE OF SOLID AND LIQUID MANURES.

I have also taken pains to point out in my report the relative value of solid and liquid excreta from different farm animals, and to show that there is still going on, from many farms, a tremendous loss of real plant food, due to the fact that sufficient care is not taken to preserve the liquid manure. For instance, to give you an idea of the comparative value of the solid and liquid excreta in the case of the cow and the horse, I would say that from analysis we deduce that horse urine is worth $6.20 per ton, while the dung is only worth $2.50 per ton. The cow urine we estimate to be worth $5.07, and the solid excreta, $1.69 per ton. These figures are, of course, subject to variation, because the value of any particular sample of manure is dependent not only on the quality of the food, but also on the proportion of the litter used, and the function of the animal, whether it is producing milk or flesh, or simply at rest. The figures, nevertheless, are relative, and show that our farmers need to take greater care of the liquid manure.

By Mr. Roome:

Q. How do you account for the difference in the value?—A. Analyses show that in the case of cow the urine contains 21 pounds of nitrogen per ton; in the case of the horse, 30·4 pounds per ton. The urine of the horse is very much richer in nitrogen than that of the cow, due largely to the diet being richer in albuminoids.

We have been advocating, therefore, the use of a liberal quantity of litter to absorb this very valuable part of the manure. Not only is it true that the liquid manure contains a larger quantity of fertilizing elements but it contains them in a more valuable form for plants, Moreover, liquid manure favours the ready development of those bacteria which set up fermentation in the more solid portions of the manure, and thus renders valuable material which would otherwise be of no value to the plant. It is therefore of paramount importance that we should not only save the liquid manure but that it should be preserved with the solid portions of the manure.

COMPARATIVE VALUE OF ABSORBENTS FOR STABLE USE.

I have pointed out in my report the value of the different litters. Litter has two functions: to act as an absorbent and to keep the animal dry and warm. The more common litter is straw, but there are many other materials that from an economical stand-point have a value for this purpose. All bedding materials should be good absorbents. In that connection I might mention the fact that we consider from the experiments tried to ascertain the absorbent character and also from chemical analysis, that we have in many samples of peat a most valuable material to be used in the cow houses, pig styes, and barnyards and any places where there is a superabundance of the liquid portions of manure. It is a material that has been used in Germany and in the large stables of England, and is indeed now imported into the States for the purpose of bedding animals.

By Mr. Gillmor:

Q. What is that?—A. Peat.

Q. The farmers could not afford that here?—A. I was about to point out that we have many deposits in various parts of the Dominion which can be used for that purpose which are very similar in character to the best used in the older coun-

tries for this purpose. For instance, within a few miles of Ottawa, at Caledonia Springs, large deposits of material of a peaty character exist. This could be used with advantage in our stables, cow houses, pigstyes, barnyards, &c.

This material—peat—has a value in itself, since it contains a large amount of plant food. It serves to retain this liquid manure which would otherwise be lost. The fermentation of the absorbed liquid in the peat would start the decomposition of the peat itself. This results in setting free, or rendering available, what I might call the locked-up plant food which exists in the peat.

By Mr. McMillan (Huron):

Q. What is your opinion with respect to manure, whether it is better made in the barnyard or under cover?—A. I don't think with ordinary care that it is necessary to prepare our manure under cover, though manure so protected is certainly much more valuable than that which has been exposed to excessive rain. It seems to me a debatable question, whether there would be always an adequate return for the outlay in so curing it. I can easily understand if we had a climate similar to that say in British Columbia, where in certain seasons of the year there were continued and excessive rainfalls, much loss of plant food from the manure would ensue, unless in some way it were sheltered. But in most seasons in Ontario when proper care is taken, I don't think that it is necessary to preserve the manure under cover. What we want to do is to keep our manure moist, without subjecting it to washing. I feel convinced that if it is kept fairly moist, there will be no great loss by fermentation.

FERMENTATION OF MANURE, NECESSARY.

We want to induce fermentation, but at the same time we want to be able to control and check it in case it proceeds too far. For the development of the bacteria of fermentation, we must have moisture, warmth and air. Manure, in order to ferment, should not be so closely packed that the air cannot permeate it, not too loose, else fermentation proceeds too rapidly. At the same time it should be kept tolerably moist throughout, though it should not be soaked or it will be impossible for the germs of fermentation to develop. Moisture, warmth and air are the three necessaries and they all need controlling, or the manure will spoil. Manure must come to a certain degree of fermentation before it is of service to crops, and I think the conditions of right fermentation are obtainable without shelter, though I have nothing to say against that method. I would suggest that the floor of the barnyard slope to the centre and be of puddled clay, so that all liquid would be retained. By a pipe leading from the centre and a pump, the heap could at any time be moistened with such fluid as drained out of the heap. It is always well to keep the manure moistened with its own liquid, but if this was insufficient in quantity, water might be used. In the first place, plenty of litter should be employed, and secondly, I would advise the occasional mixing of a cartload or two of peat or swamp muck with the mixed manure in the heap, from time to time. By attention to these details, there would be no fire-fanging—very little, if any, loss of ammonia, and finally there would result an increased weight of manure of good quality.

In the preservation of manure I regret to say that we have very few reliable and scientific data to argue from. It is and has been largely a question of theory and opinion.

Q. I don't want to go into it, but I disagree with you. I believe in making manure under cover and in building my new barn, I fixed up the roof of my old one to put manure in. All the experience I have had leads me to think that manure is better under cover. We consider two loads of manure in the shed is worth three loads of manure in the barnyard.—A. This is a matter dependent largely upon the care which is given the manure and the amount of rainfall. If the conditions which

I have stated were complied with I am of the opinion that a great improvement in the manure would result. That made on the farm is, at present, often lost before there is any chance of getting a return from it.

By Mr. Roome:

Q. Don't you think the rain or moisture destroys the manure?—A. It washes a certain amount of the fertilizing power out of it. It leaches it, in fact.

By Mr. McMillan (Huron):

Q. Have you seen a little work intitled "Scientific Farming"?—A. No, I cannot say that I have, though I have read several works that treat at great length and also scientifically of the care of manure.

Q. I have that little work, and it says that manure in the open was reduced in value from 10 per cent to 40 per cent while in the shed it only lost 9 to 10 per cent.—A. It is easy enough to imagine conditions under which the value of the manure might be entirely leached away—but with a barnyard such as I have described and the plentiful use of litter and absorbents I do not think such could occur in ordinary seasons, in Ontario. I could not lay down a rule for the care of manure equally applicable for all parts of the Dominion and for all seasons. In the Maritime Provinces and British Columbia, it may be absolutely necessary to protect the heap, but I scarcely think that such is the case here. In my last report I have entered fully into particulars regarding the changes that take place in the fermentation of manure and their originating causes. When these facts are mastered, each one will be able to apply the principles involved for himself, so that the greatest good may result.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
FRIDAY, 24th March, 1893.

The Select Standing Committee on Agriculture and Colonization met this day at 10.45 a.m., Dr. Sproule, Chairman, presiding.

Mr. SHUTT, recalled, proceeded:—Mr. Chairman and gentlemen, understanding that the time at my disposal is excessively short, I shall restrict my remarks to two subjects.

FODDERS,—THEIR GENERAL IMPORTANCE.

First, the results of the analyses of certain fodders made during the past year; and secondly, some improved methods that are suggested in connection with the testing of milk. Of all the branches of agriculture, none I think have taken such great strides during the past few years as dairying and dairy farming. The tremendous extent to which the business of cheese production has of late developed and the annually increasing sales of this food commodity in the English markets are facts very well known to you all. The indications are that butter making in creameries in the near future is to take a place side by side with the cheese industry, and that before long we shall have a very large and important industry, in this article. Then again increased attention is being paid to the fattening of stock, principally swine. This is a matter directly connected with the dairy industries, and in no sense antagonistic to it. Stock fattening may and should be successfully and economically worked with the production of milk. Since then so many of our people have diverted their capital and concentrated their energies and attention towards the development of the dairy industries, it would seem but right to do all

in our power to help their enterprise, and through them assist in developing the resources and the wealth of this Dominion. We may expect great things from this progressive movement—better methods of farming in general, a greater fertility of the soil, and a larger crop yield per acre. We may also expect improved stock. Now, the cheese, butter and the flesh are produced by the animal from the food eaten and consequently their cheap production is chiefly dependent upon cheap, efficient fodder. The efficiency of the fodder in the first place depends upon its composition, that is the percentage of its various constituents; and, secondly, upon the digestibility of those constituents. The cheapness of fodder, that is its relative price compared with other fodders, depends upon the cost of the feed and the culture and the yield per acre.

COMPOSITION OF FODDERS.

In all fodders there is a certain amount of water to which we attach no monetary value, though of course its presence is of great importance in all green fodders for preserving them in a succulent and palatable condition. After the deduction of the water, what is left is known as "dry matter." This dry matter is made up first of mineral matter, or ash; and secondly, organic matter. This organic matter consists of (*a*) albuminoids, that is, substances which are akin to the white of egg or the lean of meat and containing as essential, the element nitrogen; (*b*) oils or fat which are present more particularly, and oftentimes in large quantities in the seeds; (*c*) starch, sugar and allied substances—known collectively as carbo-hydrates; and (*d*) the fibre of the plant—the least valuable of all the constituents of the fodder. I do not propose to enter to-day into any account of the functions of these different constituents of fodders, since I have already published such in detail and my time is now limited. Suffice it to say I have enumerated these constituents in the order of their value and importance. Further, I wish to emphasize that the albuminoids, the nitrogen holding compounds are above all essential in certain proportion for the maintenance of life. The presence of the nitrogen holding compounds are essential in certain proportions for the maintenance of life and for the development of flesh and milk. Further, these albuminoids cannot be replaced in a fodder by any extra amount of another constituent. The albuminoids first replacing the waste tissue and the balance then serves in the production of milk or flesh. The albuminoids are therefore exceedingly important constituents when discussing the question of cattle feeding. Their percentage is a measure of the feeding value of the fodder as well as a regulator of the market price. This might be illustrated by citing linseed meal or cotton seed meal, both of which materials are of a concentrated character, containing a large amount of albuminoids. At the same time they are highly priced feeding material. Our object then is to provide as cheaply as possible, foods containing a fair quantity of these albuminoids. Cattle fodders naturally fall into two great classes, first, coarse or bulky fodders; and second, concentrated fodders. Both are used in economic food rations. Both are necessary for the supply of these constituents in the right proportions, which alone exist in economic feeding, and both are necessary for the maintenance of the health and vigour of animal life. Coarse or bulky fodders consist of straw, grass, hay, roots, corn fodder, and ensilage of such like. They as a class are characterized by a large percentage of water and being comparatively poor in albuminoids. They as a rule contain a small percentage of dry matter, owing to the large amount of water of which I have spoken. The concentrated fodders, on the other hand, consist of the grains, the seeds of the cereals, pease, and certain milling products, such as shorts, bran and linseed cake. They contain very much less water than the coarse or bulky fodders and are much richer in albuminoids.

COARSE FODDERS—THE CORN CROP.

I think we have established beyond any doubt the great value of the corn crop, whether preserved in a silo or dried in stooks. From the results of laboratory and

field experiments carried on during the last three years, corn fodder has been shown to occupy first place among the coarse fodders. We can obtain the largest amount of cattle food per acre from this crop. Consequently we seek to introduce its growth more and more. It enables farmers to keep their winter stock in good condition and makes winter dairying and stock raising profitable enterprises.

By Mr. Carpenter:

Q. Will you please tell us which contains the greatest percentage of albuminoids in the bulky food—the corn or the hay?—A. If we assume that four tons of corn ensilage is equal to one ton of hay, an assumption which I think is very close to the truth, and that two tons of hay is a fair crop per acre, we should obtain an equal amount of cattle food from the yield of eight tons of corn fodder to the acre. But sixteen tons of corn fodder is only an average crop, so that it will be readily seen that there is a considerable margin in favour of corn.

By Mr. O'Brien:

Q. The corn is weighed in the green state?—A. Yes, I am putting the food value of corn fodder in the green state with one ton of hay, which, as everybody knows is grass in a dried condition.

We have, however, to recollect that corn fodder or ensilage, will not make a complete ration. Other foods ought to be given with it, which contain a larger percentage of albuminoids. This is done at the present time by the use of grain and meals of various kinds, but it would be an infinitely more economical method if we could substitute some less expensive food, such as a coarse fodder, rich in albuminoids. We think that this can best be done by growing and preserving with the corn, more legumes, plants belonging to that family which includes clovers, pease and beans. These are all rich in albuminoids, all contain a large percentage of nitrogen. This nitrogen they take chiefly from the atmosphere—a property or qualification in their favour, not possessed by other plants. Moreover, it has been shown that by the decay of the roots of these legumes in the soil—the soil has become enriched by the nitrogen which they possess, and which they, in the first place, have taken from the air. This additional nitrogen which they give to the soil, is in a condition readily available for the food of future crops. As you are all aware Prof. Robertson has proposed a plan whereby beans are grown with the corn to furnish albuminoids, and sunflower heads are added to furnish fats, in which constituents corn fodder is more or less lacking. The whole of the corn, beans and sunflower heads are put together in the silo. In addition to beans, as a source of albuminoids we have clover and pease, both of which are crops easily grown. They are rich in albuminoids and might be used to advantage in the silo. I think it would be an excellent plan to put the second cut of clover in the silo with the corn. Substances rich in albuminoids like the above mentioned crops, are extremely difficult to preserve in the silo by themselves, but when they are mixed well with the finely cut corn, the whole makes a very excellent fodder.

COMPARATIVE VALUE OF VARIOUS FODDERS TABULATED.

The following table shows the relative value of various green fodders according to their albuminoid contents. It gives the average number of pounds of albuminoids per ton.

	Lbs. per ton.
Corn in glazing condition	35 to 42
Beans, whole plant	60 100
Pease, whole plant	60 75
Clover in bloom	80 90
Vetches	60 70
Grass, average in bloom	45 65
Fodder oats	35 55
Fodder rye	40 55

Q. Did the oats include the whole plant?—A. Yes, everything. The figures which I have given are, of course, averages, and subject to a certain amount of variation, the figures increasing with the degree of maturity, within certain limits. The leguminous plants, the beans, pease, clover and vetches, it will be seen, are characterized by being rich in albuminoids, containing a much greater proportion than the other green fodders I have enumerated. For this reason clover hay is far more valuable for feeding purposes than hay from timothy or other grass. It is advisable, therefore, that we should encourage a more extensive growth of these leguminous plants. The result will be the production of a valuable home-grown fodder. Efficient rations could then be made with a less amount of meal than now necessary and the fertility of the soil would be enhanced, since their growth would enrich the soil with nitrogen. Nitrogen is the most expensive of all the elements of plant food, just as it is the most expensive constituent of animal food; the growth of legumes adds to our store of it in both cattle food and plant food.

In my report for last year which is just issued, you will find the composition in full, of the various varieties of beans, the details of which I cannot enter into on the present occasion. They are the Horse bean, the Broad Windsor and the Telephone bean. The last when sown with the corn uses it as a pole. It climbs up the Indian corn plant and, in harvesting, the corn and beans are cut together in one operation. The whole passes together through the cutting machine and forms an intimate mixture for the silo. From my analysis of the Telephone bean I should say it was a very desirable and valuable addition to the corn.

ANALYSIS IN AGRICULTURE.

An analysis of the sunflower heads containing the seeds, the whole being intimately mixed, shows 97 pounds of fat or oil to the ton. The sunflower stalks and leaves were also examined chemically. From the analysis, however, I judge them to be of no value for feeding purposes.

CONCENTRATED FODDERS.

With regard to the second class of fodders, the concentrated fodders. A considerable number of analyses have been made of grains such as oats, barley, wheat, pease and others and the results appear in my last report. I would now only draw your attention to the composition of frozen wheat as obtained from the North-west Territories and Manitoba. The results of the experiments in feeding swine and steers with this wheat by Professor Robertson, have been brought before you. He speaks highly of it as a cheap and efficient food. Its analysis corroborates this opinion, and shows it to be rich in albumenoids and richer indeed than many of our soft wheats grown in Ontario. Compared with No. 1 hard it possessed more water and less albumenoids, and this is undoubtedly owing to the development of the grain being arrested by the frost. Notwithstanding this, it stands very high as a food, compared with the grains now usually used by farmers for feeding purposes.

RELATIVE COST OF FODDERS.

By Mr. Cargill:

Q. Have you ascertained the relative value of ensilage as compared with the root crop for feeding purposes, and the relative cost of production?—A. With regard to the relative cost of production, speaking from memory, the roots during the past year have cost us $2.50 per ton, while the ensilage in round numbers costs us $1.50 per ton. One ton of ensilage would contain more real cattle food than one ton of roots. It should be remembered that roots, however, have a peculiar value of their own in a cattle ration. They possess properties which assist in maintaining the tone, vigour and healthy digestion of the animal. This gives them a place of their own in all cattle rations. Roots contain a large quantity of water, and the dry matter is not rich in albuminoids, but for the reasons already stated, they make an important factor in all economical rations.

METHODS OF TESTING VALUE OF MILK.

Attention has already been called to the rapid development of the creamery industries. I now bring before you some recent experimental work in connection with that branch of agriculture. Whether we are ready to admit that the measure of the value of milk for cheese-making is dependent upon the percentage of fat in the milk or not, there can be no doubt of the correctness of that basis for butter-making. I believe that the time will come when it will be universally recognized that fat is the chief constituent of milk for all purposes, and that milk will be paid for according to its percentage of butter-fat. Be that as it may, the quality as well as the quantity must be taken into account, when we prepare milk for the manufacture of butter.

The Babcock test, the test devised by Dr. Babcock of Wisconsin, allows us to adopt this basis, by giving us a method whereby the percentage of fat can easily be found. The results of careful experiments in the laboratory have shown the reliability and accuracy of this method. It is also one which can be easily manipulated by a man in the creamery or in the factory. The objection, however, to the general introduction of this test was that it was necessary to make a daily examination of each patron's milk, and that this involved a considerable expenditure of labour which, in other words, may be written money.

