The Commonwealth of Massachusetts

Department of Animal Industry

Sixth Annual Report

of the

Commissioner of Animal Industry

November 30, 1917

Public Document No. 98

SIXTH ANNUAL REPORT

OF THE

COMMISSIONER OF ANIMAL INDUSTRY.

1917.

FOR THE YEAR ENDING NOVEMBER 30, 1917.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
32 DERNE STREET.
1918.

PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

Committed to Bureau of Industry
May 29 1918

1917

The Commonwealth of Massachusetts.

Department of Animal Industry,
Boston, Dec. 1, 1917.

To the Honorable Senate and House of Representatives.

In accordance with the provisions of section 4, chapter 608, Acts of 1912, I have the honor, as Commissioner of Animal Industry, to present the report of the Department's work for the year ending Nov. 30, 1917.

The Department of Animal Industry is charged with the duty of inspection and examination of animals within the Commonwealth; the quarantining and killing when necessary of animals affected with, or which have been exposed to, contagious disease; the burial or other disposal of their carcasses; the cleansing and disinfection of districts, buildings or places where contagion exists or has existed. It is also charged with the duty of tuberculin testing all neat cattle shipped from other States to Massachusetts, unless the same are intended for immediate slaughter, or are accompanied by a record of test made by a veterinarian approved by the livestock official of the State from which they are shipped, and the record is accepted by the Commissioner on arrival of the animals.

The control and eradication of contagious diseases among live stock constitute an important economic factor in the material prosperity of many citizens of the Commonwealth. They are also very necessary to successful agriculture, and are closely related to the maintenance and protection of the public health, for the reason that many diseases affecting animals are communicable to the human subject. Our dependence upon domestic animals for food material calls attention to the importance of the Department's work in reducing the number of cases of bovine tuberculosis, the prevention of diseases among swine, the repression of glanders in horses, of rabies in

dogs, and of various other diseases common to animal and man, and in the present emergency of war it has a special relation to the conservation of food.

The prevalence of contagious disease among animals whose carcasses if healthy would be utilized for food operates to reduce the available supply, and when we consider that the carcasses of half a million animals were condemned in the United States during the year 1916 as unfit for human food, we realize what a large part contagious disease among live stock plays in increasing its cost. If tuberculosis affecting cattle and cholera affecting swine (taking these diseases as examples) were entirely stamped out, half a million carcasses would be yearly added to the food supply, together with many others whose production the saving of that large number of animals would make possible.

Early in the present year the relation of our work to the successful prosecution of the great war was realized. It seemed that one great problem to be solved in this country was the production of food in sufficient quantities not only to maintain our own people at home and our armies to be sent abroad, but also the production of immense additional quantities for exportation to our allied countries, necessary to them in the maintenance of their armies and their civilian populations, which already were being restricted in their use of many different kinds of food, and especially of animal food.

Our conception of this Department's duties in this emergency was that of being especially watchful for the appearance of any condition operating against the continued propagation of food-producing animals in this Commonwealth, and also of doing everything possible to increase the amount of animal food products usually available under normal conditions. To this end, therefore, we considered that our activities should be specially employed in the carrying out of measures for the prevention of diseases in live stock, and in persistent control of such contagious diseases as were then prevalent.

Beef and pork being the kinds of animal food the conservation of which is especially necessary at this time, the Department has been striving to improve the conditions under which neat cattle and swine are kept, and to control and if

possible eradicate the diseases most prevalent among them, namely, tuberculosis affecting neat cattle and cholera affecting swine.

The prevalence of contagious or infectious abortion in Massachusetts herds is of very great concern to owners of cattle which are kept for the production of milk and for the raising of pure-bred stock. It is estimated by the Bureau of Animal Industry of the United States Department of Agriculture that this disease with its attendant conditions is costing the cattle owners of the country more than $20,000,000 a year by decrease in the amount of dairy products and the non-production of animals. In economic importance it is second only to tuberculosis, and investigation as to its prevalence in Massachusetts discloses the fact that we are suffering in common with other sections of the country. I think considerable progress is, however, being made in the study of the cause and development of this disease, and of the many correlating physical conditions affecting or influencing its development. Effective measures in prevention seem at the present time to be limited to regular and thorough disinfection of barns and places where susceptible animals are kept; antiseptic treatment of pregnant animals approaching, during and following parturition; destruction of all material which might carry infection; and prophylactic treatment of all male and female animals at the time of breeding. This Department is prepared at the present time to make laboratory examinations of material submitted for the purpose of diagnosis, and is experimenting in a small way in the production of a vaccine for use in preventive treatment. Our work in this direction, however, has not yet been sufficiently extensive to warrant an unqualified opinion as to the effectiveness of the product. The United States Bureau of Animal Industry is continuing its investigation as to the cause, mode of dissemination and proper treatment of this condition, and we have reason to believe that its continued work in this direction will finally result in finding additional practical methods of combating this menace to the dairy industry of the country.

The importance and necessity of a laboratory organized and equipped for the special work of this Department has very

plainly presented itself during the past year. The development of the Department's work in connection with contagious diseases of animals has led us into many different kinds of special work which can only be done in a laboratory. Many conditions arise with which we are unfamiliar, prompt diagnoses of which are important in order that plans to be followed in disease control may be properly formulated. The services of a trained bacteriologist and pathologist under direct supervision of the Commissioner should be promptly available in such cases. We are fortunate in having among our agents one who has had special training along this line, and who, although having direct supervision of an important branch of the work of the Department, has nevertheless been able to serve us efficiently in the capacity mentioned. A wide experience has made him perfectly familiar with field conditions, and on this account he is especially valuable in this work. A room has been kindly furnished us by the Harvard Medical School, rent free, in which more or less work has been accomplished during the past few months. We have been able not only to examine many specimens submitted for diagnosis by agents of the Department and private veterinarians, but also to prepare special biological products, such as tuberculin and mallein, for use in special emergency cases, and to do more or less experimental work looking to the increased value of the Department's efforts in the control and eradication of disease. It seems to me that the time is at hand when the importance and value of this particular branch of our service must be recognized and its development provided for.

The routine laboratory work of the Department in connection with diagnosis of rabies in dogs and glanders in horses is now being done for us by the State Department of Health. That department, however, while rendering valuable service in our routine work, is not equipped to render the special emergency service referred to above.

As it frequently happens that no person is acting as inspector of animals in a certain city or town, owing to death, resignation, or failure on the part of town officials to nominate, and during such period an outbreak of contagious disease occurs, an emergency thereby arises which requires the serv-

ices of a quarantining officer. I therefore recommend that the authority, powers and duties of the Commissioner, his agents and assistants, be enlarged to include the authority, powers and duties of an inspector of animals, in order that the public health and live-stock interests of the Commonwealth may be at all times protected.