We have now a very important and valuable modification, an account of which I will give you this morning, by which a composite sample obtained during six days may be tested once a week and tested with accuracy. Its introduction of course will effect a very large saving of time and labour. A Swedish chemist, named Alen, discovered that a small quantity of potassium bichromate added to milk, would keep it from coagulation and decomposition. That is, it will keep it perfectly fluid for a considerable length of time. The idea occurred to me to apply this to the Babcock method, and as a result, I might say, that I find that its presence in the milk, in no way interferes with the accuracy and reliability of the Babcock method. Further, that the rennet or percentage of fat obtained was just as accurate as from milk to which none of this potassium bichromate had been added. The addition of the potassium bichromate of course lessens the amount of work very much, since the times of testing are reduced to once a week. The method is extraordinarily cheap and it is easily understood. This chemical is quoted at fourteen cents per pound and a pound of it is sufficient for 800 tests. It is well to purchase it in a powdered condition, as it is then more easily weighed and measured. Ten grains is a sufficient quantity to keep perfectly fluid, a pint of milk, for a period of longer than five weeks. I have kept a sample of milk perfectly fluid for five weeks and analysed it at different times during that period, and obtained constant results throughout.

The exact amount of bichromate that it is necessary to add to a sample of milk is not a matter of great importance. However, it will be found advantageous to ascertain the measure, say, of ten grains in a small spoon, and then, subsequently, to measure out the bichromate instead of weighing it. This is a much easier method and will save considerable time. To briefly describe the method. For each patron there should be a bottle properly labelled with the name of the patron upon it. It should be closed with a good cork or a glass stopper. Into it a sample of the patron's milk is run daily. At the end of the week we shall have a composite sample, which, being perfectly fluid, allows of the Babcock pipettefull to be withdrawn. This is put through the test in the usual way, and the percentage of fat ascertained. The percentage of fat so ascertained, if multiplied by the pounds of milk supplied by the patron during the week and divided by 100, will give the number of pounds of butter-fat supplied by that patron.

By Mr. Smith:

Q. What effect would that bichromate have on the milk during the very warm weather when you are feeding calves?—A. You must understand that the bichromate can only be used as a preservative for milk about to be tested; it cannot be added to milk for any purposes whatever but testing.

To the quantity of milk which I have in this bottle, about 1½ pints, ten grains of potassium bichromate have been added. You will observe that it has assumed a distinctly yellow tint, so that it could not be mistaken for an untreated sample. This chemical is a poison, although not a poison in such a marked degree as corrosive sublimate or potash, both of which have been recommended as preservatives of milk for testing. The bichromate has this advantage over the other two chemicals, that it colours the milk very strongly, while they do not. The milk in the composite sample bottle should be kept in a cool place, although not necessarily on ice. When an additional sample is run in, the whole should be gently shaken, not churned in any way violently, but shaken sufficiently that the cream which has risen during the previous 24 hours may again become thoroughly incorporated in the milk.

By Dr. Roome:

Q. Will the cream again become incorporated with the milk when once it has risen to the top?—A. Oh, yes. I have tested this matter and can speak with definiteness on that point. I have taken from a composite sample of one week quantities at different intervals in the following five weeks and always obtained the same percentage of fat. It clearly shows that no decomposition has taken place, and that the fat must become thoroughly mixed with the milk on shaking.

Q. You break up the fatty globule and dilute it with milk again?—A. It should be very carefully done. The bottle should not be shaken violently. Three or four turns are all that are necessary to thoroughly mix the added sample of milk with that which has been placed in the bottle before. The cream is then thoroughly suspended throughout the mixture, for it must be borne in mind that the fat is in suspension, not in solution. It does not form a hard cake on the surface. During the week in which the tests were made we had no trouble whatever. This method allows the Babcock test to be made once a week, instead of daily, as heretofore. One word with regard to sampling the milk in order to do the work easily and accurately. I have suggested that when the milk is in the weigh-can, that the sample of milk for a test should be taken. I consider that when the milk is in the weigh-can, it is about as thoroughly mixed as it ever will be in the creamery. In order to get that sample, I take a tube such as the one I have here (of glass), but in the factory, however, it would be better to have it of tin—less than half an inch in diameter and open at both ends. The end inserted should be slightly contracted. Insert the tube in the weigh-can containing the milk, then close the upper end with the finger and withdraw the tube. The pressure of the air will hold the milk in it. Then put the tube into the mouth of the bottle to hold the samples of that particular patron's milk and remove the finger; the milk in the tube at once runs into the patron's bottle. This simple method is gone through, with all the others. It will be found to be an extremely easy way in which to get a thoroughly representative sample, and at the same time, a sample in direct proportion to the amount of milk supplied daily by each patron. Thus, if there is milk to the depth of two feet one day in the can, we get two feet in the tube, whereas on another day milk to one foot in depth in the can is supplied, we likewise take from that a proportionate amount to put in the testing bottle. In this way we do not get approximate but accurate results in testing the milk by the Babcock method; for the result from such a method will give exactly, after calculation, the number of pounds of butter supplied during the week by that patron.

I am afraid, Mr. Chairman, that I have exceeded my time, and I have therefore to thank the members of the committee for their kind attention to my remarks.

Having examined the preceding transcript of my evidence, I find it correct.

FRANK T. SHUTT,

Chemist, Dominion Experimental Farms.

MR. WILLIAM ALEXANDER.

At the meeting of the Committee on Agriculture and Colonization, on 24th March, Mr. Innes, M.P. for South Wellington, read a letter from Wm. Alexander, LL.D., Editor of the *Free Press*, Aberdeen, Scotland, in reference to the character and quality of store cattle hitherto shipped from Canada to Scotland, and the importance of improving the same in view of the hoped for resumption of the trade between the two countries. In reference to the scheduling of our Canadian cattle, and to the efforts made since that time to have the order removed, Mr. Alexander, in his introduction, says he is satisfied Mr. Gardner will order the removal as soon as it is safe to do so. This has been made perfectly clear, not only by his reply to the deputation of farmers and others from Scotland, but by more recent statements he has made in the House of Commons.

In view of this, Mr. Alexander goes on to say that he desires to make a few remarks bearing on what he conceives to be the true interests, both of the farmers in the Old Country, who are to buy store cattle, and also of those in Canada who grow cattle for exportation and ship them to that country for the purpose of being fattened. He shows how Aberdeenshire has been for years noted as one of the leading counties in Scotland where cattle of superior quality have been fed for the London market. This business has nearly altogether taken the place of dairying, though attempts were recently made to promote the latter branch of agricultural industry by lectures and other means. The high character attained by the Aberdeenshire farmers in the rearing of beef-producing cattle of the best stamp, he says, was largely due to a few capable far-sighted men, chief of whom was the late Mr. Wm. McCombie, of Tillyfour, who did so much to improve the native breed of Polled cattle, and Messrs. Anthony and Amos Cruickshank, of Sittyton, who devoted their attention to the improvement of Durham Shorthorns. Through the efforts of these and other stock breeders the reputation of Polled cattle and Durham Shorthorns reached a very high standard, and the cattle yearly sent from that county has been known for years in the London market as "Prime Scotch."

Coming then to the subject more immediately under attention, he goes on to say—"During the years of depression that have intervened since 1877, farmers with shortened means, as the readiest way of meeting immediate necessities, have shown a tendency to restrict outlay in the purchase of high class breeding stock, supplying themselves instead with such lean animals as they could pick up outside, for the purpose of fattening. And in the opinion of persons well entitled to speak, this policy has gone far enough already to have somewhat damaged the prestige of Aberdeenshire and district, as a region famous above all others for the high and uniform excellence of the beef sent from it to the great London market.

"Ireland has for a very considerable number of years been one outside source for the supply of store cattle to Aberdeenshire. Canada for the past eight years has been another. In the case of Ireland the large number of young stock annually received has steadily improved in quality year by year, and no complaint about the imported 'stores' from the Green Isle adversely affecting the character of the finished supplies sent to London, in the shape of dead meat or live stock, has been heard. As much cannot, I regret, be said with regard to the 'stores' from your side of the Atlantic. Of late, and more especially since the scheduling of Canada by the Agriculture Department gave rise to public discussion, it has been freely alleged that cattle brought over from Canada and fattened here have been sent up to London in carcass form and sold as best Aberdeenshire, to the serious prejudice of the home farmers who have continued to rear and fatten the stamp of cattle really entitled to that designation. At an Agricultural Society meeting, held in a central district of the county last week, a leading speaker said: He had been told by London salesmen that the best of the West End London butchers all sold a great deal of American meat along with the Scotch, but it was all sold as Scotch meat, which brought 4s. 2d. by the side, whereas American meat sold as such was worth only 3s. 2d. a side.

"Now, it will not do to say that this applies only to meat from the United States, for it is an undeniable fact that no inconsiderable proportion of the store cattle from Canada landed at Aberdeen up to the time when importation of stock was stopped, have been rough animals that compared badly with the improved home-grown cattle, alike in form and in quality. The hard pressed home farmers have bought these, because cheaper than well bred home reared cattle, to enable them to pay their rents by fattening and selling off as soon as possible; but if the business goes on on this line, the inevitable effect must be to lower both the character and the relative price of the best Scotch meat in the London market. And while that must ultimately tell seriously against the northern Scotch farmer who fattens the store cattle, it must also tell against the Canadian farmer who breeds them.

"It has to be observed that amongst even those of our home farmers who have continued to be careful breeders, there is no prejudice against Canadian store cattle as such. On the contrary, seeing that Canada is not only within the British Empire, but in some of the older parts of it largely peopled by men and women of northern Scottish descent, it would, I believe, (contagious diseases apart) be gladly recognized as probably the best and most natural outside breeding ground of any for cattle to be fattened off on Aberdeenshire turnips. What is required is that the Canadian farmers should rise to the occasion, and by systematic attention to breeding the best beef-producing type of animals send over a supply that in point of quality should take the top place alongside the most carefully bred home cattle. If they would do that, in place of sending 12,000 a year to this port, as has been done for some time, they might safely count on Aberdeen affording them a good market for three times that number.

"It was the firm belief of the shrewd and capable men who so greatly raised the character of the neat stock of this region, that only by the production of cattle of sweet nature and shapely form, and that as a consequence were easily maintained and matured rapidly, could stock farming be made really and permanently prosperous and remunerative. And it was the true belief. I have in so far indicated the methods and results. Will the stock farmers of Canada be persuaded to adopt their belief, and within limits to follow out their practice?"

(Signed) WM. ALEXANDER.

ABERDEEN, 28th Feb., 1893.

RECOMMENDATIONS BY THE COMMITTEE.

The following resolutions, 1, 2 and 3 were unanimously adopted by the committee as recommendations for the promotion of the agricultural interest referred to in each.

NO. 1.—A BOUNTY IN AID OF CREAMERIES.

"Moved by Mr. Carpenter, seconded by Dr. Roome, That in view of the vast and rapidly growing importance to the farmers of this country, of the dairy interests, more particularly the manufacture of cheese which has attained, and we believe justly so, such an enviable reputation in the markets of Great Britain, this committee is of opinion that there is also an unlimited market for a good article of butter if properly manufactured in creameries or butter factories, and that in order to promote and encourage our farmers to go more extensively into the manufacture of butter for export, this committee would strongly urge upon the government, the advisability of granting assistance to the extent of not less than two hundred ($200) dollars to each cheese factory that may add the necessary appliances for making

butter, and also to each factory built exclusively for the manufacture of butter; said assistance not to be granted to more than four (4) of such factories in any one constituency."—Carried.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
16th March, 1893.

No. 2.—Recommending the continuance of the employment of Mr. J. W. Robertson, as Dominion Dairy Commissioner and Agriculturist, on the ground of his invaluable public services.

THE DOMINION DAIRY COMMISSIONER.

"Moved by Mr. Carpenter, seconded by Mr. Smith (Ontario), That the committee having learned that the time for which Professor Robertson was originally engaged has now expired, and recognizing, as we do, the invaluable services which he has rendered to the dairy interests of this country, we would strongly urge upon the Government the importance and necessity of placing the Professor upon the permanent staff of the Central Experimental Farm, and that he be paid a liberal salary for his services."—Carried.

HOUSE OF COMMONS,
COMMITTEE ROOM 46,
24th March, 1893.

No. 3.—Recommending the appointment of a chief veterinary surgeon, to be invested with authority to deal with all reported cases of disease in herds, within the Dominion.

A SUPERINTENDING VETERINARY SURGEON.

"Moved by Mr. Carpenter, seconded by Dr. Cameron, That in view of the rapidly growing importance of the live stock industry to the farmers of this country, and the necessity of arresting and preventing, if possible, the introduction and spread amongst our herds, of contagious or other diseases, this Committee are of the opinion, and would strongly urge upon the Government the importance and necessity of appointing, without delay, a competent veterinary surgeon whose duty it would be to look after the health of the live stock of the country, and to whom all communications could be addressed from persons who had reason to believe that their herds were in any way affected; the said officer to be invested with full authority on the receipt of such communications to take immediate and prompt measures to arrest and eradicate the disease."—Carried.

HOUSE OF COMMONS,
COMMITTEE ROOM 46,
24th March, 1893.

I hereby certify the preceding resolutions, 1, 2 and 3 respectively, to be true copies, as adopted, and as the same are recorded in the minutes of the Select Standing Committee on Agriculture and Colonization.

J. H. MACLEOD,
Clerk to Committee on Agriculture and Colonization.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
28th March, 1893.

TESTIMONIAL.

The following resolution was adopted by the Committee in relation to the lengthened and valuable services to the farming interests of the Dominion, by the late Minister of Agriculture, Hon. John Carling.

Moved by Dr. Roome, seconded by Mr. McMillan (Huron),

And Resolved :

That we, the members of this Committee desire to place on record our appreciation of the valuable services which the late Minister of Agriculture, the Hon. John Carling, has rendered to the agricultural interests of this country.

As early as 1867, when occupying the position of Minister of Agriculture for the province of Ontario, in the Sandfield Macdonald Government, he undertook the work of establishing an Agricultural College and Experimental Farm for the Province of Ontario, and laid the foundations of the present provincial institution, which has proved so useful to Ontario.

On assuming the portfolio of Minister of Agriculture for the Dominion, he devoted his energies to the establishment of a system of Experimental Farms for Canada, which, during his term of office, he brought to successful completion. This system stands unequalled for its comprehensiveness, embracing all the climates of the Dominion, from the Atlantic to the Pacific, while the practical character of the work carried on at each of the Experimental Farms, has commended them to farmers in all parts of Canada as institutions carefully designed and conducted for the special purpose of advancing the best interests of agriculture.

The promotion of the cattle trade, the carrying out of a judicious system of quarantine, the advancement of the dairy interests and the furtherance of all other departments bearing upon farming, have received Mr. Carling's constant attention and careful supervision. The success which has attended the administration of the department of which he had charge, is the best evidence of his earnest, persistent and well-conducted efforts, and entitles him to the gratitude of the country.—Carried.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
29th March, 1893.

Certified a true copy of the resolution, as adopted by the Committee this day.

J. H. MACLEOD,
Clerk to the Committee on Agriculture and Colonization.

29th March, 1893.

THE EVIDENCE

PART II

QUARANTINE

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
THURSDAY, 2nd March, 1893.

The Select Standing Committee on Agriculture and Colonization met this day, at 10.30 a.m; Dr. Sproule, chairman, presiding.

Mr. John Lowe, Deputy Minister of Agriculture, was present by invitation, and stated to the committee as follows:—It is probably better, Mr. Chairman, in the first place, that I should give an explanation in reference to the Return to the Order of the House of Commons. The moment that order was received in the department all the papers to which it referred were immediately collected by the secretary of the department and distributed, to be copied with as much celerity as possible by the staff of the department available for that purpose. That copying has since gone on and it is now completed. Mr. Small, the secretary, showed me the return this morning, and it is ready to present. As respects any apparent delay in that return it certainly has not had the slightest effect in relation to the Imperial Government, for the reason that all the papers were sent forward at the end of January, accompanied by a very elaborate case in the form of a report of the Privy Council. The case was conclusive, in my opinion. There is very strong objection on the part of English interests to reinstating Canadian cattle in the old position, while there is a comparatively strong pressure on the part of Scotland that the reinstatement should take place. The admission of settlers' cattle under the order of 1887, was objected to in England. Sir Charles Tupper, not very many days ago, telegraphed that fact to the Minister, and as a consequence, an Order in Council eliminating the suspensory power to admit settlers' cattle was passed some days ago—on February 18th. That is now before the Imperial Government, and the advices which have been received are hopeful. In further reference to the papers, there certainly has been no undue delay so far as the department is concerned in making a copy of these papers, as the whole of the available staff of the department has been very fully and continuously employed in the work.

INQUIRY INTO THE BRITISH SCHEDULING OF CANADIAN CATTLE.

In addition to the facts of the investigation which was conducted by Professor McEachran, it might be of interest to the committee to learn what were the actual proceedings which led to the placing of Canada in the schedule, and the taking away of our old privileges. The whole thing took place in a very short time. I hold in my hand a copy of the papers which will come before the House, as part of the return referred to. I will explain to the committee in short, the points it contains. On the 24th of October last, Sir Charles Tupper sent a cipher message to the Minister of Agriculture, the reading of which was in these words:—

"Two animals, one a cow, ex steamer 'Monkseaton' or 'Huronia' at Dundee, and Fifeshire slaughtered suspicion pleuro pneumonia. Post-mortem indication very similar pleuro but no decision yet arrived at. Have seen authorities and pointed out impossibility disease being pleuro. Make immediate inquiry where all animals came from. Most important to prove no contact with American cattle and no disease in locality stock came from."

That dispatch was received in the afternoon too late for any practical purposes to telegraph Mr. McEachran, and as the dispatch came in cipher we thought it advisable also to send it by mail. It was decided to have the investigation made and a letter was sent to Mr. McEachran, which he received the next day, asking him to see the shippers and find out the facts desired. Part of the animals came from Ontario and part from Manitoba. There were only three Canadian animals affected.

One was positively stated to have come by the "Huronia" and the other two by the "Huronia" or the "Monkseaton." All the animals by the "Huronia" were collected in Ontario, a part of the "Monkseaton's" were collected in Manitoba. Mr. McEachran immediately received directions from the department to proceed to Toronto and put himself in communication with Mr. Andrew Smith, veterinary inspector of the department for the province of Ontario, and at the same time a direction was sent to Mr. McFadden of Emerson, the veterinary inspector of the department in Manitoba, to trace every animal from that province. Mr. McEachran gave to the sub-committee the details of that investigation, which the committee will find as an appendix to the report of the Minister of Agriculture, already in the possession of the members.

The facts as found by Mr. McEachran, Mr. Smith and Mr. McFadden are fully stated in that report. The crucial question came on the animals from Ontario. That was the only one respecting which there was definite information. The substance of information obtained was sent by cable to Sir Charles Tupper, to Sir John Abbott, who was in London at the time, and Mr. Foster, the Minister of Finance. I will not detain the committee by reading these exciting cablegrams at length; but I will merely give those which are essential to show the action taken. The news came on the 24th which was the end of the week and Sunday intervened. Mr. McEachran and Mr. Smith employed eleven veterinary surgeons and found out from the purchasers and shippers the localities where all the animals came from. As soon as it was possible to ascertain the facts these veterinarians made detailed reports.

But while this was being done, Sir Charles Tupper, on the 29th, virtually only four days after his first despatch arrived, sent this message:—

"'Standard' to-day says plain duty Board Agriculture to schedule Canada. Subject is to be discussed by Central Chamber Agriculture Monday and Royal Society Wednesday. Most important you should cable at once statement in plainest possible language the animals shipped by 'Monkseaton' and 'Huronia' have been traced to their places of origin, and that no disease exists there. Urgent. (Signed) "TUPPER."

Sir John Abbott telegraphed to the Minister the same day as follows:—

"Of highest and essential importance you should comply literally with Tupper's request to-day's message. I feel much anxiety results action of agricultural societies pressing upon Ministers. If once scheduled, consequences most serious and lasting. (Signed) "ABBOTT."

This cable was sent to Sir John Abbott immediately in reply to the one I have just read:—

"OTTAWA, 29th Oct., 1892.

"Urgent directions given in literal sense of Sir Charles's cable to-day. Several veterinarians employed. I expect report of districts on Monday.

(Signed) "CARLING."

That was the first Monday the week following that when the news originally came of the discovery of alleged disease of pleuro-pneumonia in animals from Canada. A further telegram was sent to Professor McEachran, who was that day in Toronto, as follows:—

"Further telegram from Sir Charles and Sir John Abbott stating extreme danger and urgency. Employ, therefore, necessary number of veterinarians and have report telegraphed department on Monday.

(Signed) "J. LOWE, *D.M.A.*"

Professor McEachran replied to the above as follows:—

"TORONTO, 31st, 1892.

"Have been at Hamilton, Woodstock and London. Have men out in all districts. Report received so far animals perfectly healthy. Expect all in to-morrow, when I will wire report. (Signed) "D. McEACHRAN."

On the 1st November, Sir John Abbott cabled again to Mr. Carling:—

"Commissioner reports no information received of district. Reports results of investigation urgently needed by wire as they come in. Matter becoming extremely critical. *Times* recommends scheduling. (Signed) "ABBOTT."

The following reply was sent to Sir John Abbott the same day:—

OTTAWA, Nov. 1st.

"McEachran sends interim report. Has been at Toronto, Hamilton, Woodstock and London. Has men out in all districts whence cattle came. Remains on ground to gather reports, those so far in establish absolute healthiness. Expect all reports in to-day, when will wire Tupper. Inform him.

(Singed) "CARLING."

The committee will see from the foregoing not only was there no delay on the part of the department, but that information was sent forward as it was obtained, in view of the pressure put upon the department by Sir Charles Tupper and Sir John Abbott. On this same day, November 1st, Sir Charles Tupper also telegraphed to the Minister:—

"*Times* urges scheduling. Altogether four suspected cases in 'Monkseaton' and 'Huronia' cargoes. No reports of examination of districts from which cattle came yet received from you. Matter most urgent and critical.

(Signed) "TUPPER."

On the same day, Sir John Abbott sent a further cable message to Mr. Carling:—

"Matter most critical. Fear indication points to scheduling to-morrow. Cable fullest possible information at once. (Signed) "ABBOTT."

The answer immediately sent to that was as follows:—

"Your second cable to-day. Have not yet received McEachran's final report of investigation. But continued progress reports fail to show slightest trace of pleuro-pneumonia. Am positively informed by McEachran and all veterinarians communicated with this disease does not exist in Canada. I state with positive confidence it does not. Wiring McEachran urging final report to-night.

(Signed) "CARLING."

On the same day the following further telegram was sent to Prof. McEachran:—

"Both Premier and High Commissioner cabling is critically important your final report be cabled London to-night. Decision relative scheduling given to-morrow. (Signed) "J. LOWE, *D.M.A.*"

At 10.30 the same evening, this message was sent to Sir Charles Tupper as a result of reports received from Prof. McEachran and Prof. Smith:—

"Professors McEachran and Andrew Smith jointly sign following official telegram from Toronto this evening: 'You can state positively that pleuro-pneumonia does not exist in Canada. Inspector's report from all districts prove this. Detailed reports follow by mail.' (Signed) "CARLING."

On the next day (November 2nd) this message was sent to Sir Charles Tupper:—

"Report mentioned in McEachran and Smith's telegram last night received, including reports of farms visited in following named districts whence cattle came, viz.:—Markdale, Meaford, Orangeville, London, Hamilton, St. Thomas, Galt, Dunnville, Woodstock, Ailsa Craig and Toronto. Districts visited by eleven qualified veterinary inspectors. Their reports uniform; no trace found of pleuro-pneumonia confirming my cable Abbott. (Signed) "CARLING."

On the same day this further cable was sent to Sir Charles Tupper:—

"Professor McEachran obtained from shipper names of every dealer from whom cattle composing cargoes of 'Monkseaton' and 'Huronia' were bought, interviewed

them and obtained names of farmers who raised and sold them. Sent eleven skilled veterinarians to visit each farm, whose reports show non-existence of or slightest trace of pleuro-pneumonia. Investigations are being continued and will be most thorough. (Signed) "CARLING."

On the 3rd of November, the following cable message was received from Sir John Abbott:—

"Special meeting of Cabinet to-day, considering cattle question. Fear scheduling practically foregone conclusion. We were heard, and finally suggested that if determined on that step, we would prefer to prevent exportation here for remainder of season, say from 20th instant, and bear expense of thorough investigation during winter, if scheduling postponed till investigation made. This proposal was agreed upon by Foster, Tupper and myself, but affords faint chance of postponing scheduling. Would Council sanction it if accepted?

(Signed) "ABBOTT."

A meeting of the Cabinet was immediately called on the receipt of that telegram, and a reply was sent in a few hours as follows:—

"Council sanctions proposal in your cable to-day. Please advise if accepted.

(Signed) "CARLING."

This was an invitation to the Imperial Government to send their own officers to Canada, to satisfy themselves whether or not the disease of pleuro pneumonia could be found here. The offer was not accepted by the Imperial authorities.

On November 3rd, a further cable was sent to Sir John Abbott by Mr. Carling, as follows:—

"Am advised by Profs. McEachran and Smith if Canada scheduled on evidence of animals slaughtered from 'Monkseaton' and 'Huronia,' will rest on erroneous diagnosis. I confidently believe this.

On the same day we received a telegram from Prof. Andrew Smith at Toronto, which stated:—"Have received reports from Hamilton, London, Chatham, Wellington and Orangeville. No signs of any disease." The next day we received a telegram from Dr. McFadden, stating "the same thing in relation to Manitoba, and we had also detailed reports from Mr. McFadden, which were very satisfactory. Every animal which came from that province had been traced, the locality whence they came had been visited, and no trace of disease discovered."

However, notwithstanding all that, on the 4th November, there came this message from Sir Charles Tupper:—

"Am informed that in view of opinion expressed by law officers of the crown this morning, Board of Agriculture have decided they have no alternative but to withdraw privilege of free importation hitherto allowed Canadian cattle. Order will come into force on 21st instant.

(Signed) "TUPPER."

Information was then immediately communicated by the department to its officers, that Canada would be scheduled from the 21st of November. Following this the department received from the cattle shippers, and also from the shipping companies, a very pressing request, that an effort should be made to secure the postponement of the scheduling for the remainder of the season. That request was communicated to Sir Charles Tupper, who saw the Imperial authorities. The result of all that was that while the Imperial authorities felt they could not alter the date fixed for the scheduling, they would look with favour on any cargoes which might subsequently arrive, and which might have been detained on the journey owing to stress of weather or unforeseen causes.

It was in consequence of that proceeding that two or three cargoes which arrived some weeks after the date fixed for the scheduling were allowed to enter. There is one further fact which the committee will see when they come to peruse the points of the Imperial case as stated in those papers. The essential fact in them is that Canada was not scheduled on any general statements, but I have no doubt

that the many publications may have had effect in determining the decision. Nothing could exceed the kindness of expression and the anxiety expressed by Lord Ripon, the Colonial Secretary. Almost the same may be said of the expressions of Mr. Gardner, the Minister of Agriculture. The Board of Agriculture defined that the case rested on those three animals, one ex the "Huronia" and two ex the "Monkseaton" or "Huronia." They referred that point to the law officers and the opinion obtained was that if the Board of Agriculture were satisfied with the diagnosis of their own veterinary officers relating to the disease found in those animals, they were bound to place Canada on the schedule. That was done accordingly.

These are the main facts as to the scheduling and the proceedings which led to it. There are many details which will appear when the correspondence is read, but these are the main facts.

By the Chairman:

Q. Would you be good enough to tell us when the case as stated by the Department, the full and extended case, was sent to England?—A. The Order in Council was dated on the 30th of January.

Q. What Order in Council?—A. The Order in Council containing the Canadian case. I have this in my hand now. It is part of the return called for by the House. The case as stated by the Canadian Government in this order. I have given the committee the essential facts, but if the committee desire more details from these papers read, I will read them.

Q. What I wish to bring out is this. I notice that the report of the officers of the department that no pleuro-pneumonia exists, signed by Dr. McEachran, is dated the 28th day of November.—A. That is correct; but the report with all additions and revision was not in the hands of the Minister till near the end of December, and the new Minister did not return after the holidays, till January was well advanced. It was then thought well to proceed with deliberation. The report was sent to council at the latter end of January. It was thought well to obtain from all sources every corroboration which would strengthen the case. It was sent forward at the last of January or beginning of February from the Privy Council office.

Q. Have you any knowledge when it was received in England?—A. We have information that it has been received. I think when the committee consider the points of the case as put by the Canadian Government, and also reading in connection with them the facts of the report of the investigations by Mr. McEachran, Mr. Smith, and the eleven veterinarians in Ontario, together with Mr. McFadden's report, they will see that the case is very strong. I may say that it establishes there is no pleuro-pneumonia in Canada.

By Mr. Wilson:

Q. You believe that the investigation has been of the fullest nature possible?—A. I am satisfied of that. I do not believe that the deadly disease of pleuro-pneumonia could exist in Canada and the fact remain unknown. We hear quite enough of minor diseases which sometimes attack herds, but these are not such as would cause the country to be scheduled.

By Mr. Cochrane:

Q. What information has the department had from the Imperial Government that would lead you to believe that the report has made a good impression on the British Government?—A. There is no official information of this nature. But the expressions in the official correspondence show the greatest consideration. We have information from private correspondence. There can be no official information except as to the fact of the decision of the Imperial Government.

TUBERCULOSIS.

By Mr. Featherston:

Q. What other diseases do you say our cattle are subject to?—A. There is tuberculosis in Canada, the same as in other countries. I have no doubt that that disease exists more or less throughout the whole Dominion. We know that it exists in parts of the Maritime Provinces, and we have had within the last few days rather exciting reports from Edmonton in relation to its presence among cattle of the Hudson's Bay Company, in the ranches in the Peace River district.

Q. You don't consider it contagious. It is more or less caused from colds or exposure?—A. Tuberculosis is not very actively contagious. It is equivalent to consumption in the human being. There is all that body of facts on the subject which was collected by the sub-committee of this committee two or three years ago, of which General Laurie was the chairman. The information was obtained by circulars sent out addressed to veterinarians and leading stockmen all over the Dominion. The answers to these questions showed the presence of that disease in various parts, and I think that there cannot be a doubt that when that disease gets into herds, if separation is not effected, it will spread.

Q. Is it more prevalent now than it was years ago?—A. I think not. It has undoubtedly prevailed for years, but it has not been one of those diseases to which the Government have not thought it proper or expedient to apply the slaughtering and compensation provisions of the Animal Contagious Diseases Act. There is very great difference of opinion among leading veterinarians on the subject. The department has received from its veterinary officers reports which are antagonistic. Then, again, that disease is not considered one which requires suspected animals to be slaughtered. This is not done in the United States, where the disease also exists; nor in England. I believe it exists wherever cattle exist, just as the disease of phthisis exists in the human being, and in the same degree. The question of its extirpation would mean a very large contract indeed, and one of an indefinite expense. The facts in our possession are not sufficiently definite to enable us to arrive at a precise estimate of the cost that would be involved in an effort to extirpate it, nor yet to arrive at an approximate estimate. It is believed that $150,000 or $200,000 would be required to extirpate the disease. But this cannot be stated. The action is a question of policy for the Government to determine. There is a possible action in relation to the disease which may render it necessary for the Government to deal with it. It happened only a short time ago, within the last ten days, that Sir Charles Tupper sent to the Department of Agriculture an extract from a newspaper, in which it was stated that the Imperial Government had in contemplation to treat tuberculosis as a schedulable disease. If that should be done, it would, of course, put the question of removing Canada from the schedule out of all debate for some time. Such a proceeding would render it necessary for us to take action in the premises and to undertake the extirpation of tuberculosis, no matter what it may cost. There is also the further consideration connected with that policy which was brought out very clearly by the sub-committee of which General Laurie was the chairman, and that is, that this disease of tuberculosis is capable of being conveyed to human beings either by the use of milk from diseased animals or of the meat of dead animals.

By the Chairman:

Q. It was remarked, Mr. Lowe, that some dissatisfaction was expressed by the British Board of Agriculture regarding the admission by Canada of settlers' cattle in Manitoba and the North-west Territories, without quarantine. What are the facts with respect to the admission of settlers' cattle into those portions of the Dominion?—A. I can give the committee a statement on that point in a very few words. Our position in that respect is very clearly stated in the case which the Canadian Government transmitted to the Imperial authorities, and which is now under consideration by them.

THE HISTORY OF CATTLE QUARANTINE IN THE DOMINION.

By Mr. Roome:

Q. It also appears in the departmental report?—A. The substance of it appears in the Annual Report of the Minister of Agriculture. There are two sets of cattle quarantine regulations: one applicable to the old provinces of Canada, the other to Manitoba and the North-west. The system of quarantining cattle commenced in the old provinces in 1876, and in 1880 our practice was consolidated in a series of regulations. The effect was to prohibit the entry of cattle from the United States into Canada except at Point Edward, near Sarnia, and then only pedigree stock were admitted; all other neat cattle were excluded. That regulation has been rigidly maintained. It has happened, animals have been brought over without quarantine. When such cases came to the knowledge of the department, and I may say that they have not often occurred—the animals have either been slaughtered or sent back, according to the circumstances. During the whole of the twelve years that that regulation has been in operation, I am able to state there has been very little attempt to evade it. In 1880, when that regulation was put into force, and until the Canadian Pacific Railway crossed the western plains in 1885, there was practically no communication with that vast area for the most part; and quarantine regulations along that frontier were an impossible thing. But it happened that in 1884, reports were received by the department of the existence of the disease of pleuro-pneumonia in Illinois. That was a point much further west than we expected to have found it. The late Minister (Hon. Mr. Pope) thereupon ordered an investigation to be made, the result of which was to confirm the report of the existence of the disease in Illinois. As a consequence, the general Order in Council of 1884 was passed. Necessarily, it had to be adapted to the conditions then existing. The principle applied to the whole frontier, but there was no machinery nor any means to carry it into effect along the western line of 1,000 miles in length from Emerson to the Rocky Mountains. Therefore, Emerson and one or two other points in Manitoba were declared to be quarantine stations at which cattle were to be detained sixty days, except those of actual settlers coming from contiguous districts, where no disease was known to exist. In view of the importance of assisting the immigration movement from the North-western States to our territories, the suspensory power was included in the regulations. The suspensory power was that the quarantine of sixty days might be "such other period as may be indicated by the Minister of Agriculture in such manner as may be ordered by him." The practice of administration under this order was that all ranche cattle was subjected to a detention of sixty days; while the cattle of incoming settlers, when accompanied by an affidavit as to the locality whence they came, the affidavit also establishing the cattle were free from disease, were admitted without quarantine detention.

By Mr. Dawson:

Q. What was the nature of the affidavit?—A. That there was no disease in the district whence the cattle came, and also that it was to be such as to satisfy the veterinary inspector, who gave the certificate, as to the health of the cattle at the point of entry.

Mr. Lowe, continuing his statement said:—

In 1887, when the Canadian Pacific Railway had crossed the Territories, the period of detention was enlarged to ninety days, so as to make it uniform with the eastern provinces. The cattle admitted were for breeding or stock purposes only. The "stock purposes" would admit cattle with settlers coming into the North-west; but cattle for stock purposes could not be imported at all in the old provinces, unless they were pedigree animals. That was the difference between the two sets of regulations. In 1884, there was no means whatever of establishing any particular quarantines, the whole being one vast plain, and the topographical features were unknown to the department. But so soon as the Pacific Railway went through, there was a reserve made of two townships along the whole line of frontier which

were declared to be "infected places" within the meaning of the Animal Contagious Diseases Act and cattle within those boundaries were ordered to be quarantined for 60 and in 1887, for 90 days. In all cases, and especially after the new regulation of 1887, every demand to admit cattle of dealers or ranche cattle was refused, and it has happened that the department has had at many times very great pressure indeed to allow such cattle to be brought in, but in every case declined, the single exception being in relation to settlers' cattle, who would bring with them from one to five, six and thirteen animals. In the case of those Mormons who settled near the Rocky Mountains, they brought with them their herds in community, and all these were quarantined for the full period of 90 days under the inspection of a veterinary officer of the department. It was with regard to these Mennonite cattle, I am informed, that many of the reports as to letting cattle come over in large quantities without quarantine have arisen. They were not let in without quarantine, and they were quarantined within the two townships reserved.