An amendment of the section of the law relating to the quarantining of animals is recommended, particularly referring to the requarantining of animals which have been released on order of the Commissioner. An animal is released from quarantine only after careful examination by one of the Department's veterinarians, whose report is that in his opinion it is not affected with the disease for which it was quarantined. In order that owners of animals which have been so released may not be soon again subjected to the inconvenience and expense of quarantine restrictions, my recommendation is that the amendment shall provide that an animal so released shall not be requarantined during a period of thirty days immediately following such release, except upon order of the Commissioner.

Section 28 of chapter 90 of the Revised Laws, as amended, defines what diseases shall be considered contagious. Owing to the rapid progress in medical and sanitary science, in my opinion "contagious diseases," instead of being listed by common names applied thereto, should be defined as any contagious, infectious or communicable disease. If scientific investigation should suggest a change in the present nomenclature of communicable diseases, no act would then necessarily have to be passed in order that the wording of the law might be in strict accordance with the best usage of scientific terms.

The regulation of the transportation of interstate cattle to Massachusetts is one requiring constant attention by agents of the Department in order that violation of such regulations by unscrupulous persons may be prevented. In the majority of cases interstate shipments are made strictly in accordance with the provisions of the Department's orders relating thereto, the greater portion of the people engaged in cattle traffic being at the present time very well informed as to the requirements. Occasionally, however, we find persons engaged in the business

of trading cattle and driving them over the State line who have persistently violated our regulations, although well informed regarding them, and it then becomes necessary to take legal action against the offenders. During the past year we have adopted at certain border points severe restrictive measures applying to this traffic, on account of information received regarding violations, and in two instances it was found advisable to prosecute suspected individuals. In these two instances convictions of the guilty parties were readily obtained and substantial fines were imposed by the court, the result in both cases being an immediate and strict compliance with the orders and regulations of the Department.

The holding of the Eastern States Exposition in Springfield in October of this year was considered as of great advantage to our live-stock interests, and the management was early informed that this Department would render every assistance possible in making the exposition a success. Two agents of the Department were detailed for duty at the exposition grounds to assist in the identification and examination of horses and cattle shipped interstate to and from the exposition. The same service has been rendered at other large exhibitions of live stock, notably at Brockton and Worcester. Too much cannot be said as to the good effect of these exhibitions of high-grade animals. They are of great educational value to all observers, of great convenience to intending purchasers of pure-bred cattle, sheep and hogs, and must be considered a very great aid to the progressive development of our agricultural and live-stock interests. No cases of contagious disease appeared at these exhibitions, and the care of the animals and the sanitary conditions maintained were in every instance found to be above criticism, indicating very efficient management of these enterprises.

Tuberculosis.

The prevalence of tuberculosis in Massachusetts cattle has been extensive and widespread for many years, and until recently efforts to reduce its yearly toll have been somewhat discouraging. The finding of large numbers of tubercular animals every succeeding year, notwithstanding the killing of

many cases the year previous, proved that the general situation was not improving; that no substantial progress was being made in eradication of the disease.

The law provides that tuberculin cannot be used as a diagnostic agent on Massachusetts cattle except at request of owner. It therefore seemed necessary to advance to a higher efficiency the methods available for the purpose of diagnosis, to improve if possible the annual inspection of bovine animals which is made by town and city inspectors, and to make a more general application of the rule of the Department requiring physical examination by competent men of cattle exposed to tuberculosis.

Accordingly, in 1915 all agents of the Department engaged in the examination of quarantined animals were instructed, in the event of their finding tubercular animals in a herd, to immediately make a thorough physical examination of all the animals in the herd, and if any were found which could be suspected of disease to have them placed in quarantine and disposed of in accordance with our customary procedure. By these herd examinations additional cases have frequently been found which by former methods would not have been discovered, but would have remained as active centers of infection and continued to spread the disease. We have frequently found that a continuous prevalence of this infection has been maintained on certain premises for a long time. Tuberculous animals would be found at every successive visit to these premises, and eradication of disease at that point was not being accomplished.

As a result, however, of our improved methods, especially the examination of every animal in herds from which a tubercular member had been removed, we already find a distinct improvement in the situation. This result could not reasonably have been expected to appear until the changed methods had been in operation for a somewhat extended period, for the reason that the first effect would undoubtedly be an increase in the number of animals quarantined, as well as in the number finally disposed of as tubercular.

Physical examinations have been made by Department agents this year of 14,027 bovine animals, an increase of 2,584 over

the record of 1916, and notwithstanding the larger number examined a much *smaller* number were found suspected of disease. One thousand three hundred and eighty-two animals were put in quarantine this year, which, compared with 1,678 quarantined in 1916, shows a decrease of 17 per cent. The record of suspected animals reported (not all of them quarantined) from all sources, namely, by owners, inspectors of animals, veterinarians and agents of the Department, shows also a marked decrease, 1,885 having been reported in 1916 and 1,719 during 1917, a decrease of 8.8 per cent.

Post-mortem examinations are held on all animals condemned and killed on account of being suspected of tuberculosis, and the record of such post-mortem examinations of Massachusetts cattle during 1917 shows a reduction of 10 per cent. in the number of positive cases found. Another study of our statistics shows that whereas 12 per cent. of all cattle examined by Department agents during the year 1916 were found to be tubercular, that percentage this year has been reduced from 12 to 8, which certainly shows a rapid diminution in the prevalence of tuberculosis in the course of a single year among animals the majority of which have been examined physically.

Considering the decrease in one year of 8.8 per cent. in the number of cases reported from all sources, the decrease of 17 per cent. in the number of suspected animals quarantined, the decrease of approximately 10 per cent. in the number of cases found positive on post-mortem examination, and a reduction from 12 to 8 per cent. of cases found in the thousands of bovine animals examined by Department agents, I think it should be recognized that a marked improvement in the general situation is already taking place. At the same time, these records lead us to believe that our methods of control within the limitations imposed by law have been distinctly improved, and that the prevalence of bovine tuberculosis is susceptible of a certain degree of limitation if careful and repeated physical examination is made by competent men of all cattle exposed to the disease.