By the Chairman:

Q. Two townships in width along the whole frontier?—A. Yes; there is one further point. We got from the Customs Department, through Mr. Parmalee and frontier officers, information of great value with regard to the trails by which the cattle came in along the frontier, and also as to places which would be suitable for more defined quarantine stations than would be possible in the great indefiniteness of a line of the two townships a thousand miles in length. The Department of the Interior also desired to use these lands. On the information thus received from the Customs Department, three quarantine stations on the principal trails, or marked on that section of the map, (shown by witness) each of which has natural boundaries and is well supplied with grass and water, were established.

Q. Where are these stations?—A. One is within the circumscription of the Milk River and the others as shown on the map exhibited.

By Mr. Macdonald (Huron):

Q. What ranges are they on?—A. The definitions are: townships one, ranges 19, 20, 21 and 22, in part; townships one, ranges 12, 13, 14, 15, in part; townships two, ranges 13, 14 and 16, in part, and townships one, ranges 4, 5 and 6, in part. It is also proposed to make another station with similar natural boundaries at the point of Estevan, a little to the east of the Manitoba frontier. That will make four along the line. It is also proposed to obtain the services of the mounted police as guardians of these quarantine stations and also to have officers of the mounted police, who shall be veterinary surgeons, and also officers of the department for quarantine purposes in the same way as the customs collectors are now officers in relation to the general quarantine. That arrangement will, with very great economy, give the greatest possible protection, together with a very effective patrol.

By the Chairman:

Q. What do you mean by the mounted police patrol? Is it a patrol along the frontier to prevent cattle being driven in?—A. Yes, and for keeping the quarantines. The mounted police will act as officers of the department, for the purpose of securing the carrying out of the quarantine regulations and preventing the entry of any animals except by the trails, where the quarantine stations are. The officers of the mounted police will also be veterinary surgeons, charged with carrying out the regulations. The whole arrangement is not yet completed. I merely give it as the project which is thought advisable to be undertaken, and which I am inclined to think will be found acceptable by the Government when put before it in formal shape.

By Mr. McMillan (Huron):

Q. Do we understand that settlers' cattle and registered cattle of thoroughbred cattle for breeding purposes were allowed to cross in small numbers since 1884 up to the present time?—A. West of Manitoba, yes, under the circumstances I have stated, if brought in by settlers.

Q. They were not confined within the distance that you speak of, but were allowed to take them to their destination?—A. If they came from contiguous points in those North-western States, where the conditions were the same as on our side and where pleuro-pneumonia nor any contagious disease has ever been known to exist, if they came, say from the Dakotas, and the veterinary inspector was satisfied by the affidavit placed in his possession, and if he found the animals healthy on arrival at the frontier, he allowed them to go forward to the homes of the settlers.

By the Chairman:

Q. Since then this provision has been dispensed with?—A. That order was suspended on 18th February. The regulation respecting quarantine now is 90 days on all animals entering Canada from the Atlantic to the Pacific, with the further restriction that in the eastern provinces, only pedigree stock can come in.

By Mr. Dawson:

Q. Are the quarantine lands reserved from settlement?—A. Yes, they are declared "infected places." No person can drive cattle into them nor away from them unless upon an order of the inspector in charge. Otherwise he subjects himself to severe penalties.

By Mr. Semple:

Q. Have Canadian cattle been scheduled at any other time in the past by Great Britain?—A. No. Questions have arisen on one or two occasions in respect of animals which have been detained long on the voyage, and had, in consequence, developed diseases of the throat or lungs, but which upon examination, by the Imperial authorities, were passed as not suffering from pleuro-pneumonia. Our cattle were never scheduled until last November.

Having examined the preceding transcript of my evidence, I find it correct.

JOHN LOWE,
Deputy Minister of Agriculture.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
TUESDAY, 14th March, 1893.

The Select Standing Committee on Agriculture and Colonization met this day, at 10.30 a.m; Dr. Sproule, chairman, presiding.

The CHAIRMAN:—I understand that the Deputy Minister of Public Works is here, prepared to give information in reference to the improvements which are being carried on at the different quarantine stations. Perhaps it would be well to take his statement now, so as to enable him to get away.

Mr. A. GOBEIL, Deputy Minister of Public Works, said:—Mr. Chairman and Gentlemen—I did not expect I would be called upon to make a statement, but rather that I should answer any questions which might be put to me by members of the committee. If you desire it, however, I can indicate in a few words and in general terms the way in which the quarantine stations are being improved.

THE PORT QUARANTINE STATIONS OF THE DOMINION.

As the members of the committee are doubtless well aware, we have three large quarantine stations in the Dominion: one at Grosse Isle, below Quebec, which is

the principal one; another at Halifax, on Lawlor's Island in Halifax Harbour, and the third on the Pacific coast at William's Head, near Victoria. Then we have also a station at St. John Harbour on Partridge Island, and there are minor stations at other ports, as for instance, Sydney, Charlottetown, Chatham and other points. The way the department is fitting up the stations has been to follow implicitly the instructions of the Department of Agriculture who have obtained from Council the necessary authorization. Our department is only the building department—in this particular we carry out such works as the Department of Agriculture is authorized by Council to have constructed. At Grosse Isle and Lawlor's Island our operations began by putting into first-class repair the buildings which existed there.

EQUIPMENT AT GROSSE ISLE.

When we began the work of repairing the stations last fall, the one at Grosse Isle was the best equipped that we had. There were there bath houses, doctors' houses, hospital, and some old sheds, erected I believe, in 1848, when the last outbreak of Asiatic cholera occurred. These have been fixed up and we have added to the Grosse Isle station a large disinfecting apparatus consisting of three chambers, boiler, pump attachment, tank, &c.

By Mr. Carpenter:

Q. That is on the ground now?—A. Yes, it is completed. That apparatus is for the purpose of disinfecting baggage and effects coming from suspected or infected vessels, and they are expected to do the work in a very short time. Each of these chambers is of the same size, twenty-four feet in length by eight feet diameter. The baggage is taken into the disinfecting chamber, by means of cars running on a track from the boat at the wharf, directly into the chambers. The chambers are open at either end and when the disinfection has taken place, the cars or trucks are taken out by the opposite end. It is expected that all the baggage of the passengers on a very large ship can be disinfected within five or six hours' time. Last year we had there, a small disinfecting apparatus which we purchased in Toronto, and at the close of the season on the St. Lawrence, we removed it for the time being to Halifax. It is only to be used temporarily at Halifax until we get the large disinfector—a two-chamber one—now in course of construction, ready for use at that port. The apparatus at Grosse Isle and the two which are in course of construction for erection at Halifax and at William's Head, are patterned on those in use in the United States. One of our officers visited the United States last year, for the purpose of examining the quarantine stations. He took the best points of the machinery in use in the United States, and we have embodied them into those we are having constructed. We expect that the disinfector for Lawlor's Island will be completed in about a couple of weeks, and the one in British Columbia, which is also to be a two-chamber one, in six or seven weeks from the present time. Then we have at Grosse Isle provided for the detention of steerage and cabin passengers. We are now constructing a new house and fitting up an old one at that point—the new one being intended for cabin, and the old one for steerage passengers. By this means a more thorough disinfection of a vessel can be effected than at present, as all the passengers and baggage will have been removed. The suspects will occupy those houses and any sick passengers removed to the hospital; the baggage in the meantime being run through the chambers. The ship will then be fumigated by means of a dioxide of sulphur blast carried on one of the steamers which will run alongside the ship. The ship will be disinfected in that way. Then, there will be at Grosse Isle a perfect system of water supply. Next week the department will commence to dig a well on one of the most elevated points of land that can be reached, to supply the people at Grosse Isle with water.

By Mr. Roome:

Q. Are these old buildings all completed?—A. Yes, they have been fitted up. The only thing not completed at Grosse Isle is the house for the detention of the steerage and the first-class passengers, but they will be completed by the time the first ship comes from the sea at the end of April.

LANDING DOCKS.

Q. Are you not also erecting docks for the landing of passengers?—A. Not at Grosse Isle. We are erecting docks at Lawlor's Island. The contract was given yesterday or the day before, and it is to be finished in a short while.

Q. How soon is it to be finished? Is it to run all summer?—A. No. It is going to be finished in June. It could not be finished before that time.

Q. Is that at Halifax?—A. Yes, and then the one at Sydney is to be extended, so as to leave at the end 12 or 13 feet of water. That work is going on now. We expect to have it completed within a month or five weeks. The wharf at William's Head is going on too. This one will take a little longer time on account of the fact that the whole of it has to be constructed and covered with yellow metal to prevent the water worms destroying it. That has to be finished by the middle or the end of July. The yellow metal has to be ordered from England, and the work will be under contract in a day or two. I think the tenders are to be received to-day or to-morrow.

WILLIAM'S HEAD, B.C.

By Mr. Earle:

Q. Has any provision been made at William's Head for the detention of suspects?—A. We have just been carrying out the desires of the Department of Agriculture. We are not supposed to take the initiative in any way. We are building what they have asked of us.

Q. Has that been asked for?—A. No.

By Mr. Roome:

Q. What seems to be the delay in this not being asked for?—A. At Grosse Isle, of course, we worked last summer, but we had no appropriations. With reference to the Pacific, I might say that plans were prepared by Mr. Gamble, an officer in British Columbia, with all due dispatch, and we had him here to give us all the explanations necessary. He has recently left. We had full powers to carry on the other works.

By Mr. Earle:

Q. The great danger from cholera seems to be in the early part of navigation, and I cannot see why the tenders were not called for?—A. On the Pacific coast there is no opening or closing of navigation. Navigation there goes on all the year round. At Grosse Isle, of course, we have taken steps so that we would be prepared. We may say that we are sure of having fully provided for the arrival of the first ship that will come from the sea. Of course we have directed our greatest efforts to Grosse Isle, because that is the most important station, the point where all the traffic will come in when navigation opens in the spring.

By Mr. Roome:

Q. This disinfecting apparatus you are getting fixed up, do you think it will be efficient for all emergencies?—A. Yes.

Q. You have one ready now for Grosse Isle?—A. Yes, and I think the one for William's Head will be finished within seven or eight weeks from now. It took the manufacturing company a trifle longer than we had expected, because they had to order their iron from the old country.

By Mr. Earle:

Q. What time is fixed for the quarantine station there being ready to be utilized?—A. It will be July, certainly not before. You must understand that at William's Head everything has to be built. We had a small station at Albert Head, a place a little this side of William's Head, but it was found to be unsuitable, because there was no way of building a wharf there, and there was no way of getting near. There was no supply of water at all, and water had to be carried from

Esquimault on the steamer "Earle," and we effected a change last fall, and chose the station at William's Head, seven or eight miles from Victoria. Of course, we had to take simply the bare ground and establish absolutely a new station, a water service has to be put in, houses built, and a new wharf has to be built. There is absolutely a new arrangement. The hospital there will cost $15,000 or $16,000.

Q. The object we had apparently in bringing you here was to ascertain if energetic measures had been taken by your department for the completion of those things at as early a date as possible?—A. That is what we have been doing. We have been taking all possible steps to have the works completed with as little delay as practicable. We are taking every means within our power to have the works constructed and put into operation as soon as possible.

PORT OF ST. JOHN, N.B.

By Mr. Wilmot:

Q. Do you know the condition of the St. John quarantine station?—A. The buildings are in a fair state of repair. Last year the department of Agriculture imported from England a small disinfecting apparatus which has been there since last fall, and which is now being supplied with a boiler attachment. We have received money from Parliament to build a wharf which will have 9½ feet of water at the end at low tide, and 35½ feet at high tide, and all houses on the island are being put in repair. This is supposed to be as much as is required at the present time.

PORT OF SYDNEY, CAPE BRETON.

By Mr. McDougall (C.B.):

Q. What is being done with regard to the present buildings at Sydney?—A. At Sydney it is proposed that when the disinfecting apparatus which is now being constructed for use at Halifax has been completed and put in operation, that the small apparatus at present in use there, which we transferred from Grosse Isle, shall be sent to Sydney, as well as a dioxide blast and a mercuric drench. We are closing up matters down there which have been in hand for a long time—procuring road and land in order to enable us to get to the hospital. A well is to be dug, an addition to the wharf is to be constructed, and then with the improvements to buildings, fences, baths, etc., put into thorough repair, we expect to have a well-equipped station there.

Q. Have you any instructions to enlarge the present buildings at Sydney?—A. No.

Q. What is the capacity of the present buildings there?—A. That I could not tell you. The Department of Agriculture will be able to answer that question.

Q. Have you any instructions to obtain any more land in connection with that station?—A. Not that I am aware of.

By Mr. Roome:

Q. Do you think the Department of Agriculture is pushing the matter as fast as they possibly can?—A. I believe so.

Q. Is your department carrying out the different works as rapidly as possible after they have been placed in your hands?—A. We are. During the past three or four months, I have devoted a very large portion of my time to this work; in fact, I had more to do with the quarantines during that period than the whole of the other business of the department together. It must be borne in mind that when we have to prepare plans and specifications for all the works which we undertake, we cannot do our work in a day, but not a moment is being lost and in the long run, even if we did not call for tenders, we should not be any further advanced than we are. In an emergency, people are inclined to ask more for land or property than they are entitled to, and we have to attend to these matters in the best way we can.

Q. Our idea was that your staff was not strong enough to push everything to a state of perfection before the cholera reaches this country?—A. We have all the money we require for this work. In the Supplementary Estimates we have asked for the appropriations which we shall require and if this is given to us, we shall then have all the money we need to enable us to carry on the works as fast as any person could carry them on.

By Mr. McDougall (C.B.):

Q. You mention that provision is being made only for improvements on a large scale for the principal ports, naming Halifax, Grosse Isle and William's Head, B.C. Are you aware that the port of Sydney is among one of the largest ports of the Dominion and that last season nine hundred-odd foreign vessels entered that port, while at the port of Halifax, there were only about 1,000? It seems to me that it should be of as much importance to make these extensive improvements at Sydney, which is nearer danger than the port of Halifax and in the track of vessels making for the St. Lawrence.—A. For disinfecting vessels properly we are making the same provision at Sydney as at the other stations, although not on so large a scale. We are providing a steam disinfecting apparatus, and also a dioxide blast.

Q. What is the capacity of the disinfector?—A. It is a smaller one than at the other ports which I have named. It is about equal to one chamber of that which we are erecting at Grosse Isle.

Q. What quantity of clothing or baggage would that disinfect at one time?—A. I really could not tell you.

Q. Not more than the baggage of 15 or 20 passengers?—A. Not more than that at any one time.

Q. Well, now supposing a large steamer with four hundred or five hundred passengers on board entered Sydney, knowing it to be a quarantine port and that vessel came from an infected port, how long would it take to disinfect the baggage of that number?—A. It would take time.

By Mr. Cochrane:

Q. Is it customary for such a vessel to enter Sydney harbour?

Mr. McDougall.—No, but they are liable to do that. It is a port of call for a large number of foreign vessels both with freight and passengers. Supposing as a vessel is crossing the Atlantic, cholera broke out on board. That ship would find it necessary to make for the nearest quarantine port, and Sydney being known prominently as a quarantine port, not having any facilities for disinfecting, you can readily see the position we would be in.

Dr. Roome.—I suppose such a vessel would be sent to a station where there are facilities—to Halifax or Grosse Isle.

By Mr. McDougall:

Q. I think this committee ought to make a representation to the Department of Agriculture on this point and get assurances that everything would be done at Sydney in the way of providing the necessary apparatus and arrangements in connection with this important matter. I venture to submit to the committee that what is being done there, as stated by the Deputy-Minister now, is insufficient for a port of that importance.—A. Of course, what I have stated really means that all the provisions that are required to be made for the proper equipment of that port will be made, except that they are on a smaller scale than at Halifax or Grosse Isle. None of the things which are absolutely necessary to make that station a good station have been omitted. They will get buildings, bath-houses, detention houses, a wharf, disinfecting apparatus; everything required for that station will be obtained. The question of providing these on a greater scale is one for the department which makes the requisition, to settle; not the construction department as ours is.

Q. The draught of water at the wharf, as it is proposed to extend it is not sufficient to allow of an ocean vessel to go alongside?—A. No; I suppose it would not take a vessel of 22 or 25 feet draught. The same observation will apply to St.

John. A deep draught vessel will only be able to get alongside the wharf at Partridge Island, at high tide, when there will be 35 feet of water, but at low tide she will have to lay off.

Q. I made a recommendation to the department last fall that in the event of a wharf at Sydney not being built to deep water so as to permit ocean vessels to lie alongside, that the department should employ a barge in case a vessel came to the port that could not get to the wharf, and wanted to transfer her passengers to the station from the vessel. I thought the best way to do that would be by means of a barge?—A. I have no doubt that can be done very easily by the Agriculture Department.

PORT OF HALIFX, N.S.

By Mr. McLean:

Q. How is the station at Halifax—is it in good condition now?—A. The buildings have all been repaired, and we have leased a steamer, the "Sir John Ogle," on which we have placed disinfecting appliances. That steamer has got an attendant barge and can meet whatever steamers may come to the port. The passengers can then be landed, and the steamers thoroughly disinfected. Of course, when the station is thoroughly equipped, the disinfecting chambers will be on shore. Then we will have a wharf there with 27½ feet of water, so that ocean steamers can lie alongside all the time. Then the Department of Agriculture have a boat fitted up with a dioxide blast, ready to disinfect a ship after the passengers have been transferred. We have no detention buildings for steerage or third-class passengers, as yet, but we expect that the one which is now in course of erection will be completed in a month and a half, or two months. I may say that I only got the notice from this committee yesterday, and came ready to answer questions, but did not prepare any statements. If I had had a few days notice I could have prepared a statement which I would have read to the committee. I had no time except to bring a few notes with me so that I might answer questions, but I have brought a lot of plans showing the nature of the work we have done, and all that we have under our charge at the present time.

PORT OF SYDNEY, C.B.

By Mr. McDougall:

Q. In erecting the disinfecting apparatus at Sydney, what provision is being made for disinfecting a vessel when it cannot go to the wharf?—A. I do not know how the Department of Agriculture are going to proceed about that. My department is simply providing the machinery—whatever is required to do the disinfecting. The application of all that is left will be in the hands of the Department of Agriculture. They say to us, put a dioxide blast on such a boat or wharf, and we do it. At Sydney, I have no information as to the way in which this is to be done. If you ask me about Grosse Isle I would say that one of the Government steamers would do that work. I tell you that, because I happen to know it. At Sydney, I do not know. No doubt they are making preparations to utilize what we are building.

By Mr. Cochrane:

Q. Have these preparations been retarded by not having a sufficient staff of officers to prepare the plans?—A. No, sir.

WILLIAM'S HEAD, B.C.

By Mr. Earle:

Q. Are the plans completed for the station on the Pacific coast?—A. Yes. Mr. Gamble, our engineer in British Columbia, has completed them all.

Q. Have tenders been called for?—A. Tenders for the wharf have been called for. Everything required to go on with the wharf, which involves one-fourth of the expenditure there, has been done. The disinfecting apparatus is also under contract as well as the dioxide blast.

Q. What about the hospital?—A. The hospital and the officers' houses are still to be commenced. Those will be built under the supervision of Mr. Gamble, and he has already received instructions to call for tenders for the hospital. He will open the tenders out there and telegraph the result to us, so that there will be no delay and the work will be proceeded with as quickly as possible.

Q. That is the only thing?—A. This hospital is the only one about which instructions have not been issued yet.

By Mr. McLean:

Q. Are the repairs to be done at Halifax of such a nature as to prevent patients from being landed there at any time now?—A. No.

Having examined the preceding transcript of my statements, I find it correct.

A. GOBEIL,
Deputy Minister of Public Works.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
WEDNESDAY, 1st March, 1893.

A meeting of the sub-committee of the Committee of Agriculture, appointed to inquire into the existence or non-existence of pleuro-pneumonia in Canada, was held this day. There were present Dr. Sproule, M.P., chairman, presiding.

Dr. McEachran, chief inspector of stock for the Dominion Government, made the following statement with regard to his investigations into the report that pleuro-pneumonia had been discovered in Canadian cattle.

He said: At page 27 of the report of the Minister of Agriculture you will find a full report of the investigation made by instructions received from the Minister of Agriculture on the 25th and 28th of October last. This report commenced at Montreal, by obtaining certain information from Mr. Crowe, the shipper of the cattle on the steamers "Huronia" and "Monkseaton" and from the cargo of which the suspected animals were landed. By an examination of Mr. Crowe's books, I was enabled to obtain the names of the dealers who sold the cattle in the Toronto market, to his agent, Mr. Rogers, and by an examination of Mr. Rogers' books, which I made on the following day, I traced still further the cattle to the local dealers, and through them to the farms, whence they were bought by the local dealers.

In conjunction with Professor Smith, of Toronto, who afforded me every assistance in this investigation, I employed, on behalf of the Government, eleven qualified veterinary surgeons,—one in each district from which these cattle had been obtained. We furnished each of them with a list of the names of the dealers, the stations from which they shipped the cattle, and instructed them to find out the name of each farmer from whom the cattle were bought. I sent to each of these the following letter of instructions:—

"TORONTO, 29th October, 1892.

"DEAR SIR,—Owing to a cow which was landed in Scotland from ss. 'Monkseaton' being suspected of pleuro-pneumonia, it is necessary to trace the animal to the farm whence she came. From information received, it would appear that some

of the cattle forming cargo of said steamer, came from your district, and were sold in Toronto market, between the 10th and 13th September by Mr. ——— to Mr. Rogers, agent for Mr. John C. owe, shipper, Montreal. I am authorized to employ you to trace said animals. Please, therefore, on receipt of this letter, proceed immediately to visit every farm from which any of these animals came, make a careful inspection of the stock, and report on each farm separately, to Professor Smith, at Toronto. Wire him in advance the substance of your report. As the circumstances demand the utmost dispatch, please give this your immediate attention."

To Professor Smith, I sent the following letter:—

"DEAR SIR,—Please see that all the barns are visited from whence the cattle forming the cargoes of the 'Monkseaton' and 'Huronia' came, as per list of names and places furnished to you. No time must be lost, and as soon as you can, forward by mail to me at Montreal, all telegrams and reports, telegraphing in advance the purport thereof to me, so that I may in our joint names report by wire to the department at Ottawa, for transmission to London. I need hardly say that it is very important that this investigation should be most thorough, and the urgency of the case demands that it be carried on with the utmost dispatch.

"D. McEACHRAN,

"*Chief Inspector.*"

These veterinary surgeons acting on these instructions, visited every farm from which these cattle were taken, extending from Deloraine, near Brandon, to Stanstead, in the Eastern Townships. Each and every one of these, not only reported the non-existence of pleuro-pneumonia, but that it never had been known to exist in the district.

I may further state that I have been about thirty years employed in teaching and practising veterinary surgery in this country, and have been for sixteen years in the Government service as adviser to the Government in connection with the health of the stock of the Dominion. I have been in the habit of attending Provincial fairs, and am in constant communication with members of the veterinary profession throughout the Dominion.

I travel at least twice a year as far as the foot of the Rocky Mountains and frequently across them into British Columbia. I come in contact with agriculturists throughout the entire Dominion, and further, I read the reports in the agricultural papers, and I know that if pleuro-pneumonia existed in Canada, it could not be kept secret from me, as I have so many sources of information. Furthermore, of late years, such has been the dread of pleuro-pneumonia, that we have constantly reports coming to us of an alarming character, which, on investigation, we invariably find to arise from indigestion or some other simple cause. I have every confidence and assurance in making this statement, that pleuro-pneumonia does not exist in any part of Canada from the Atlantic to the Pacific, and that for the thirty years in which I have resided in the country, it has not existed, or I certainly would have known of it.

Having examined the preceding transcript of my evidence, I find it correct.

D. McEACHRAN, F.B.C., V.S.,

Chief Inspector for Quebec and Maritime Provinces.

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
WEDNESDAY, 22nd March, 1893.

The Committee on Agriculture and Colonization met this morning; Dr. Sproule, chairman, presiding.

THE CHAIRMAN:—Professor McEachran, of Montreal, is present this morning for examination. In the last Report of the Minister of Agriculture, Dr. McEachran speaks of the existence of tuberculosis in cattle, glanders in horses and lump jaw in cattle. Dr. McEachran says that the diseases can be eradicated, and in consultation with members of the committee, it was thought well to bring him before us this morning so as to enable him to give us his views, and then it will be in order for the committee to make such recommendations as in their judgment they may think proper, to the House. I will now ask Prof. McEachran to address the committee.

TUBERCULOSIS IN CATTLE.

Prof. D. McEACHRAN said:—Mr. Chairman and gentlemen,—As stated in my report to the Minister of Agriculture, and which appears in the Annual Departmental Report, the disease of tuberculosis exists universally wherever domestic animals are raised. In Great Britain, recent reports show that the percentage varies from 4 to 28 per cent according to the localities, while in France it is fully as high. In the United States it varies from 3 to 14 per cent; so that while admitting that this disease exists in Canada, we are merely in a similar position to every other country in the world, but I may say with this difference, that the disease does not exist so widely in Canada on account of the number of domestic cattle in our cities being relatively less.

PATHOLOGY.

The disease is found to exist in the outskirts of cities generally. Now, the nature of this disease, I may state, is due to a bacillus, a micro-organism which was discovered by Koch in 1888, and is now well understood and well recognized by scientists. It is contagious, it has been proved by experiments that it is communicable from man to animals and also from animals to man. It is well known to exist in all the domestic animals and can be communicated by or to them. It has been found to be communicative by poultry eating sputa from consumptive patients; from dogs in the same way and by dogs and other animals drinking the milk of or eating the flesh of cows so affected, and in the minds of many scientists, consumption in the human family often arises from the drinking of milk or eating the flesh of animals affected with tuberculosis. As a matter of public health, this is a question of great importance for this committee to consider. I have reports of it from Cape Breton and from as far west as the Peace River District, and from many intervening sections of country, but fortunately the disease may be stated not to exist to anything like an alarming extent and is quite capable, to my mind, of being exterminated by proper measures.

Up to very recently the great difficulty which Governments found in attempting to deal with this disease, and recommending active measures for its extirpation, was the diagnosing of the disease in many of its earlier stages. Of course where it has lasted in cattle for several months, we may know when it attacks the lungs by coughing and other symptoms, but in the earlier stages, when the disease does not affect the lungs, it is rather difficult. Often the tuberculosis may form on the mesentery in the intestines, on the cavity of the jaw, and sometimes on the external glands of the body; in fact, it may affect any part of the body, but when it does not affect any organs by which distinctive symptoms are produced, it is difficult for me to go into a herd and pick out all the tuberculous animals.

DETECTION AND EXTERMINATION.

Recently it has been discovered that by injections of tuberculene, which is an attenuated condition of the virus, that this being injected into animals suffering from the disease, immediately causes an increase in temperature of 4, 5 or 6 degrees, but it has no effect on animals not affected by tuberculosis. So that it is now fully believed that by injections of tuberculene, professional men may go into a herd of cattle and pick out every animal affected with disease. With this means of discovering the disease in a herd of cattle, I see no difficulty, if proper measures are instituted, in entirely eradicating the disease from our herds, and once eradicated, by keeping watch on the herds which have been affected, and taking proper sanitary measures, to destroy everything that they may have come in contact with, and the cause of virus is carried in the sputa coughed up from the lungs, and becoming dry gets into the drinking troughs, and the feed boxes, and into the hay, and is thus communicated to other animals, that the disease once out of the herd can be very easily controlled.

I would not be prepared to say what amount would be required to exterminate it entirely from the herds of Canada, but I would be bound to say that it will cost less than half a million dollars. That would certainly be a small amount as compared with the value gained, as well as preventing a very serious loss constantly recurring in the cattle themselves. I would venture to say that the loss from tuberculosis amounts annually to double that sum now, although I believe the disease to be a preventable one.

ABSENCE OF REQUISITE MEANS.

It is found very difficult to get statistics of the number of cases of people becoming infected by the milk or by the meat, but I am positive from the investigations of European scientists, that such is the case. I regret very much to say (and I throw it out as a suggestion to this committee) that we have in Canada no pathological station. We have no appliances and no means of carrying on independent investigations from Canadian stand-points and under Canadian circumstances. I would suggest that this committee should recommend to the Government that an appropriation be made, and that a station be established, say, in connection with McGill University, or other university, where such diseases could be investigated, as they are doing in France, Germany and the United States, and in fact, in almost every other country in the world. So far as the expense goes, therefore, I would say that even if it could be done for half a million of dollars the money could not be better spent in the matter of public health. The effects of it would not be immediately seen, but in the years to come, if the Canadian herds would become entirely free from this disease—as they are now entirely free from all other contagious diseases.

NO PLEURO-PNEUMONIA IN CANADIAN HERDS.

Pleuro-pneumonia does not exist and has never existed in Canada, and need never exist in Canada if proper measures are maintained, and the benefit will be very great. Foot-and-mouth disease has on several occasions been imported, but it was always stopped at the quarantine, thereby proving that it was perfectly capable of being controlled and prevented. If we get rid of tuberculosis, then we can say without fear of contradiction that we have the healthiest and soundest constitutioned cattle in the world. I feel quite confident in saying so. I happen to know. Circumstances have given me an opportunity of knowing the cattle from ocean to ocean. I have visited nearly every agricultural district in Canada from one ocean to the other, and I know nearly every herd in the country, having seen specimens of them at nearly all the exhibitions, so that I take it upon myself to say that there are no healthier cattle than there are in Canada to-day, and if we exterminate this disease which is not only a menace to the cattle themselves but a menace also to

the public health of the inhabitants of the country, we will be doing a great deal towards perfecting the prosperity and the public health of the country.

By Mr. Roome:

Q. Do you think then that tuberculosis is communicated from the animal to man?—A. I believe it firmly.

Q. You say that $500,000 will eradicate it out of animals. Is it not a disease that will communicate from man to animals?—A. Yes.

Q. If you wipe it out of the animals how are you going to prevent it coming from man or land as it is in the human race?—A. By properly educating the people. They have not been properly educated. I am bound to say, if the remarks I am making now are made public, it will be news for millions of our people, that the remedy for that would be dissemination of simple, easily understood literature and statements of fact which are abundant from scientific investigations.

Q. Would it not be well to start and eradicate it from the human race first. Ten per cent of our people die from tuberculosis. Would it not be better to eradicate it from the human race first, then from the animal?—A. I should think not. I should think the animal tuberculosis is the great source of human tuberculosis. I consider if we arrest it in the animals we would be removing the cause in a great measure.

Q. In parts of Canada there is little tuberculosis except in the human race?—A. That I think would come more under the medical Board of Health, and the profession.

By the Chairman:

Q. You say you think it can be eradicated. What means would you suggest as practical for the eradication of the disease the cost of which, I think you said, would be about $500,000? Would you propose the slaughtering of all animals and pay compensation for them? Would that be your suggestion?—A. My suggestion would be to slaughter them and to pay compensation. You will observe, gentlemen, that while France and England never placed this disease on the contagious list, three years ago Canada put it on the list, so that provision is made in the Act as it now stands for dealing with this as a contagious disease.

GLANDERS—EXTERMINATION OF.

Q. You have only spoken of tuberculosis. Do you mention other diseases of a contagious character in your report?—A. Glanders is another contagious disease affecting horses. It is contagious, communicable from animal to animal by direct contact and by coming in contact with utensils such as drinking troughs, feed boxes and other articles that may have become infected by the disease from the nostrils of the infected animal. This disease is also communicable to the human subject, and there are numerous instances in which grooms and people working about glandered horses, with scratches on their hands or other parts of their bodies, have contracted the disease, and it produces, as the medical gentlemen present will tell you, a very fatal and loathsome disease, attended by the most excruciating agony, resulting in one of the most agonizing deaths a man can die. Fortunately, in this country the disease does not exist to a large extent. In Montreal, we probably do not see more than a dozen cases of glanders in a year; in Toronto it is a case rarely seen, and in all our large cities it is the same. It has been reported recently by a member of the North-west Council, Dr. Brett, to me, as occurring in the constituency which he represents in the North-west Territories. It is occasionally reported from British Columbia, and it does exist to a limited extent. While I have no statistics which I can place before you as to the extent to which it does exist, I can say generally, that while it exists in the country, it is to a very little extent, and it would cost comparatively little to exterminate it. A peculiar injection of malaien has been discovered by which this disease can also be found, and it causes a peculiar rise of temperature, as tuberculene in tuberculous animals. It has been proved to be absolutely reliable, and in this way there would be very little difficulty in a properly experienced man going into a herd of horses and picking out every glandered animal.

Under the Contagious Diseases Animals Act, you will observe that horses are not included. Horses were eliminated from the Act, which, I think, was a very great misfortune. It arose, I presume, when the question of indemnity came to be considered. You will see that horses, only when specially mentioned, are eliminated from the Contagious Diseases Act. Therefore, the Minister of Agriculture at present would have no power to deal with glanders, and I strongly recommend that the Contagious Diseases Animals Act be amended so as to replace horses, that such a disease can be dealt with. The cost of dealing with the disease would be little. I venture to say there are not four hundred horses in Canada infected. Then, a horse with glanders is of comparatively little value, and the actual cost would be comparatively small, and the expense for the reorganization of the quarantine system that has been recommended to the department to be carried out, would also be comparatively inexpensive. I should strongly recommend that the subject be brought up, although, perhaps, it is too late for this session. The Act, however, ought to be so amended, that diseased horses could be dealt with under its provisions.

By Mr. Smith (Ont.):

Q. We have a Provincial Act in Ontario dealing with glanders?—A. Yes. Each province in the Dominion, except the province of Quebec has a statute covering this disease. Manitoba has a very stringent Act which is well carried out. Ontario has a good Act in operation.

By Mr. Featherston:

Q. Does not the Ontario Act provide that glandered horses must be destroyed at once?—A. Yes.

By the Chairman:

Q. It seems you are officially attending to veterinary affairs in connection with the Department of Agriculture, can you give us some information respecting your relationship to the department and what the department requires of you in the event of disease? Is your connection only with reference to quarantine, or does it apply to diseases among animals that may arise in any part of Canada?—A. I will explain that to the committee. In 1875, it was suggested to the Government that a quarantine of animals should be established, and in 1876, I was appointed to look after the matter. At that time the Act only gave us permissive powers. Subsequently the statute was amended, and I was appointed chief inspector for Quebec and the Maritime Provinces. At that time my duties consisted chiefly of looking after imported cattle. No live stock was being exported then. Then, the export cattle trade commenced, and has rapidly grown until it has attained the large proportions which it now has. It was then that was added to my duties, the supervision of the exportation of cattle, the examination of the animals before shipment to ascertain if they were in good health, the supervision of the ships, the loading of the animals and everything connected with the trade, has been done by the staff working under my directions. As the quarantine matters have grown, and as the North-west became opened up, my duties have increased so that now I advise the Government on all matters with reference to the health or diseases of animals from ocean to ocean, although my commission only reads for Quebec and the Maritime Provinces. I have recommended to the Minister that this be changed and that my commission be made to cover the entire Dominion, that I be allowed to employ the best men that I can find in every section of the country, and have them nominated as inspectors for the department. My desire is that these should be paid so much per day as they are employed. It will be a comparatively inexpensive staff, only remunerated as their services might be found necessary. The reason that I suggest this, is, that frequently from all parts of the Dominion, reports of an alarming character reach me, as I mentioned last time I was here. Any farmer finding an animal sick, fears it to be a contagious disease and reports the matter to the department. Either we cannot send an inspector at all, or else we have to employ some one over

whom we have no control and as to whose capabilities we know nothing. Should such a staff as that which I have suggested be appointed, it is my intention to give these men a course of instruction as to the contagious diseases of animals and the scientific methods of discovering and dealing with them. That in brief is an outline of my relationship to the Department of Agriculture.

By Mr. Featherston:

Q. The system you have mentioned is established to a limited extent in Ontario now?—A. Yes, and in Manitoba

DISTURBING RUMOURS—A RECOMMENDATION.

By Mr. Roome:

Q. You spoke of giving information to the public about tuberculosis. What system would you advise as to the best method of giving this information?—A. I would recommend the dissemination among the public of pamphlets bearing on this subject. Dr. Playter, editor of the *Canada Health Journal*, has sent me a copy of an admirable pamphlet which contains very valuable information on the subject. From time to time, pamphlets of that kind should be distributed among members of Parliament and agricultural societies throughout the Dominion.