It is generally recognized by all scientific authorities that the tuberculin test carefully applied by competent veterinarians is the most accurate method of determining whether or not an animal is affected with tuberculosis; that it will dis-

close many cases not found by physical examination, and will reveal the existence of the disease in many animals not even suspected. The advantages of the tuberculin-test method of diagnosis are made use of by the Department in its work of eradication of tuberculosis, although its use on Massachusetts cattle is limited by law to animals whose owners consent to its application, and to such as have been reported as tuberculous on physical examination by a competent veterinarian. We find an increasing number of Massachusetts cattle owners requesting the application of the test to their herds by the Department, this service being rendered without charge. We find, also, that many more veterinarians than formerly are reporting results of tests made by them in a private capacity, and referring the cases of reacting animals to the Department for disposal. The Department tests all cattle arriving from other States at Brighton and all other points, which are not accompanied by a properly approved and satisfactory test record made in the State from which the animals are shipped, the testing of such interstate cattle being one of the important activities of the Department.

In July of this year the United States Department of Agriculture offered its assistance in the testing of pure-bred herds, in co-operation with agents detailed by our Department for the same service. This work, now being done by the United States Bureau of Animal Industry in co-operation with this Department, is directed toward the eradication of tuberculosis from the herds which supply breeding stock, and upon its successful accomplishment there is contemplated the establishment of a register or list of accredited herds of tuberculosis-free animals from which buyers may procure foundation stock without test at time of purchase, depending on certification by Federal authorities to the effect that the herd in question is not infected.

All of the different agencies mentioned — namely, thorough annual inspection by local town and city inspectors, followed by quarantine of suspected cases; careful successive physical examinations by competent men of infected herds, followed by slaughter of clinical cases; tuberculin testing by Department agents and by private veterinarians, followed by slaughter of the animals reacting to the test, or by complete isolation or

segregation; testing of all interstate cattle arriving at whatever points, followed by the killing of those not passing the test; eradication of disease from pure-bred herds by Federal authorities working in co-operation with this Department — contribute to a record of decrease in the prevalence of tuberculosis in Massachusetts herds. It is reasonable to predict that if these agencies are continued in force, and are efficiently and persistently applied, they will continue to lower the yearly toll of this insidious destroyer of animal life.

Following are various tables showing the extent of the work of the Department in connection with the control of tuberculosis in Massachusetts for the year ending Nov. 30, 1917: —

Massachusetts Cattle.

Cattle reported as diseased in 1916 disposed of in 1917,		27	
Cattle reported as diseased during the year ending Nov. 30, 1917,		1,719	
			1,746

Disposition.

Quarantined.

Reported by inspectors, Department agents, veterinarians, owners, etc. (20 reported in 1916, 1,382 in 1917),		1,402	
Condemned on physical examination (11 reported in 1916, 994 in 1917),	1,005		
Condemned on physical examination, no lesions,	10		
Permit to kill, lesions of tuberculosis found (3 reported in 1916, 36 in 1917),	39		
Permit to kill, no lesions,	41		
Died before action could be taken (1 reported in 1916, 30 in 1917),	31		
Released, not tubercular (5 reported in 1916, 266 in 1917),	271		
Awaiting action,	5		

Private Test.

Reactors reported on private tests (2 reported in 1916, 200 in 1917),		202	
Condemned on physical examination,	12		
Permit to kill, lesions found (2 reported in 1916, 133 in 1917),	135		
Permit to kill, no lesions found,	22		
Died before action could be taken,	1		
Released showing no clinical symptoms,	32		

Voluntary Request.

Reacting to so-called "voluntary request" tests (5 tested in 1916, 111 in 1917),		116	
Permit to kill, lesions found (5 of 1916 test, 104 of 1917),	109		
Permit to kill, no lesions found,	5		
Died before action taken,	1		
Awaiting action,	1		

United States Test.

Reacting to test made under supervision of United States,		26	
Permit to kill, lesions found,	26		
			1,746

The preceding table is a record of the actual disposition of cattle reported under the three headings of "quarantined animals," "reactors reported on private test," and "reactors found on so-called voluntary-request tests," while following is a tabulation of work actually accomplished under the voluntary-request test and reacting animals actually reported during the year 1917 by private veterinarians. The difference in the two tables referring to private tests is due to the fact that some of the cattle recorded in the 1916 report as being released were killed during 1917 on "permit to kill" form of warrants by request of the owners of the cattle, the cattle showing no clinical symptoms of disease.

Voluntary Request.

Premises on which tests were made,	28
Number of animals tested,	561
Number of animals tested more than once,	179
Number of reactors,	151

Disposition of Reactors.

Killed, lesions found,	109
Killed, no lesions found,	5
Died, no post-mortem examination made,	1
Killing order issued, not yet killed,	1
Awaiting action,	35
	151

Reactors reported on Private Tests.

Number of herds in which animals were reported,	92
Number of animals tested,	1,660
Number of reactors,	382

Disposition of Reactors.

Disposed of by owner, no record of post-mortem findings,	109
Condemned on physical examination,	12
Died, no post-mortem examination made,	1
Killed, lesions found,	125
Killed, no lesions found,	7
Showing no physical symptoms of tuberculosis, no record of disposition,	128
	382

The following figures show the total number of cattle owned in Massachusetts examined or tested by agents of the Department, and the disposition of those found suspected of disease.

Massachusetts Cattle examined by Agents.

Physical examination (1,065 herds),	13,466
Tuberculin tested,	561
	14,027
Number killed on physical examination,	1,044
Number killed on tuberculin test,	109
	1,153
Percentage of tubercular animals in total number physically examined and tuberculin tested,	8

Attention is called to the fact that a larger number of animals have been examined than in 1916, and that the percentage of tubercular animals found among them has been reduced from 12 to 8. This reduction in one year is especially noticeable, and shows that tuberculosis among bovine animals in Massachusetts is probably decreasing rapidly.

Interstate Cattle.

There were ten permits issued in 1916 for bringing cattle from out of the State which were not reported upon till 1917, and in addition there were 20 instances where animals brought in on permits were held and tested in 1917; the total number on these permits comprised 26 head tested before shipment, 139 tested after arrival, 1 beef animal, 3 calves, and 2 Massachusetts animals that had been out of the State temporarily. These figures are included in the total given below.

Cattle held from 1916 at Brighton, retested in 1917,		34	
Cattle tested at the quarantine station at Brighton,		12,215	
Cattle accepted on approved test made in other States:—			
Received at Brighton,	1,164		
Received at other points,	4,045		
		5,209	
Cattle tested by agents of the Department at points other than the quarantine station,		4,224	
Cattle awaiting test,		93	
			21,775

Disposition of Above Cattle.

Brighton.

Cattle reacting and killed, lesions found,	210	
Cattle reacting and killed, no lesions found,	34	
Permit to kill, lesions found,	35	
Permit to kill, no lesions found,	22	
Cattle released as free from tuberculosis,	13,107	
Awaiting retest,	5	
		13,413

At Other Points.

Cattle reacting and killed, lesions found,	91		
Cattle reacting and killed, no lesions found,	8		
Permit to kill, lesions found,	11		
Permit to kill, no lesions found,	5		
Condemned, awaiting report of post-mortem examination,	7		
Cattle released as free from tuberculosis,	8,130		
Awaiting test or retest,	110		
		8,362	
			21,775

There were 556 cattle at Brighton held for a second test, 255 of which were later released.

Of the dairy cattle received at Brighton and accepted on tests made in other States, 972 came from New Hampshire, 10 from Maine, 47 from Vermont and 135 from New York.

The following statistics show in detail the record of interstate cattle received at points in the State other than the quarantine stations: —

Report of Cattle brought into State during the Year to Points Other than the Quarantine Stations.

For dairy and breeding purposes, tested before shipment,	4,045	
For dairy and breeding purposes, tested after arrival, .	4,224	
For dairy and breeding purposes, awaiting test, . .	93	
		8,362
Neat cattle on which no test was required, classified as follows: —		
Cattle for immediate slaughter, ...	2,364	
Calves for immediate slaughter, ...	3,471	
Dairy calves under six months old, ...	247	
Cattle returned from out-of-State pastures, . . .	535	
Died before test could be made, ...	5	
Returned from sales or exhibitions in other States, .	76	
Returned from temporary stay in other States for other purposes, ...	18	
Remaining in State for brief periods only, for breeding purposes, etc., ...	34	
For temporary stay at sales or exhibitions (at Springfield 368, at other places 268), ...	636	
		7,386
Total for all purposes, ...		15,748

There are large slaughtering establishments at Haverhill, West Newbury and Springfield where Federal inspection of slaughtered animals is maintained, to which points cattle and calves for immediate slaughter can be shipped without special permit, record of which is not kept by this Department. There are on an average several thousand animals shipped to these points during the year.

Of the animals brought into State for purpose of sale or exhibition, 368 went to the Eastern States Exposition at

Springfield, which took place in October. There were also at this exposition 175 head of valuable cattle belonging to Massachusetts owners. All of the New England States were represented at the exposition, and there were cattle from New York, Maryland, Pennsylvania, Ohio and Iowa. The following breeds of cattle were represented: Milking Shorthorn, Holstein, Guernsey, Jersey, Ayrshire, Brown Swiss, Shorthorn, Hereford, Angus and Fat Cattle.

Nearly all of the total number of animals coming to points other than the quarantine stations came in on permits issued by the head of the Department; 528 head were brought in unaccompanied by permits, having been reported to the Department by railroad agents, local inspectors and others. Of this number, 216 were accompanied by acceptable records of test, 179 were tested by agents of the Department, and the remainder were for immediate slaughter or other purpose not requiring test.

There were 1,403 permits issued during the year for bringing cattle from other States to points outside of the quarantine stations.

Forty-eight permits were issued allowing cattle to be brought into the State for exhibition purposes, and four allowing cattle to be returned from exhibition in other States. Nine permits were issued allowing cattle to be pastured in the State during the summer season; five permits were issued to persons living near the border line for returning cattle from out-of-State pastures from time to time during the season without being tested or tagged; and two permits were issued allowing oxen to be worked on the border line temporarily without test.

One hundred and eighty-nine of the permits were not used, and eighteen on which no report had been received at the close of the year were carried over and will be included in the report of the next succeeding year.

During the spring and early summer Massachusetts veterinarians or agents of the Department tagged 871 head of cattle that were to be sent into other States for pasture during the season, mostly into New Hampshire. Tag numbers are kept on the files of the Department in order that these animals may be identified upon returning to their home State in the

fall. Many of them were brought to the Brighton Stockyards and released there; others were returned to premises of owners in other parts of the State.

The Department keeps records of all animals received at the several quarantine stations; also the States from which neat cattle are shipped, as shown by the following figures: —

Receipts of Stock at the Watertown Stockyards for the Year ending Nov. 30, 1917.

New Hampshire cattle,	3,839
Vermont cattle,	5,476
Massachusetts cattle,	664
Calves,	21,752
Sheep and lambs,	1,557
Swine,	3,903

Receipts of Stock at the New England Dressed Meat and Wool Company's Yards at Somerville for the Year ending Nov. 30, 1917.

Maine cattle,	1,795
New Hampshire cattle,	2,605
Vermont cattle,	8,875
Massachusetts cattle,	92
Western cattle,	4,145
Canada cattle,	2,390
Calves,	78,228
Sheep and lambs,	217,103
Swine (at Squire's, 589,103; at North's, 545,000),	1,134,103

Receipts of Stock at Brighton for the Year ending Nov. 30, 1917.

Maine cattle,	9,810
New Hampshire cattle,	8,074
Vermont cattle,	5,562
Massachusetts cattle,	13,480
New York cattle,	13,261
Western cattle,	26,126
Canada cattle,	148
Calves,	89,706
Sheep and lambs,	7,932
Swine,	42,313

Section 111 of chapter 75 of the Revised Laws, as amended by chapter 243 of the Acts of 1907, requires rendering com-

panies to report to this Department cases of glanders, farcy or tuberculosis found by them, and the information thus furnished is of considerable value in bringing to the attention of the Department cases of these diseases which otherwise would not be known. A table of reports of rendering companies follows: —

Reports of Rendering Companies.

Rendering Companies.	Number of Reports.	Number of Cases of Glanders.	Number of Cases of Tuberculosis.	Number of cases of Glanders not previously reported.	Number of cases of Tuberculosis not previously reported.
W. H. Abbott, Holyoke,	7	7	–	–	–
Ayer Rendering Company,	1	1	–	–	–
C. S. Bard, Haverhill,	2	1	–	1	–
Butchers' Rendering Company, Fall River,	4	1	3	–	–
Home Soap Company, Millbury,	25	14	37	–	1
Lowell Rendering Company,	10	2	13	–	–
A. G. Markham, Springfield,	2	2	–	–	–
James E. McGovern, Andover,	26	52	15	–	–
Muller Brothers, Cambridge,	17	27	–	1	–
William H. Nankervis, Marlborough,	1	1	–	–	–
New Bedford Extractor Company,	5	5	–	–	–
New England Rendering Company, Brighton.	12	20	1	–	–
P. J. O'Donnell & Son, Woonsocket, R. I.,	1	1	–	–	–
Parmenter & Polsey Fertilizer Company, Peabody.	15	5	12	–	–
R. & B. Tallow Company, Saugus,	1	1	–	–	–
Rand & Byam, Charlestown,	1	1	–	–	–
N. Roy & Son, South Attleborough,	10	1	5	3	1
N. Roy, Jr., Fall River,	25	21	28	1	–
Sherborn Rendering Company,	2	1	3	–	–
Springfield Rendering Company,	4	8	–	–	–
N. Ward Company, Boston,	34	81	3	3	–
Whitman & Pratt Rendering Company, North Chelmsford.	20	5	12	–	3
S. Winter Company, Brockton,	3	4	–	–	–
Worcester Rendering Company,	5	6	–	–	–
Wunsch Manufacturing Company, Pawtucket, R. I.	2	2	–	–	–
Totals,	235	270	132	9	5

For several years, at the request of the United States Department of Commerce and Labor, a report of the receipts of all live stock at Boston has been sent to Washington each month. The following table shows the receipts by months for the past year: —

Receipts of Live Stock at the Stockyards in Boston and Vicinity for Twelve Months ending Nov. 30, 1917.