Q. You think that pamphlet is a good one?—A. I think it contains very valuable information of the most scientific investigations in reference to it.

By the Chairman:

Q. You think it would be better to have veterinary surgeons appointed in different parts of the Dominion, so that you could be in direct communication with them always in the event of a contagious disease breaking out, instead of having to make a long journey yourself. Your suggestion is that these officers should make their reports through you to the department?—A. Yes. If these men were specially instructed, specially trained and knew exactly what to do, and how to distinguish a disease, then we would be free from these disturbing reports which we get from men with diplomas, to-day. On one occasion I remember I had to go as far west as Maple Creek, to the Cypress Hills, on the strength of a report received from a professional man—a man with a diploma, who assured me that pleuro-pneumonia existed among the cattle there. There was nothing in the history of the disease—absolutely nothing to lead such a man to make such a report. That is why I say that if such men were appointed and named by the Government as official inspectors, and then trained in the nature and symptoms of pleuro-pneumonia and other diseases in animals, we would be free of any of these disturbing reports, and the reports we find in the agricultural press.

Q. Some time ago something was said about a reported disease among animals in the Peace River District. What steps were taken in regard to that?—A. A year ago we had a report of that disease, and the description given pointed very clearly to tuberculosis. In fact, a clearer picture of tuberculosis could not have been painted in words. I recommended then that the Hudson Bay Company should exterminate the herd entirely, but such action was not taken. A similar report as to the existence of this disease came to us again a few weeks ago. Recently I saw Mr. Chipman, the commissioner of the Hudson Bay Company, at Montreal, in reference to the matter, and he is now very anxious that the herd should be exterminated, and has offered to give transport to an inspector to visit the Peace River District, if the Government will send one. The Minister of Agriculture has decided to send an inspector up there to see that the herd is exterminated as soon as it is possible. It is almost impossible to go in the winter, as the inspector would have to utilize dog-sleds. The rivers are now breaking up, and if he were to attempt to leave now, it would probably take him a couple of months to get there. As soon as navigation is opened, after leaving the railway at Edmonton, he would have no difficulty in proceeding to his destination, and this he will do early in the spring.

INSPECTION OF CATTLE BEFORE PLACED ON BOARD SHIP.

By Mr. Hughes:

Q. Will you please explain what system is in vogue in examining cattle before they are shipped to the old country, at the port of Montreal. Is any attempt made to find out whether they are diseased or not. Supposing cattle were affected with pleuro-pneumonia, could that be detected, before they left the harbour? —A. The cattle shippers are bound to give notice to the inspectors twelve hours before the arrival of cattle, and the cattle have to remain 24 hours in the yards for rest and inspection. They are yarded at the stock yards of the Grand Trunk Railway, and a special inspector is in charge. They are also yarded at the C. P. R. yards where there is another inspector. Each inspector has three men under him, a foreman, and two assistants. The cattle have passed through chutes and as they pass through they are carefully inspected. If the men see any suspicious looking animals, they are put aside for a special examination and the attention of the inspector is called to them.

The inspector carefully examines all the animals in the yard, and every suspicious animal is put in the chute and carefully examined. As they pass through the chutes they are branded with the brand mark V. R. on the hip, the one red and the other blue so we can tell who is the inspector and what yard they came from. The C. P. R. is blue and the G. T. R. is red, at the same time, the stockers, which are allowed to be shipped of a thousand pound weight, are passed through the chutes and over a set of scales, regular ox scales, and they are weighed as they pass over; as they pass over they are branded S. as stockers. That is the method of the inspection, which is very thorough. I think there is no trouble at all; so far there has been none. I expect there will be none as the inspection has been very thorough.

LUMP JAW—REMEDY FOR.

By Mr. McMillan (Huron):

Q. There is another disease called lump jaw, which I heard a little about the other day?—A. That is a disease commonly called "lump jaw," or actinomykosis. It is due to a fungus, the spores of the fungus of actinomykosis which finds an entrance in the germs, or any sore. These fungi are found in the food, and in the grass, and may be dropped in the saliva from the mouths of diseased cattle, and thus it is looked upon as a contagious disease. In fact it is a contagious disease It is called lump jaw, on account of its most frequently attacking the jaw and facial bones. It frequently attacks the cartilage of the larynx and trachea, and in fact it may be found in all the tissues of the body, so that it is an incurable disease. It is occasionally known to be communicated to the human subject as well. This disease works such destructive changes in the bone and other tissues which the fungus invades, that it is utterly incurable. There is actually no cure for it once it has reached a certain stage. Experiments have been made by scientists, and it has been found that iodide of potassium, if applied in the early stages, will have the effect of destroying the vitality of the fungus and stop the disease in many cases. That is another disease that I think great good can be done by disseminating useful information among the farmers, with reference to it. I have had numerous communications from farmers in Ontario and other places, and a great many of them are now trying this iodide of potassium in the early stages of the disease.

By Mr. Hughes:

Q. How is it applied?—A. Given internally among the food.

By Mr. Smith (Ont.):

Q. It is meeting with a good deal of success?—A. Yes, tolerably successful.

By the Chairman:

Q. Would you consider animals so diseased, unfit for human food?—A. Yes.

Q. In the early stages?—A. In the early stages the food might be eaten without any deleterious effects, but where it invades the tissues besides, it is not fit for food certainly, and for some years back we have not allowed any of these animals to be exported.

Q. Is there any law you know of prohibiting the sale of meat so affected in markets?—A. I am not aware of any except it is a municipal law of any municipality.

By Mr. Roome:

Q. Do you know of any instance where the disease has been transferred to man? A. The disease is well known to exist in man, and I presume that it has been communicated.

By Mr. Featherston:

Q. A great many cattle have a lump outside that has been caused by the chain? —A. The animal may bruise the soft tissues of the jaw and have a lump just as a horse will be bruised on the shoulder from the collar, but these lumps on the cheeks are very often tuberculosis Many of these soft lumps of a cheesy consistence are tuberculosis. For a long time in the continental countries, there was no opposition made to the use of the flesh as food, but now they have found by a microscopic examination that the bacilli are found in the muscles and the other tissues, and the food is no longer recommended to be used. It is true that cooking will kill the bacillus of tuberculosis, but it very often escapes when deep seated in the joints, and in that way can be communicated. There is no doubt whatever, were it not from the fact that cooking kills many of these parasites, we would have these diseases much more frequently than we have.

By Mr. Hughes:

Q. In the human system you mean?—A. Yes, in the human subject.

The CHAIRMAN—That is a good reminder for those who eat meat rare.

PROTECTION OF CANADIAN CATTLE ABROAD.

By Mr. McMillan (Huron):

Q. Would it not be well for the doctor to give us a statement in respect to the removal of Canadian cattle from the schedule in England before he goes?—A. I have no very direct information, but I may state generally the position of affairs. As you are aware, a deputation of steam-ship owners and cattlemen were heard about a week or ten days ago, recommending that a veterinary surgeon be sent over from this side. That, I think, under the present circumstances, and in the present state of affairs, would be perhaps as well delayed. Sir Charles Tupper has done everything that can be done, and the report which has been sent by the Department of Agriculture, I think, has been looked upon as in a great measure conclusive that we have no disease in Canada, or at least that we do not know of it. I presume that the steps that will be taken by Mr. Gardner are probably on these lines, that a few of the ships will be allowed to go in and if the cattle are found to be free from disease it will be decided to remove the embargo. I think that is most likely what is to be done. I see that the press has, and I think this committee has recommended that a veterinary surgeon be sent over from here to watch the examination of the lungs of the Canadian animals as they are killed. I think it would be much better if Sir Charles Tupper were to employ three of the leading men in Scotland, and I suggested the names of Prof. McCaul, of Glasgow; Prof. Williams, of Edinburgh, and Prof. Walley, of Edinburgh. If these three men were retained by Sir Charles Tupper, or better still, by the steam-ship agents themselves, and these men be sent for in the event of any of our catttle being suspected of disease, I think their influence would be greater than that of any individual sent over from this side.

By Mr. Hughes:

Q. Have you made that suggestion to the Government?—A. That is the suggestion I made, and I think that is what is being carried out. In fact, I know that a communication in that sense has been sent to Sir Charles Tupper.

By Mr. Featherston:

Q. I think it would be much better if you would go, because in the spring we will have a lot of distillery cattle going over. You know yourself that there are only two out of every three of those cattle that arrive sound. They have been fed all winter on hot food, and they cannot stand the voyage, and it is a pity to have all the cattle of the country condemned on account of the few sent from the distilleries?—A. Well, I think myself that a report from three men of high standing in the profession would weigh more with the Imperial authorities than one given by a Canadian veterinarian.

Q. I think there should be some one over there to distinguish between the distillery-fed cattle and farmers' cattle. The distillery-fed cattle are not as strong as the other class of stock, and their lungs are liable to be affected by the fatigue of the voyage, and the fact that they have not been accustomed to exercise all winter. They are not strong enough to stand the voyage, and have often been mistaken for farmers' cattle to the detriment of such stock?—A. It is my intention to keep the veterinary surgeons of the Privy Council in London fully informed of every shipment, stating whether they are distillery cattle or otherwise.

By Mr. Hughes:

Q. The reason I asked the question in reference to the method of examination at Montreal was, because I know a number of shippers, and they inform me that sometimes the 24 hours rest before embarkation is curtailed, that the cattle are not examined in the yards until about to be loaded, and that the inspectors simply look at the animals, as they walk on board. An examination of that character cannot be a very careful one. I am informed that animals with lumps on their jaws have passed on board. The impression seems to prevail that the examination is but a superficial one, and that it is possible for diseased animals to be placed on shipboard. I would suggest that in the future, this matter be given closer attention?—A. So far as I am aware, the examination is closely looked after. I give it all the personal attention that I can. The cattle must stay 24 hours in the yards, but occasionally if anything happens to a railroad train, and the cattle for a certain ship are delayed and the ship is already to leave, if we are satisfied as to the condition of the animals, we allow them to go on board short of the 24 hours, so as not to cause unnecessary delay and increase the expense to the shipper. We have to exercise a little judgment, so as not to hinder the commerce of the country. The rule, however, is very stringent, and some cattlemen say it is too much so.

The CHAIRMAN:—In harmony with the expressed wish of the committee, I may say that I saw the Minister of Agriculture the other day, and drew his attention to the resolution of the committee that a veterinary surgeon should be sent to England from Canada, and a competent one employed over there, to be present at the autopsical examination of the first shipments of Canadian cattle landed this spring. Mr. Angers's idea was that owing to the statement made by Mr. Gardner, the Imperial Minister of Agriculture, that the first shipment on arrival would be examined, and if found healthy, that Canadian cattle would be removed from the schedule list, he thought it would be well to have the closest examination made before the cattle was shipped, and to accomplish that, it would be well to keep Professor McEachran here, as he is considered the best man in this country. Any communications from him through the High Commissioner would go with greater force than from a man not so well known in England as Dr. McEachran is. In addition, the Minister also suggested that it would be well to communicate with Sir Charles Tupper to employ one or more competent veterinary surgeons over there to look after the cattle on arrival. In answer to his suggestion that I would name an officer in Great Britain, I mentioned the name of Professor Williams, of Edinburgh, as one who would be acceptable

to our shippers. It is known that Professor Williams has been in Canada and the United States, and is well acquainted with pleuro-pneumonia and corn-stalk pneumonia, the symptoms of which seem to be common to both. If necessary, more than one will be employed as shipments may arrive at different ports almost simultaneously. The Minister stated that he would communicate at once with Sir Charles Tupper, with this end in view, and instructed his Deputy to that effect while I was present. I think the action of the Minister cannot but be gratifying to the cattle exporters.

By Mr. McMillan (Huron):

Q. Is there any danger of loading cattle on the spar decks early in the spring as well as in the fall?—A. We had a letter the other day from Messrs. Aikins and Flanagan of Toronto, expressing their opinion that a great deal of this trouble over the loading of stockers on the spar decks late in the autumn. This I know to be the case, and have always tried to discourage the loading of animals on the spar deck. After the middle of October, the Atlantic is usually so boisterous that the seas wash over the animals on the spar decks and they become drenched. They cannot retain their footing on the slippery decks and being exposed to cold, it is really not surprising that many take congestion of the lungs and pneumonia. I think myself that the placing of cattle on the spar decks after the middle of October should be prohibited. In the spring there is not so much danger, as the weather is generally milder, but in the late fall, from the middle of October, there is always danger of congestion of the lungs and pneumonia being produced by exposing the cattle to the washings of the sea.

Certified a correct copy.

J. H. MacLEOD,
Clerk to Committee.

The CHAIRMAN:—Dr. Playter, of Ottawa, editor of the *Canada Health Journal* is present this morning and desires to address the committee for a few moments.

Dr. PLAYTER said:—Mr. Chairman and gentlemen—I have very little to say and will not occupy the time of the committee long. I will not say anything in reference to the pamphlet to which Dr. Roome and Professor McEachran have alluded. Many gentlemen present will remember that five or six years ago I first brought this question of tuberculosis before the Committee on Agriculture. Several members of the committee recently have told me that this disease is becoming seriously common. I venture to think that if the committee at that time had taken the tuberculosis bull by the horns and endeavoured to kill it, much good would have been accomplished and certainly there would have been far less disease in all cattle. It is said that there is no cure for the disease. It is known that in man 25 per cent of all the diseases in the cases of patients examined in hospitals show that tuberculosis has existed and has been cured. That is, the cases have been affected with tuberculosis in some part of the body, but certain changes have taken place which has led to the disappearance of the tuberculosis, whatever that change may have been. I do not see why something should not be done to remedy the incipient disease in cattle. An eminent authority—a member of one of the Provincial Boards of Health, recently agreed with me that he thought it would be possible to treat cattle in the very early stages of the disease of tuberculosis. There are generally incipient symptoms. If the cattle were dried up and put on grass where possible, or in well-ventilated and light stables, they would with very great care recover to a certain extent in time. If it is possible, I don't say that I would recommend that such meat be used, and it is thought by some authorities that the animal might then be killed and the meat used for food if thoroughly cooked. There is the only obstacle—to get thorough cooking. I would merely say that we all know that prevention is the great thing in all these cases. I have practised in the country myself, in North York, a good many years, and I have seen cattle kept in dark close stables, and if cattle are still kept in dark close stables as they were fifteen years ago, I do not wonder that we are getting a good many cases of tuberculosis disease. I think fresh air and sunlight in the early period would lessen a great deal of the tuberculous disease that is prevalent now.

THE EVIDENCE

PART III

IMMIGRATION AND COLONIZATION

COMMITTEE ROOM 46,
HOUSE OF COMMONS,
FRIDAY, 24th March, 1893.

The Select Standing Committee on Agriculture and Colonization met this day at 10.30 a.m; Dr. Sproule, chairman, presiding.

Mr. A. M. Burgess, Deputy Minister of the Department of Interior, was present by call of the committee.

The CHAIRMAN.—We have with us Mr. Burgess, the Deputy Minister of the Interior, who will give us some information regarding the immigration operations conducted by the Interior Department. I may state that I was informed by a member of the executive of the Farmers' Institute of Ontario, that they were going to send to me to lay before the committee a copy of a resolution passed at the recent meeting of the Institute in Toronto, urging the Government to take active steps towards inducing the emigration from the British Isles of farm servants, both male and female. I was to submit the resolution to the committee, but as they have neglected to send it to me, I thought I would mention the matter to-day.

Mr. BURGESS, responding, said:—Mr. Chairman and gentlemen,—I received your invitation to be present at to-day's meeting of the committee, and availed myself of it with great pleasure, although I do not know that I have much to add to the information contained in the annual report of the department, which has already been laid before both Houses. There is one very important omission, however, from my own contribution to that report, which I greatly regret, and I avail myself of the earliest opportunity afforded me of compensating for it. I failed to mention the fact that Mr. Geo. H. Campbell, the general immigration agent of the Government for the United States, resigned his office in December last. Mr. Campbell was, according to the best of my capacity to judge, about as well fitted for the position which he held as any man who could have been selected for it. He had had what I conceive to be very valuable and important experience before he took the office. He had been city passenger agent for the Canadian Pacific Railway at Winnipeg, and I believe that in that way a man gets the kind of experience which serves him to the best advantage when he comes to solicit the consideration of intending settlers in regard to the country to which he proposes they should move. Mr. Campbell was a very great success in the position which he occupied, and his loss has been a great loss to the department and to the Government. He has been appointed the general manager of the Electric Street Railway at Winnipeg at a salary which, I regret to say, is not often paid to public servants, and as it was distinctly in his interest to accept it, no one could have expected him to remain. His place was taken, however, I am glad to say, by Captain A. F. Holmes, who must be known to a great many members of this committee. He has been an officer of the Immigration Department for a good many years. His headquarters are at Ottawa, where Mr. Campbell's would have been had he remained in the service.

IMMIGRATION PROPAGANDA TO THE U. S.

The work of the department is spreading eastward and westward. We no longer confine ourselves to the states immediately south of Manitoba. We have commenced in northern New York, in the New England States, and in Oregon, Washington and Idaho. It was considered in the interests of the service if the chief officer of that branch were stationed at Ottawa, directly under the eye of the Minister. We have at the present time seven agents operating in the New England States, three of whom are French-Canadians, endeavouring to repatriate

their fellow-countrymen from Lower Canada, and the prospects of success are reasonably good. We have one man just started in northern New York—in the country immediately across the river from here. Six are at work in the various parts of Michigan, two in North Dakota, two in South Dakota, two in Minnesota, one in Iowa, three in Nebraska, and two in Oregon, Washington and Idaho.

A DELEGATION OF IOWA DAIRYMEN.

Mr. Riley, ex-mayor of Calgary, devoted some time last summer to visiting the dairy sections of Iowa, and discovered, so he reported, a strong interest among the dairymen there in our Canadian North-west, our climate being so well adapted for the production of butter, and they sent a delegation with Mr. Riley to examine the grasses and general conditions to see if they were equally favourable. I understand they were well satisfied with what they saw, and that some of them are likely to sell out their comparatively small holdings in northern Iowa and move to various parts of Manitoba and the North-west Territories, where they can get a greater area of land for the same money, and carry on their dairy operations on a larger scale.