For Month of —	Cattle.	Calves.	Sheep.	Swine.	Horses.
December,	10,137	9,893	18,320	147,641	1,567
January,	9,876	11,773	16,035	208,018	2,142
February,	7,343	9,195	12,039	122,527	2,000
March,	6,999	18,338	9,181	92,054	2,128
April,	6,993	35,116	21,935	103,337	2,654
May,	6,279	22,564	9,764	83,527	2,407
June,	4,707	16,809	18,966	80,522	2,552
July,	7,315	14,263	14,312	94,247	2,273
August,	6,916	10,555	13,161	53,705	1,665
September,	8,347	10,195	27,740	33,662	1,810
October,	17,979	19,067	37,970	51,582	2,015
November,	13,451	11,913	27,169	109,497	1,763
Totals,	106,342	189,681	226,592	1,180,319	24,976

Glanders.

The control of glanders among horses and mules in Massachusetts is a branch of the Department's work requiring constant attention. On account of the money loss it causes, and its danger to human life, the prevalence of this disease must be limited by every means at our command, and ultimate extermination accomplished if possible.

The Department's records for the eighteen years previous to 1917 show that glanders caused an average yearly loss of 731 animals in that period, and that in one year (1913) 1,084 were killed on account of being affected.

These records show the economic necessity for control and eradication, and although the number of deaths of persons infected with this disease by horses is a small one, it is nevertheless regrettable that even one human life should be lost by this means.

We are glad to be able to show by our records for this year that the prevalence of glanders in Massachusetts is being rapidly limited, there having been a reduction of 34 per cent. from the record of 1916 in the number of positive cases found, which number also shows that fewer horses or mules have this year been condemned on account of the disease than in any one of the nineteen constituting the tabulated record.

The Department's records for the year ending Nov. 30, 1917, show the following facts: —

At the end of 1916, 39 animals were under observation. Of this number, 16 have been killed as positive cases, 11 have been released as free from the disease, 4 died or were killed before final diagnosis was made, and 8 are still held under observation.

During the past year 1,384 animals have been reported as being suspected of having glanders. Of this number, 270 animals proved to be positive cases, and were destroyed in accordance with the requirements of the law; 21 died or were killed by owners before diagnosis had been made; 1,067 were released as free from the disease; and 23 were still held under observation at the end of the year. Three animals were killed by order of the Department, post-mortem examination of which did not reveal the presence of the disease, and full appraised value of the same ($490) was paid to the owners.

Horses reported as Suspected.

Brought forward from year 1916,		39	
Arriving from outside of State and condemned,		20	
Reported by renderers,		9	
Reported by inspectors, Department agents, veterinarians, owners, etc.,		1,355	
			1,423

Disposition of Above Horses.

Appraised and killed, positive,	266		
Killed, of no market value, positive,	1		
Reported by renderers, positive,	9		
Killed by owners, no award, positive,	7		
Died, positive,	3		
		286	
Appraised and killed, no lesions,		3	
Killed by owners or died, no lesions,		25	
Released as not affected with glanders,		1,078	
Awaiting disposition,		31	
			1,423

Following is a table giving the number of cases of this disease covering a period of nineteen years. In this table cases which have occurred in the city of Boston are shown separately, on account of the fact that Boston was for many years the storm center of this disease. Special tabulation of the number of cases in that city has always been made in order that its relative importance to other sections of the State may be studied.

Number of Cases.

Year.	Cases.		
	In Boston.	In Other Places.	Totals.
1899,	159	384	543
1900,	192	507	699
1901,	197	548	745
1902,	155	580	735
1903,	250	610	860
1904,	254	555	809
1905,	210	414	624
1906,	194	376	570
1907,	308	403	711
1908,	389	552	941
1909,	278	406	684
1910,	314	362	676
1911,	387	565	952
1912,	395	446	841
1913,	556	528	1,084
1914,	355	495	850
1915,	152	250	402
1916,	157	278	435
1917,	80	206	286

As shown by the above table, there has been a marked decrease in the number of cases this year. Several factors contribute to this decrease, the most potent ones undoubtedly being, first, the limitation of spread of the disease from one animal to another, which has been accomplished in many instances, probably, by the closing of all public watering troughs

in sections where outbreaks have occurred; and second, the more general application to all exposed animals of the different diagnostic tests now available, followed by the prompt killing of such as are deemed to be positive cases.

If an unusual prevalence of glanders occurs in any one stable it is our present practice to apply one or both of the tests now in use to all other horses kept on those premises. In this way we frequently disclose hidden or occult cases which would have escaped detection on ordinary physical examination, and which, not being observed, would not have been destroyed and would have continued to spread the infection.

Our post-mortem examinations of these occult cases reveal the existence of the disease in such a large percentage of cases as to seemingly establish the reliability of the tests and warrant their continued use as diagnostic aids. The tests now used are the ophthalmic mallein, or so-called "eye test," and the laboratory examination of samples of blood drawn from the animal's jugular vein, or the so-called "blood test." This year the laboratory examination of samples of blood has included the agglutination test in addition to the complement-fixation test, with the object of checking each test by the other and studying any differences which may be noted, thereby enabling us to make a more satisfactory decision in cases which for any reason are doubtful.

In the so-called "stable tests," or tests of all animals in stables where glanders has been found, 1,112 horses have been tested in 64 stables, and among them 79 cases of glanders have been found which would have escaped detection by the ordinary physical examination, as they showed no clinical symptoms of the disease. These figures show that we have increased "stable testing" 84 per cent. during the past year.

The Department has continued the policy of promptly killing all animals showing clinical symptoms of glanders, of disinfecting the premises where they have been stabled, the blacksmith shops in which they were shod, and the public watering troughs where they were in the habit of drinking. To effectively aid in the complete disinfection of premises from which diseased animals have been removed, owners have been requested to tear out mangers, loose boarding and such

other portions of the stall as the animals had come in close contact with, or upon which might have been deposited any discharges from their respiratory passages. We have required that this disinfection be attended to by the owners of the premises before approving their claims for reimbursement.

Animals which for any reason have been suspected of being diseased, either because of having been in contact with other diseased animals or as a result of the different tests, but which have not shown sufficient clinical symptoms to warrant condemnation, have in some instances been quarantined, frequently examined, and allowed to work under certain restrictions. We have found in some instances that contact animals apparently in perfect health have temporarily reacted to one of the tests applied, and at a later date have ceased to react to the same. It has therefore not been thought justifiable to kill valuable animals which, having reacted to only one of the tests above mentioned, did not also show clinical symptoms and appeared to be in a good condition of health. These so-called temporary reactors have, however, been carefully watched, subjected to frequent tests, and, upon reacting persistently to either one or both of the tests, have been destroyed. Autopsies have been made on condemned animals in every case where there has been any conflict of the different tests, and in all other cases where practicable.

The use of subcutaneous mallein for the testing of suspected animals is not advised by the Department, for the reason that it may interfere with the correctness of any blood test subsequently thought advisable.

At the present time, in 31 cities and towns of the Commonwealth, the public watering troughs have either been closed or entirely eliminated, as an aid in preventing spread of the disease.

In my opinion the closing of the public drinking places for animals has operated to limit the spread of contagious diseases other than glanders, and the practice of watering animals from individual pails is one to be encouraged from the standpoint of the control, not only of glanders, but also of many other diseases of a contagious character. We find that horse owners and team drivers are already acknowledging the beneficial re-

sults of this method of watering animals under their charge, and do not think it advisable to return to the former method of making use of the public troughs.

Another factor in the suppression of glanders is the disinfection of blacksmith shops. Following the condemnation of an animal affected with this disease the proprietor of the blacksmith shop in which this particular animal was shod has been directed to immediately disinfect the premises. Frequent inspection of blacksmith shops by agents of the Department has undoubtedly been a factor in securing repeated disinfection by their owners or occupants, and without doubt this practice has limited the prevalence of this disease to a great degree. Ninety-six inspections of blacksmith shops have been made during the year, and instructions given relative to disinfection.

The Massachusetts Society for the Prevention of Cruelty to Animals, the Boston Workhorse Relief Association, the Animal Rescue League, and the branches of these various associations in many cities and towns of the State, have through their agents been of material aid to the Department in the work of controlling this disease. Their close observation of working animals of all classes has brought to light many showing suspicious symptoms, which they have promptly reported to this Department, and many of the animals so reported have proved to be positive cases of the disease.

The constant activity of the humane societies in removing disabled animals from work, and destroying those which on account of extreme age or poor condition are no longer useful, is undoubtedly a factor in the suppression of glanders, as such animals are very susceptible to this infection.

The maximum amount, fixed by chapter 646 of the Acts of 1913, which may be paid for any one animal condemned and destroyed on account of being affected with glanders being $50, the appraised value of the animals condemned is a subject of considerable interest. Of the 286 positive cases of glanders occurring during the year, 266 were appraised at a total valuation of $40,063, the average amount per animal being $150.61. On the remaining 20 animals affected with glanders no appraisal was made for the following reasons:

9 of them were reported by renderers, the disease having been found on autopsy; 10 died or were killed by owners before appraisal could be made; and 1 animal killed was of no market value.

Of the 266 horses appraised no award was allowed on 28, 16 of them being interstate, 5 arriving in Massachusetts with Federal troops, 4 not having been in the Commonwealth the required twelve months prior to condemnation, 1 having been killed by owner after appraisal, and 2 having died while awaiting result of test. Of the remaining 238 horses which were appraised, 206 have been paid for, the amount paid being $10,222, and 32 are awaiting the filing of claims for payment.

Complement-fixation Test.

Of the 32 horses under observation at the end of the year 1916, 1 was condemned, 4 were released and 2 died, and 25 were subjected to the complement-fixation test, with result that 11 of them were condemned and killed, 1 died, 7 were released as probably free from the disease, and 6 are still under observation.

Twelve hundred and six samples of blood were taken from 864 horses during the year 1917, and the following disposition of the animals was made: —

Animals held over from 1915, disposed of as above,	1
Animals held over from 1916, disposed of as above,	24
Animals released on first test,	502
Released on second test,	96
Released on third test,	23
Released on fourth test,	12
Released on fifth test,	2
Died or killed by owner after first test,	18
Died or killed by owner after second test,	3
Died or killed by owner after third test,	1
Condemned on first test,	106
Condemned on second test,	36
Condemned on third test,	14
Condemned on fourth test,	2
Held for further observation,	24
	864

Ophthalmic-mallein Test.

This test has been applied to 1,191 horses during the year. It happens that the test in some instances was repeated on the same animals, and 1,446 such tests have been made. The results are as follows: —

Tests giving positive reaction,	239
Tests giving no reaction,	1,061
Tests giving unsatisfactory results,	146
	1,446

Agglutination Test.

Seven hundred and forty of the samples of blood examined in the laboratory during the past year have been subjected to the agglutination test in addition to the complement-fixation test.

Interstate Horses.

Horses, asses and mules shipped to Massachusetts from the States of New York, Connecticut and Rhode Island must be accompanied by a permit from the Commissioner of Animal Industry. This regulation was established on account of the prevalence of glanders among the horses of the States mentioned, and in order that upon arrival the animals might be immediately located, and examined by agents of this Department.

The number of horses, mules and asses shipped from these States has increased from 4,500 in the year 1916 to 4,764 in the year ending Nov. 30, 1917. Among these animals very few cases of glanders have been found, as shown by the following statistics: —

Equine Animals from New York, Connecticut and Rhode Island.

Mules,	9	
Donkeys,	2	
Horses,	4,753	
		4,764

Disposition of Above Animals.

Died soon after arrival,	2	
Condemned as affected with glanders,	16	
Released upon physical examination,	3,126	
Released after test,	1,620	
		4,764

The small number of animals condemned, as shown by the above table, is worthy of notice. Many of the animals brought from the above-mentioned States are of the better class, being highly bred horses used for carriage work and breeding purposes. The second-hand horses, which are trafficked in and sent from the markets of one State to those of another for purpose of public sale, have been specially watched on account of their being considered more liable to be subjects of contagious disease than the higher class animals, and if not accompanied by a satisfactory certificate of test have been tested on arrival by agents of the Department.

Rabies.

The control and eradication of rabies in dogs is a matter requiring special attention by this Department, not only on account of the monetary loss which the disease causes every year by the death of valuable dogs, but as a public health measure on account of the communicability of rabies to man. Every species of domestic animals, many species of wild animals, and the human subject are susceptible to infection with this disease, although its general prevalence is among dogs.