One of our agents has just returned from Idaho, Washington and Oregon, and he speaks very encouragingly of the disposition of the people there to move north. A very considerable number did so during the past season, and although the winter in the North-west, as it has been all the world over, was exceptionally severe, I have not heard that their experience has made them sorry for having removed to our side of the line.

The imposition of the 90 days quarantine right along the international boundary, and the abolition of the old system of admitting settlers' cattle on veterinary examination, will probably have a deterrent effect upon the best class of our immigration from the United States.

CATTLE QUARANTINE STATIONS ON THE N. W. BOUNDARY BETWEEN CANADA AND THE UNITED STATES.

By Mr. Wilson :

Q. Do you insist now on the same quarantine for these settlers' cattle as you do for all others ?—A. Yes, the same. The Government have thought it desirable that whatever could be done to mitigate this condition of affairs should be done, and yesterday I received from Mr. Daly, with a view of presenting it before this committee, an Order in Council passed on the 22nd instant, which will explain itself. The order reads as follows:—

" The sub-committee of Council desire to direct attention to the fact that during the past year no less than 513 entries for homesteads in Manitoba and the North-west Territories were made by persons coming from the United States of America, many of whom brought with them—in addition to their experience of the agricultural methods best suited to the country—their horses, cattle and implements, and effects generally.

" The sub-committee observe that the reports received from the agents of the Department of the Interior in the United States indicate that but for the recent order putting an end to the admission into Canada of settlers' cattle from that country upon a veterinary examination and report, and enforcing the 90 days quarantine at all points along the international boundary from the Atlantic to the Pacific, this immigration would have been very largely increased during the coming season. As already indicated, settlers of this class are more than ordinarily valuable to Canada, because in addition to the equipment for the pursuit of agriculture which they bring into the country with them, and which enables them at once to commence the cultivation of their lands, they bring also an experience of the climate and soil characteristic of the great prairie region of the West, of the most approved methods of agriculture, and of the care, breeding and feeding of farm animals which it takes the immigrant from Great Britain or Continental Europe some years to acquire.

"The sub-committee therefore submit suggestions which they believe will tend to mitigate to a very considerable extent the difficulties in the way of immigration of the class referred to which are incident to the enforcement of the quarantine.

"1. The sub-committee recommend the immediate reservation of two additional quarantine stations on the international boundary, in the neighbourhood of Estevan and Wood Mountain, respectively, which may be described as follows:—

"*Estevan*:—All the lands at the disposal of the Government in the following Townships, viz.: Township 1, Range 9; that part of Township 2, Range 9, lying south of Long Creek or Souris River; that part of Township 1, Range 8, lying west of Long Creek or Souris River; that part of Township 2, Range 8, lying southwest of Long Creek or Souris River, all west of the 2nd meridian."

I might say, Mr. Chairman, that Estevan is the western terminus of the Souris branch of the Canadian Pacific Railway, the coal town of south eastern Assiniboia. It will be observed that the advantage of this quarantine ground, in common with all the quarantine grounds along the international boundary, is that it consists of good grazing land, and is well supplied with water, being bounded upon at least two sides by creeks that run all the year round. The advantage of this is that while the cattle are detained in quarantine they will have food and water without expense.

"*South of Wood Mountain*:—Townships 1, Ranges 5 and 6, west of the 3rd meridian. These two tracts (which are coloured green upon the map marked 'A' hereto attached) and also the reservations approved by order of Your Excellency in Council on the 17th September, 1892, which are coloured red upon the map 'A,' have been selected with such reference to facilities for feeding and watering, and to the general physical features of the country, as will make it comparatively easy and inexpensive to herd and maintain such animals as are from time to time placed within them.

"2. The sub-committee observe also that in order to accommodate the very large number of people in Washington, Oregon and Idaho who have signified their intention of removing to Canada during the coming season with their cattle and effects, it would be desirable, if possible, to establish a quarantine station of about the same area and having the same facilities for feeding and watering, at Huntingdon, the point on the boundary in British Columbia where the Canadian Pacific Railway connects with the railway systems of the above-mentioned states, but the requisite facilities are not obtainable. The agents of the Department of the Interior in the three States referred to are therefore being instructed to encourage settlers wishing to bring their live stock with them, either to send them overland to the nearest quarantine station, south of Fort McLeod, or to ship them by either the Union Pacific or the Great Northern Railway to the nearest point on these railways to the quarantine station south of the Canadian boundary, from which they could be driven across country to the quarantine stations.

"3. The sub-committee state also that as to settlers from Michigan, which, from the British point of view is a suspected State, the immigration agents are being instructed to advise intending settlers to dispose of their meat cattle in the United States, and purchase such animals as they require after arrival in the North-west."

This, however, I might say, is open to some objection, because we have ascertained, apparently beyond doubt, that they cannot sell their cattle to as good advantage in the United States, as they could in Manitoba or the Territories. In other words, they cannot sell for such prices in the United States as would enable them to buy the same number and class of animals for the same amount of money in Canada.

"The sub-committee further observe that it will be quite possible and profitable for most of the intending settlers from Minnesota, Dakota, Iowa, Wisconsin and Nebraska to drive their cattle across country to the quarantine station proposed to be established south of Estevan. For the benefit of such of them as may find this method inconvenient or unprofitable, the sub-committee have arranged with the Canadian Pacific Railway Company to use as a temporary quarantine station a tract of 125 acres belonging to that company at Gretna. The only expense attached to the acquisition of this land will be the payment to the present lessee of the value of the fence which surrounds the tract, about $175. This tract may not be of sufficient

area to accommodate all these settlers' cattle entering the country *via* Gretna, which will require to be quarantined during the season, but as soon as its capacity has been reached, it is proposed to send the cars containing such animals from Gretna along the south-western branch of the Canadian Pacific Railway to Estevan, and unload them at the quarantine station at that point, which can be accomplished without breach of the regulations.

"The sub-committee propose that the care, feeding and watering of the animals during the period of quarantine shall devolve upon, and any expense that may be attached to the same shall be paid by the Government of Canada. It will also be necessary to make provision for the branding and registration of the animals on arrival, so that upon the expiry of the ninety days, if in a condition to be released, there may be no difficulty in allotting them to their proper owners, and any expense attending the same shall be paid by the Government of Canada.

"The sub-committee are agreed in the opinion that it would be desirable in the public interest that the mounted police force should be utilized for this work, and clothed with the necessary authority to act on behalf of the Department of Agriculture and the Department of the Interior jointly.

"The sub-committee state that what would have to be done in order to carry out this recommendation would be to place certain officers of the force selected for that purpose in charge of each of the quarantine stations, with a detachment of sufficient strength to properly care for the animals, the number of men to be fixed from time to time as necessity may dictate.

"This might involve, the Comptroller of the force computes, the withdrawal of some fifty officers and men from various points to the north where they are now performing ordinary police duty. The advantages of this arrangement would be, first, that it could be carried out at a cost to the Government much less than it could be in any other possible way; second, that there would always be a reserved force of men to draw upon if circumstances made it requisite; and third, the fact of this service being under the control of the mounted police (a semi-military force) would tend to create greater confidence on the part of the British Government in the enforcement of the quarantine west of Lake Superior than if it were managed by any purely civil branch of the public service. The veterinary department of the force, as at present constituted, would probably not be equal to the additional duty involved by this recommendation, but this arm of the service could without difficulty be recruited when necessary from the ranks of professional men resident in the vicinity of the various quarantines.

"The sub-committee also are agreed in the view that any additional expense which may be involved in the proposition made in the next preceding paragraph, including the services of additional veterinary surgeons should be defrayed from the respective appropriation at the disposal of the Minister of Agriculture for quarantine, and of the Minister of the Interior for immigration. The proportions in which the expenditure should be allotted to the respective departments it is impossible at the present time to indicate, but the sub-committee are satisfied that the Minister of Agriculture and the Minister of the Interior will have no difficulty in arriving at an equitable adjustment of this question.

"The sub-committee report that a verbal arrangement was arrived at between Mr. A. M. Burgess, Deputy Minister of the Interior, and Mr. George Olds, the traffic manager of the Canadian Pacific Railway Company, in Montreal, on Saturday, the 25th February ultimo, to the effect that the company will do whatever may be possible on their part to assist in carrying this scheme into successful operation, including the furnishing of 125 acres proposed to be utilized at Gretna; and it was specifically agreed that settlers' cattle, brought in by way of Gretna, destined for points in Manitoba, the North-west Territories and British Columbia, which previously were booked direct to the point of destination, will be forwarded by the company from Gretna or Estevan as the case may be (after the expiration of the 90 days' quarantine) at the same rate as if the car-load had at first gone direct to the point of destination. It was, however, understood between Mr. Burgess and Mr. Olds that, in regard to any animals carried to the quarantine station at Estevan as settlers' effects, which might be relieved before the completion of the Pasqua branch

of the Canadian Pacific Railway, and which might be destined for points west of Brandon, the Government would, by aid of the North-west mounted police, unless the owner of the cattle objected, undertake to drive the animals across the country by easy stages to the nearest station on the Canadian Pacific Railway, so as to save the very long extra haul which would be involved if the railway company were compelled to carry them eastward by the Souris branch to Kenmay and back again to Pasqua by the main line.

"The committee concurring in the above report recommend its adoption."

(Sgd.) JOHN J. McGEE,
Clerk of the Privy Council.

PAY OF IMMIGRATION AGENTS AND THEIR FIELDS OF LABOUR.

Q. How are the agents in Dakota and the other States paid?—A. They are paid at the rate of $75 per month.

Q. Regardless of the number of immigrants they send over?—A. It is not possible to pay them on the basis of results.

Q. The $75 a month includes travelling expenses?—A. No. Travelling expenses are allowed in addition.

By Mr. Smith (Ontario):

Q. Are the agents allowed hotel bills besides?—A. We make an allowance of $2.50 per day for hotel expenses.

Q. Have you found any of the agents who have not been a success, and have discharged them in consequence?—A. They have had varied success.

Q. And have you discharged any who have not come up to the mark?—A. Yes. Some have been unsuccessful, and we have dispensed with their services.

By Mr. Roome:

Q. Do they work promiscuously in each state, or is there a plan agreed upon? A. Generally a programme of work is arranged. The superintendent, Capt. Holmes, has visited them all this spring.

Q. Do the agents report to him or to the department?—A. They report to him.

Q. I understand that in Michigan two or three agents have reported on the same thing?—A. Not that I am aware of.

Q. The information came to me that they were making different railway arrangements?—A. None have authority to make arrangements with the railway companies. All that is done by the department.

Q. Well, I was informed that conflicting arrangements had been made?—A. I do not think that there has been anything of the kind since the immigration service has been under the charge of the Interior Department. There may have been a little friction or confusion at the beginning.

Q. No; I have heard that this has taken place in the last three or four months? —A. That is not the case. None of the agents can make any arrangements with the railway companies. There would be a chaos if that were allowed.

By Mr. McDonald (Assiniboia):

Q. Is the Government assisting these immigrants from the States in any way? —A. No, sir.

By Mr. Wilson:

Q. I notice that in the Auditor-General's Report it is stated that you have been feeding some of them? That is practically assisting them?—A. That must have been last year. I know of no circumstance of that kind since I have been in charge of the immigration business. There may have been an exceptional circumstance to

justify the supplying food in some particular instance, but if so, I am not aware of the fact.

Q. What district in the North-west are you sending them to, particularly ?—A. They are allowed to go where they like.

Q. But you have a special part which you send them to, I think ?—A. Oh, no, they select their own location.

Q. Speaking of assistance to them, do you not have houses built for emigrants, when they get to the end of their journey ?—A. We invariably make provision of that kind, at important points, either by buildings or tents.

Q. Do you not in every place in Manitoba and the North-west put up Government buildings, in which to house immigrants ?—A. Not at every place. We have them at all important points in Manitoba and the Territories.

Q. Can you tell me where they are ?—A. Yes. At Winnipeg, Brandon, Regina, Qu'Appelle, Prince Albert, Whitewood, Calgary and Edmonton.

Q. It is part of the Government's policy to put up this accommodation ?—A. It has been in the past, but I would not say it is part of their policy now, because we find, in consequence of the changes in the direction of settlement, those sheds suitable for a year or two. There is a rush to one particular place for a season or two, and then the immigrants leave the line of railway at other points.

By Col. Tyrwhitt :

Q. What success have you had in repatriating French Canadians ?—A. I consider we have had fair success.

Q. Are they returning to Quebec, or are they going to the North-west ?—A. We have no trace of those returning to Quebec. The Quebec Government is looking after them, but there is a considerable number going to Manitoba and the North-west Territories.

By Mr. Roome :

Q. In each State, every agent corresponds directly with Capt. Holmes ?—A. Yes.

Q. He controls the men in the States ?—A. Exactly.

IMMIGRATION FROM THE U. S. IN 1892.

By Mr. Carpenter :

Q. How many immigrants were brought in from the United States last year—how many all told ?—A. The annual report shows the exact number that took up homestead entries last year. There were 513 actual entries by heads of families.

Q. That number would represent about 2,500 or 2,600 people ?—A. About that. These figures, of course, only relate to those who took up homesteads, but we have good reason to believe that the immigration from the States was much larger than the homestead entries indicate. Some bought land from the railway companies; others purchased and rented from private individuals. It is quite impossible to keep such accurate track of those coming in as to state with definiteness what the number is.

Q. The agents should know all about them ?—A. They send us the numbers, but I could not say that the returns are altogether to be relied on.

By Mr. Roome :

Q. Well, if your agents cannot be relied upon they ought to be dismissed ?—A. It is not a question of non-reliabilty on the part of the agents, but there is difficulty in getting absolutely correct returns. Perhaps next year we may be able to organize this part of the business a little better, so that we may get approximately accurate returns.

By Mr. Carpenter :

Q. You are looking forward to a large immigration this year ?—A. Yes, I anticipate that there will be a large immigration.

By Mr. McDonald (Assiniboia):

Q. Would it be possible to ascertain how many out of the 513 immigrants from the United States who took up homestead entries have returned to the United States?—A. None have returned to the United States so far as we know.

Q. It will be difficult to find that information out?—A. I may say this to the committee, that I am confident there are quite a number of people from the United States in the country now, who have not taken up homestead entries. One of our surveyors found forty of such in one township last year.

By Mr. Wilson:

Q. Last year did you do anything in the eastern states?—A. We made what you might call a commencement. We could not expect any great results yet from what we did last year.

Q. Have you great hopes of results from the eastern states?—A. Yes.

Q. And from New York?—A. I would not like to say "great," but very good. The man who is there reports that the farmers are in the mood for leaving.

Q. I had a conversation with a man in town here and he seems to think there are the best prospects of a large immigration from the eastern states?—A. Yes.

Q. How many men do you say you have working in the eastern states?—A. We have seven in the New England states and one in northern New York.

Q. How many have you altogether in the states now?—A. Twenty-six.

By Mr. McLennan:

Q. Do you mean that these reports are not correct about how many would come from the United States?—A. I would not like to furnish the number from memory. The form in which we get the information is not so perfect as I would like it to be.

Q. How would the number last year compare with the year before?—A. The increase is very marked as compared with the year before.

By Mr. Cargill:

Q. Had you as many agents there the year before?—A. Quite a few, but not as many as we have this year. We have increased the number by nine or ten.

By Mr. Wilson:

Q. You are spending quite a large amount of money in that?—A. We calculate to spend $50,000 in the United States this season.

Q. None of that is to go to help people to move?—A. No, not a cent of it.

By Mr. Carpenter:

Q. Have you any idea what number were brought in last year from the European countries?—A. The annual report states the number.

IMMIGRATION FROM EUROPE.

By Mr. Roome:

Q. What is your policy for bringing them from the old country?—A. I will just deal with that general question now, if you will allow me. A meeting of the Canadian and European representatives of the St. Lawrence steam-ship lines and the railway companies was held in Montreal in November last. I was invited to be present to listen to, but had not to take any part officially in the proceedings. A series of resolutions was passed at that meeting having relation to European immigration, which I would like to read to the committee. The first reads:

"That the booking agents in British Isles who can, to a very large extent, influence immigration, be paid commission to the extent of not less than $1.75 per adult ticket, and proportionately on children's ticket, by the Government of Canada, in addition to the commission already paid them by the transportation companies, so as to at least equal the commission at present allowed by some of the other colonies. That the present plan of commission payment on actual settlement

being uncertain, is not desirable to the booking agent, and does not enlist that interest in Canada desired, and that to secure payment of a commission, on booking, it is recommended, should same be necessary, that the payment of the bonus at present allowed to the settler be discontinued."

I am pleased to be able to tell the committee that the first part of this resolution has been acted upon favourably. The High Commissioner pressed it very strongly from the other side of the Atlantic, and Mr. Daly, when he became Minister, pressed it equally strongly upon his colleagues. The consent of the Government was accordingly obtained to give the system a trial. The only objection to which it can be open is that after the immigrants are brought to the central point agreed upon, which is Winnipeg, you are not quite sure they will all remain in the country. There is a possibility that they may filter through to the United States, and we might thus be paying agents bonuses for people who did not remain in Canada at all. Since we only pay $1.75 for each head of a family and proportionately for children, instead of $5 for each head of a family who takes up a homestead and proportionately for children, the conclusion we came to was that we could even afford to lose some and still profit by the change. On the other hand, there are 5,000 of these agents working in Great Britain and Ireland, and since they seemed to be so unanimous in their desire that matters should be arranged in this way—in other words, since they were agreed that one bird in hand was better than three in the bush—it was decided to give the system a trial.

If it is found to work disadvantageously in any way, the Government can stop it at any moment, and resort to the old plan of paying by the number of people who take up homesteads. The agents complained that as the homesteader has no interest in satisfying the Government after he arrives on this side that the agent is entitled to a bonus on his account, and, as a matter of fact, in many instances, did not come forward to give the necessary proof, the returns the agent received were so small and so little to be depended upon, that the bonuses practically afforded very little encouragement. The amount of $1.75 was agreed upon as the bonus because that sum, when added to the commission paid to the agent by the steam-ship company, afforded the same return from the sale of a ticket to an emigrant for Canada as the agent would get if he were selling a ticket to the most remote Australian colony.