In considering the means by which this disease is spread the dog only need be mentioned, and the ownerless or stray dog is the one requiring special attention, as he is much more often a spreader of the disease than is the dog which has proper care and a good home. The ownerless dog may become affected with rabies and spread the infection before he is observed to be in an abnormal condition, and, no one being especially interested in his welfare, it happens that the attention of the proper authorities is not promptly directed to him. Unfortunately the dog license laws are not strictly enforced in all cities and towns, and therefore one great factor in the control and eradication of this disease is not operative. In our opinion, if the present laws are more strictly enforced than they have been hitherto, and the projected dog laws for the protection of the sheep industry are passed and enforced, a marked reduction in the number of cases of rabies will result.

Many complications in the control and eradication of infectious diseases among other kinds of animals do not enter

into the control of rabies, for the reason that there is much less traffic in dogs than in those animals which are used for production of food material or for business purposes, and also because their market value is on an average very much less. It is possible, also, to confine them at much less expense than larger animals, and they generally endure the restraint without danger to their health. For these reasons, although an outbreak of rabies causes much inconvenience and trouble to dog owners, and often subjects public officials to unjust criticism on account of quarantine restrictions necessarily imposed, nevertheless its control can generally be accomplished by the prompt co-operation of town and city officials with this Department in the measures directed toward such control.

Following is a general outline of the Department's methods in this work under the present regulations: —

Upon report being made to the Department of Animal Industry that a person has been bitten by a dog, the inspector of animals of the town or city in which it occurs is ordered to make an examination of the animal, and, even if it appears to be healthy, to have it restrained for a period of fourteen days for the purpose of observation. This regulation is deemed necessary for the reason that competent authorities have proven that in some instances the bite of a dog infected with rabies may communicate the infection fourteen days before the animal itself shows clinical symptoms. If at the end of this period no symptoms of rabies have developed, the animal may be released. In case a person is bitten by a dog which upon examination by the inspector of animals, or any other person, shows evidence of already being affected with rabies, this animal is immediately confined in strict quarantine. If it is subsequently killed or dies, its head is at once sent to the Department's office, and a laboratory examination of the brain is made for the purpose of confirming the diagnosis. Information as to the laboratory findings is promptly communicated to the person or persons who have been bitten. The State Department of Health is given the information received in every case of dog bite reported to this office, whether the bite has been inflicted by an animal suspected of rabies or not. We also order the local inspector of animals to ascertain not

only the names of all persons who have been bitten by dogs suspected of rabies, but to find out if animals have also been bitten, and if so to place the same in quarantine for a period of at least ninety days. All dogs which are known to have been in contact with a rabid animal, whether or not it appears that they have been bitten by it, are also placed in quarantine for the same period.

If an unusual number of cases of rabies is found to exist in any town or city, the selectmen or the mayor or board of aldermen are asked to issue a restraining order, under the provisions of section 158 of chapter 102 of the Revised Laws. Such an order obliges all dog owners to confine their animals to their own premises for a certain period, or take them therefrom only on leash. This restraining order is much more effective in the local control of an outbreak than is an order which compels owners only to muzzle the animals but not restrain them, as a muzzled animal let loose may in some way get the muzzle off and bite other animals or people. A muzzled dog at large may, therefore, become much more dangerous than an unmuzzled one which is at all times confined upon owner's premises or taken therefrom only on leash. Dogs found running at large while a restraining order issued by town or city authorities is in force may be killed on the issuance of a warrant for the same to a police officer. It has been found necessary to issue general restraining orders in five towns of the Commonwealth during the past year. These orders were for periods of ninety days.

Our force of district agents, most of whom are veterinarians located in different parts of the State, together with the local inspectors of animals, of whom there is one or more in every city and town of the State, constitutes an organization by which systematic local control of an outbreak of this disease can generally be accomplished within a reasonably short time.

During the present year we have been in constant fear of local outbreaks of this disease on account of its unusual prevalence in the neighboring State of Connecticut. In that State during the past year rabies has prevailed extensively in many towns west of the Connecticut River, and during the last months of the year has extended to the northeastern portion

of the State and to many towns contiguous to the Massachusetts line. At the present time dogs in 123 towns of that State are officially quarantined or restrained on account of the prevalence of this disease, and a spread of the contagion across the line to Massachusetts could reasonably be expected. We find that in the last few months of the present year quite a few additional cases have been reported in Massachusetts, the source of which has in many instances been traced to Connecticut.

On Nov. 16, 1917, the following letter was addressed to the 372 inspectors of animals in the various cities and towns of the Commonwealth: —

A serious situation confronts us at the present time on account of a threatened invasion of rabies. For a period of more than a year this disease has prevailed very extensively in our neighboring States of Connecticut and Rhode Island. In Connecticut at the present time there are more than 100 towns in which the dogs are muzzled, restrained or quarantined, and the contagion seems not yet to be under control.

Owing to the ease by which this disease is spread by stray dogs, it is reasonable to expect that Massachusetts will experience a more or less serious outbreak in the near future, and it may be said that already an unusual prevalence of it is reported from several different towns and cities.

I deem it advisable at this time to call this matter to your especial attention, so that, having the danger in mind, you may be prepared to put into execution such methods towards its prevention as may be in your power. I advise that on every possible occasion you acquaint dog owners with the situation, and ask them to immediately report to you any ownerless or stray dogs, and also any which are showing unusual symptoms of any kind. Such animals should be immediately confined and securely chained, so that if rabies develops they cannot further spread the contagion by biting other animals or persons.

If you receive reports of strange dogs having gone through your town which have been in contact with any others, it would be a measure of prevention to immediately confine the contact dogs for observation.

Please report promptly any facts in connection with this matter that may come to your attention, and request advice from this Department at any time.

It is my opinion that, being forewarned of this threatened outbreak, inspectors of animals should be ready to take prompt action when the invasion immediately threatens, and thereby very materially limit its prevalence.

I have found inspectors of animals specially alert to their duties in towns where a case of rabies has appeared, and by prompt action they have undoubtedly limited the extent of a local outbreak of this disease. We are receiving, also, the earnest co-operation of dog owners, private veterinarians and agents of the various humane societies.

During the year ending Nov. 30, 1917, 335 animals were reported to the Department for diagnosis, observation or quarantine on account of the prevalence of rabies, and 12 were brought forward from the year 1916. The records have been classified as follows: —

Animals suspected of rabies,	95
Animals exposed to rabies (7 reported in 1916, 107 in 1917),	114
Animals which have inflicted bites upon persons (5 reported in 1916, 133 in 1917),	138

Animals suspected of Rabies.