By Mr. Roome:

Q. There is nothing for the immigrant at all, then?—A. The system of giving a bonus to the settler on taking up a homestead has been adhered to by the Government—that is, $10 for the head of the family, and $5 each for the wife and all the children of ocean adult age.

Q. Do you think they would not come if they did not get this?—A. The evidence upon that point is not very direct but Sir Charles Tupper appears to think it is having a very good effect on the other side: we must look to him for advice upon a question of that kind. His opportunities of judging are of the best.

By Mr. Wilson:

Q. I think the department would have a better knowledge than Sir Charles Tupper?—A. Every effort will of course be made to find out the effect of this bonus upon the general question. The $10 for the head of the family, amounts in reality to a rebate to him of the homestead fees.

Q. You only give that to the foreigner from Europe, the Canadian is at a discount of about $10.—A. No. The disadvantage is the other way. The bonus granted to the settler will not equal the difference in the cost of getting to the North-west from Europe and from Canada and the United States respectively.

By Mr. McLennan:

Q. We have no interest in moving Canadians from one part of the country to the other?—A. No; none whatever.

IMMIGRANT RAILWAY FARES C. P. R. AND I. C. R.

By Mr. McGregor:

Q. Do the C. P. R. people act with you?—A. They reduce the rates to the lowest figure they say they can carry the people for, and act in concert with us in that way.

Q. And with your agencies in the old country?—A. Yes.

Q. Do they stipulate that the settlement must be in any portion of the North-west or Manitoba?—A. They stipulate that the settlement shall be in Canada somewhere.

Q. That the immigrant leaving the old country must settle within certain range of their railways?—A. They grant reduced rates to immigrants intending to settle in Manitoba or the Territories, but they make no stipulation as to the land upon which the immigrant is to settle or as to the locality. They are perfectly satisfied if he goes to Manitoba or the Territories.

Q. They can settle anywhere in these districts?—A. Yes.

Q. That is encouraging?—A. With a view of enabling the department to pay the British booking agents promptly on the arrival of the emigrants the authorities of the Canadian Pacific Railway and the Intercolonial Railway have consented to the addition of a coupon to the tickets which they give to the immigrants on their arrival at Quebec or Halifax, as the case may be, which will be collected by the Canadian Pacific Railway conductors during the last collection made before reaching Winnipeg. These coupons will be returned to us as proof of the arrival of the immigrants on account of whom the agents are entitled to the bonus.

IMMIGRANT STEAM-SHIP RATES—A RISE.

By Mr. McGregor:

Q. There was a report some days ago that the steam-ship companies had decided to raise the rates for carriage of steerage passengers to this country. Have you anything official about that?—A. It is true that the steam-ship companies have increased the immigrant rate by £1 sterling, but not specially as against Canada. This increase affects the whole North Atlantic business; it includes the United States as well as the Dominion. I may say in that relation that when my Minister, Mr. Daly, heard of this action having been taken he at once entered, as did the High Commissioner, an emphatic protest with the steam-ship authorities on both sides of the Atlantic, but so far this protest has been ineffectual. The steam-ship companies say, and it must be stated in their defence, that their business has been a losing one for some years past, and that if they are prevented from making this increase at the present time, a considerable number of the lines would be wiped off the Atlantic ocean. We think that with the splendid prospects for immigration this year, the increase in rates is a mistake, and we have so stated. I do not know, however, that it is in our power to do anything more.

Q. I think this committee is entirely in accord with the Government and desirous of assisting them in every way possible to get immigrants into this country. We want to build up the North-west and the best way to do that is, of course, by peopling it. I would suggest that a small committee be appointed to consult with Mr. Daly and Mr. Burgess, to see what steps could be taken towards assisting the Government in its immigration work. I think we ought to strengthen the hands of the Minister as much as possible?—A. It might be of some importance to hear what Mr. Daly has been doing in this direction. His appointment, as you gentlemen are aware, only came shortly before the session of Parliament, and he has been very much pressed with work since then, but he has devoted a good deal of attention already to immigration matters. May I say this on the question of population? I presume it is a fact well known to every member of the committee, at any rate it is well known to the medical men, and they can speak of it with greater authority than I, that the withdrawal of normal immigrants from European countries does not signify that the population over there decreases to that extent. It is a curious fact

that Iceland, for example, has shown itself capable of maintaining only about 70,000 people. There are annually large drains on the population of that Island, and yet the population is never any less on that account. We have between fifteen and twenty thousand Icelanders in our own North-west, and there must be quite as many in the United States. Despite these heavy drains, the population of Iceland has not decreased. The mere fact of emigration going on has not had the effect of reducing population in European countries.

By Mr. Roome:

Q. It has in Ireland?—A. Oh, yes, I acknowledge that; but the circumstances there have been altogether exceptional, and the results in every way abnormal.

Following up what I commenced to say as to the action already taken by Mr. Daly, I may mention that Mr. E. J. Wood, a practical farmer from Southern Manitoba, who was at one time a member of the legislature there, and who may be known to some gentlemen of this committee, was sent over to England to follow up by more direct personal intervention the work which is being done in the rural districts by occasional lectures, and by the pamphlets which are distributed by the regular departmental agents, Mr. Dyke, of Liverpool, and Mr. Down, of Bristol. I believe it is Mr. Daly's intention to pursue in England this method of promoting immigration to a still greater extent as soon as he can lay his hands upon the right men for the work—men of the stamp of Mr. Wood—good practical farmers, having the capacity to convey their ideas and experiences in an intelligent and attractive way to the people among whom they go. In addition to Mr. Wood, there are four temporary agents in England, practical farmers, also from Manitoba and the North-west Territories, who are expected to spend the winter among their friends, convey to them the results of their experiences, what they had when they came to the country, what they are worth now, &c. Interest in Canada as a field for settlement is every now and then worked up in a particular locality by a lecture delivered by some clergyman or other person of good standing in the community who has visited Canada, and takes enough interest in this country and in the welfare of his fellow creatures to tell them what he knows about it. When local interest has been thus aroused, it is thought to be wise to follow it up by the work which men known in that community, who have removed to, and had success as farmers in Canada, alone, can do.

In Scotland, Mr. W. G. Stuart, who is well known to a good many of the members of this committee, has been appointed to promote in the same lines emigration from the north of Scotland; and Mr. Peter Fleming, who was for twenty-five or thirty years selecting agent in Scotland for the Australian colonies, has been appointed to do the same class of work in the south of Scotland. These gentlemen have not the intimate knowledge and practical experience of Canada that Mr. Wood has, but they are men of very great influence in their respective spheres in Scotland, and Mr. Stuart, as you know, spent a whole year in this country, living among the people, especially the people of Highland descent, in every settlement from the Atlantic to the Pacific. He spent the whole of last winter in the North-west, and he is able to speak with authority regarding that country, particularly, regarding the Winter, which is a kind of bugbear to the people on the other side. Both these gentlemen are engaged for one year, the continuance of their engagement to be dependant upon their success, and that cannot be judged of until next season. There may be some fruit from their work this year, but it is not likely to be appreciable until next season.

By Mr. Wilson:

Q. How long have they been there?—A. They commenced in the month of February. Then Mr. Auguste Bedard, a native of France, who has been in Canada for sixteen or seventeen years, who has lived in the County of Essex, and has been in the North-west, and is a very intelligent and enterprising man, has been sent to France and Belgium. We have had quite a number of settlers from both countries during 1892, as the report of the Department of the Interior will show. Then,

there are two practical men in Norway and Sweden, one in Denmark, and we have Mr. Baldwinson, Icelandic agent, in his own country, following up the work he has been doing during the past ten or twelve years. The prospects are that there will be a large Icelandic immigration during the coming season.

The Government of Manitoba are apparently sending an agent there, too. Mr. Daly has taken great care to impress upon the authorities of Manitoba and the North-west the inadvisability of duplicating work and wasting power and money by sending agents into the same localities as the Department of the Interior, and I think if the Government of Manitoba proposes to occupy the Icelandic field, the Dominion Government will withdraw Mr. Baldwinson altogether. Not only is there waste of power and money, but there is great risk of clashing and conflict between the agents operating in the same field if they are not all under the same instructions and obtain their authority from the same source.

By Mr. McGregor:

Q. The Dominion of Canada is all we want?—A. That is all we want. So long, however, as the Icelanders go to Manitoba we are perfectly satisfied, and the occupation of the field by the Government of the province may result in the withdrawal of Mr. Baldwinson, who has been doing excellent service during the last nine or ten years, and apparently he has been doing the same this winter.

Then, there is Mr. Ritchie, a Scotchman, who of late years has lived and farmed in Essex, who visited Canada last summer, got transportation facilities from the Canadian Pacific Railway and an allowance from the department for expenses, and has been delivering lectures in England and Scotland on what he saw here. He furnished an excellent report upon his trip, which we had printed, and 10,000 copies have been circulated on the other side of the Atlantic. Mr. Ritchie is practically doing his work for the love of it. He has taken a farm himself in the vicinity of Winnipeg, and intends to settle there. Then Mr. Thomas Moore, the editor of *Land and Water*, paid a visit to Canada last summer, and we have arranged with him to publish a series of articles in regard to Canada's agricultural resources in his paper, which is a high authority, and will reach the class of people Mr. Cargill is referring to—people who have capital. I must confess I think our best hopes of success have relation to people of comparatively small means rather than to those possessed of large capital. People who have plenty of money and are doing well where they are have ties to bind them to their native country of a kind we do not clearly understand on this continent. We are accustomed to moving long distances with great liberty, while in Great Britain they are accustomed to be confined in a comparatively small space, and they do not change their place of residence with the same facility as we do here. A man who has plenty of money and good prospects for himself and his children is much less likely to move to another country than is a man with a lighter purse and poorer prospects. There are exceptions, as we all know, but I am speaking now of the general rule.

By Mr. Cargill:

Q. How do you account for so much capital going to the United States from foreign countries and seeking investment?—A. That is a matter not of investment. The people emigrating placing their capital in the United States do not go with it themselves as a rule. Just as soon as our country is populated, just as soon as we have large centres of population sprung up, British capital will come here for investment as freely as it does to the United States, without doubt.

By Mr. McDonald (Assiniboia):

Q. How many agents have you at work in Europe?—A. There is the High Commissioner's office at London, the Liverpool agency and the Bristol agency, in England, the Glasgow agency in Scotland, and the Dublin and Belfast agencies in Ireland. In addition, there are the two special agents in Scotland, Mr. Fleming and Mr. Stewart, to whom I have already alluded; in England, Mr. E. J. Wood; and

Mr. Bedard in France and Belgium. A number of temporary agents, practical North-west farmers, have gone over for this season. Of these, there are four in England, four in Ireland, two in Scotland, two in Norway and Sweden, one in Denmark and one in Iceland. Then Mr. Ritchie is delivering lectures in England and Scotland, and besides these we have a number of lecturers, who are employed from time to time by the High Commissioner. They are supplied with carefully selected and scientifically prepared Canadian views with which to illustrate the lectures. Many such lectures are delivered free of expense, chiefly by clergymen who have visited this country and have been impressed with its advantages.

By Mr. McGregor:

Q. What facilities have you for keeping track of those who come into this country? The Deputy Minister of Agriculture, the last time he was before this committee on immigration business, stated that 834,000 people came here in ten years, but when the census came down we were greatly disappointed at the figures. Are you keeping track of those coming in?—A. No. If you look at the annual report, you will find that one of the first conclusions I arrived at when the immigration business was handed over to the Interior Department—a conclusion which, I may say the Government concurred in—was that to attempt to keep track of the people going to and fro in such a country as ours, with the enormous boundary line we have, would be useless, or at best misleading.

Q. Every time Mr. Lowe came before the committee we were met with the statement that so many were coming in. We ought to be encouraged in a matter of this kind?—A. Well, I took the ground, in my report to the Minister of the Interior, that the decennial census is the only true indication of the number of people in Canada. To try to keep track of those coming in and those going out would, to my mind, be practically like trying to count the sands of the sea. With great hesitation I ventured in this matter to differ from Mr. Lowe, who has had a long and valuable experience; but holding the views I did, I felt bound conscientiously to say so to the Government.

There is one other question which was passed upon by the Transportation conference to which I have alluded, in addition to a resolution about the desirability of exchanging proofs of pamphlets and using illustrations in common, by which a considerable saving in money and time will be effected, and this had relation to a topic to which I made some reference in my evidence before this committee last year. The resolution adopted at the conference speaks for itself:—

"That it is desirable that an experiment be tried which has met with considerable success in the settlement of other colonies, namely, the establishment of a colonization Bureau in Europe representing the Canadian Government and the steamship and railway companies for the furnishing of transportation in whole or part to a specified number (300 suggested for 1893) of desirable settlers and their families, the conditions of selection after personal inspection by the Bureau being:—

"That they shall be married and have families,

"That they shall have been engaged in agricultural pursuits, at least three years prior to the selection,

"That they shall be of good temperate and industrious habits,

"That they shall be in good health,

"That the cost of transportation shall be borne one-half by the transportation companies and one-half by the Canadian Government,

"That the same plan be adopted in connection with a specified number (500 suggested for 1893) of unmarried female domestic servants, between the ages of 18 and 30 years. The Canadian Government to take care of these servants on arrival in Manitoba until placed in suitable service."

This resolution, as you may suppose from my evidence last year, has my personal sympathy. It has not yet been acted upon by the Government, but Mr. Daly is in communication with the High Commissioner with the object of ascertaining his views on the subject.

By Mr. Roome:

Q. These female servants would be as serviceable in Ontario as in Manitoba?—A. Certainly. I may remind the committee, however, that this is a proposal for which the Government is to no extent responsible. Whatever is done, if anything is, is sure to conserve the interests of all parts of Canada.

By the Chairman:

Q. Has any attempt been made to bring male and female servants to the older provinces?—A. Yes. We are offering a bonus of $5 for every female servant of good character and between the ages of 18 and 30 years, brought out to Canada by Mrs. Burt.

By Mr. McDonald (Assiniboia):

Q. Have you had any immigrants from France?—A. Yes, the annual report shows that we had quite a number. The committee will observe that in the annnal report, we have submitted a table showing the nationality of every man who made a homestead entry last year.

By Mr. Cargill:

Q. Is there any prospect of the transportation companies accepting these terms?—A. The companies would accept them quite readily, as the proposals are their own. The question is whether the Government will accept them or not. I may remark that there were 107 entries made by Frenchmen from France last year, and 54 by heads of families from Belgium.

By Mr. McDonald (Assiniboia):

Q. I think we ought to devote more attention to European countries, rather than to the United States?—A. The bulk of those who have come in this year from the United States are not returned Canadians. They are all of European nationalties, as well as natives of the United States, and I take the liberty of referring the committee to the observations I have offered in the annual report upon their superiority as a class, and the advantages over ordinary European immigrants under which they commence life in our North-west. Out of 513 entries made by persons from the United States, only 92 were made by returned Canadians. With regard to the work in Europe, I think I ought to remind the committee that we labour under very great difficulties in carrying on that work in some of the nothern countries from which our best settlers are drawn. The best men whom we can send over are the men who have been successful here. It is essential that they do their work among their friends with great care, in order to avoid any breach of the immigration laws. You will, therefore understand that you have not only to send home men who have been successful as farmers in Canada, but men also of judgment who will get neither themselves nor the government into trouble. The laws of Germany are particularly stringent in this respect. With regard to the work in the United States, I may state that the obligations of the government in respect of agencies are not of a permanent character. Our agents may be withdrawn from the States at a day's notice.

Having examined the preceding transcript, I find it correct, in so far as my own evidence is reported.

(Signed.) A. M. BURGESS,
Deputy Minister of Interior.

MAP REFERENCES.

TABLE OF DISTANCES showing the superior commercial advantages of leading Canadian seaports as compared with the chief seaports of the United States, in relation to the geographical position of the Canadian ports to Liverpool regarded as the central commercial port of Great Britain; the more favourable geographical position of the latter ports to leading Asiatic seaports; and the superior facilities possessed by Canada for Trans-Continental communication between the United Kingdom and Asia.

—	Canadian Ports.	U. States Ports.
	Miles.	Miles.
To LIVERPOOL from :—		
North Sydney, Sydney Harbour, *via* Cape Race	2,280	
Halifax *via* Cape Race	2,480	
St. John " "	2,720	
Quebec " Straits of Belle Isle	2,650	
" " Cape Race	2,850	
Montreal " Straits of Belle Isle	2,800	
" " Cape Race	3,000	
Boston " "		2,890
New York " "		3,130
Philadelphia " "		3,180
Baltimore " "		3,360
To ASIATIC PORTS :—		
Vancouver to Yokohama	4,283	
San Francisco to Yokohama		4,880
Vancouver to Hong Kong (direct)	5,936	
San Francisco to " "		6,482
Boston to Yokohama *via* shortest U.S. Ry. route and San Francisco		8,277
" to Hong Kong *via* " " "		9,879
New York to Yokohama " " " "		8,151
" to Hong Kong " " " "		9,753
Montreal to Yokohama " *C.P.R. and Vancouver	7,189	
" to Hong Kong " " "	8,842	
Halifax to Yokohama " " "	7,945	
" to Hong Kong " " "	9,598	
Toronto to Yokohama " " "	7,052	
" to Hong Kong " " "	8,705	
FROM LIVERPOOL TO :—		
Yokohama *via* Halifax, C.P.R. and Vancouver	10,425	
Hong Kong " " " "	12,078	
Yokohama " Montreal " "	9,989	
Hong Kong " " " "	11,642	
Yokohama " New York, U.S. Ry. shortest route and San Francisco		11,281
Hong Kong " " " " "		12,883
INTER-CANADIAN DISTANCES :—		
Halifax to Vancouver *via* Canadian Pacific Railway	3,662	
Quebec " " " "	3,078	
Montreal " " " "	2,906	
Toronto " " " "	2,769	
Winnipeg " " " "	1,483	
Montreal to Toronto " " "	344	
Quebec to North Sydney *via* I.C.R., through mail line to Atlantic Ocean	820	

*N.B.—The Canadian Pacific Railway forms the great Canadian through trans-continental line of communication, extending from the Atlantic to the Pacific Ocean for a distance of over 3,000 miles of an unbroken line, under one management throughout.

Government Railways in Canada, the I.C.R., &c., 1,397 miles.