	Dogs.	Cattle.	Pigs.
Diagnosis positive,	51	9	–
Diagnosis negative,	22	1	1
Diagnosis questionable,	10	–	–
No diagnosis made,	1	–	–

Referring to the 10 cases in the above table on which the diagnosis is given as questionable, 6 of these animals disappeared, but on account of their having bitten other dogs or cattle which later developed rabies they have been recorded as cases.

One animal said to have died of indigestion is recorded as rabies, diagnosis questionable, as another dog which it had bitten and which had not been in contact with any other animal developed rabies.

One animal was reported in a newspaper article as having been affected with the disease. The animal disappeared, and, positive diagnosis not being possible, it was recorded as a case of rabies, diagnosis questionable.

In one instance a dog was killed supposed to have been suffering from rabies, but the body having been destroyed, laboratory examination could not be made.

In another instance the brain of a dog was sent to this office in such a mutilated condition that examination was impossible. The clinical symptoms of this case not having been typical of rabies, it also was recorded as questionable.

Regarding the one animal recorded as "no diagnosis made," it was reported by a veterinarian as a suspicious case. The animal was killed and the body disposed of without examination.

Animals exposed to Rabies.

	Dogs.	Horses.	Cats.
Number released after a quarantine of ninety days, .	35	1	–
Number killed, no symptoms having developed, . .	23	–	1
Number killed, positive symptoms having developed, .	2	–	–
Number still held under observation, ...	51	–	1

Animals which have inflicted Bites upon Persons.

	Dogs.	Cattle.
Number killed immediately, no diagnosis, ...	3	–
Number killed during quarantine, no symptoms having developed,	31	–
Number released after fourteen days' quarantine, ...	97	1
Number still held under observation, ...	6	–

Of the 51 rabid dogs in the first classification, 13 had bitten persons. Of the 10 dogs on which the diagnosis was questionable, 3 had bitten persons.

Twelve animals which were under observation at the close of the year 1916 were disposed of during 1917, as follows: —

Dogs killed at request of owners, not having shown symptoms of the disease, ... 3
Dogs released from observation, no symptoms having developed, . 8
Cattle released from observation, no symptoms having developed, . 1

There have been examined in the laboratory during the past year the brains of 64 dogs, 3 cows and 1 pig. Of this number, 26 dogs and 2 cows showed positive evidence of the disease. In the case of 1 dog the diagnosis was questionable, and in 35 dogs, 1 cow and 1 pig the diagnosis was negative, and the heads of 2 dogs were so decomposed at time of examination that no diagnosis could be made. Of the 335 animals reported for observation, diagnosis or quarantine 32 were, as far as the Department could determine, unlicensed and ownerless dogs, 10 of which proved to be positive cases of the disease.

The following table shows the number of positive cases of rabies by cities and towns: —

City or Town.	Dogs.	Cows.	City or Town.	Dogs.	Cows.
Amherst,	1	3	Lakeville,	1	–
Attleboro,	1	–	Lowell,	1	–
Berkley,	1	–	Mansfield,	1	–
Beverly,	2	–	Marion,	1	–
Boston (10): —			Marshfield,	1	–
Dorchester,	5	–	New Braintree,	–	3
Brighton,	3	–	Newton,	1	–
Charlestown,	1	–	North Attleborough,	2	–
Roxbury,	1	–	Revere,	1	–
Boylston,	1	–	Sandisfield,	1	–
Brookline,	1	–	Scituate,	1	–
Canton,	2	–	Somerville,	1	–
Charlton,	1	3	Southbridge,	1	–
Chelsea,	1	–	Sunderland,	1	–
Dighton,	1	–	Wareham,	1	–
Dudley,	1	–	Webster,	1	–
Easton,	1	–	West Boylston,	1	–
Falmouth,	3	–	West Brookfield,	1	–
Framingham,	1	–	Worcester,	1	–
Franklin,	3	–			
Holliston,	3	–	Totals,	53	9

Hog Cholera.

Our activities in attempting to control and eradicate hog cholera have increased during the year. Notwithstanding the fact that we have added three agents to our staff (one of whom, however, has since joined the Colors and is now in service in France) the demand for treatment has continued to grow so rapidly that it has at times taxed our ability to attend to the applications for treatment as promptly as is our custom. The work has continued along the same general line which has been in effect since 1914. Slight improvements in our methods have been made in accordance with the valuable experience

gained in the execution of the work, but in general it has not been found necessary during the past year to make any radical departure from our policy. During the year the serum treatment was administered to 51,222 animals. These animals represent 753 herds evenly proportioned throughout the State in 190 cities and towns. The following list shows the cities and towns in which immunization work has been carried on, the number of herds, and animals treated in each town: —

City or Town.	Herds.	Animals treated.	City or Town.	Herds.	Animals treated.
Abington,	7	33	Gloucester,	3	194
Acton,	2	18	Goshen,	1	1
Acushnet,	1	6	Grafton,	14	545
Adams,	3	61	Granby,	3	52
Agawam,	17	372	Granville,	1	8
Amesbury,	2	85	Great Barrington,	1	5
Amherst,	5	74	Greenfield,	4	485
Andover,	2	50	Hadley,	1	17
Arlington,	2	50	Hamilton,	1	25
Ashburnham,	1	2	Hampden,	1	10
Ashby,	1	7	Hanover,	1	35
Attleboro,	3	26	Hatfield,	1	2
Auburn,	4	180	Haverhill,	4	67
Ayer,	2	497	Hingham,	2	11
Barnstable,	2	94	Holden,	7	63
Bedford,	2	54	Holland,	1	8
Belchertown,	2	119	Holliston,	1	17
Belmont,	9	1,377	Holyoke,	11	604
Berlin,	1	8	Hudson,	2	60
Bernardston,	1	9	Hull,	3	775
Beverly,	3	484	Ipswich,	2	163
Boston,	3	901	Kingston,	1	4
Bourne,	2	45	Lakeville,	2	139
Boylston,	2	47	Lancaster,	3	3
Bridgewater,	3	508	Lanesborough,	5	113
Brockton,	2	940	Lenox,	8	47
Brookfield,	1	1	Leominster,	6	178
Brookline,	1	13	Lexington,	17	2,712
Burlington,	1	760	Lincoln,	6	715
Chelmsford,	1	1	Littleton,	1	134
Chelsea,	1	9	Longmeadow,	5	65
Chester,	1	1	Lowell,	8	344
Chicopee,	8	179	Ludlow,	10	499
Colrain,	1	6	Lunenburg,	1	22
Concord,	4	259	Lynn,	2	46
Dalton,	5	9	Manchester,	2	121
Danvers,	4	1,289	Marlborough,	1	84
Dedham,	4	81	Marblehead,	6	230
Deerfield,	2	8	Marion,	1	46
Dennis,	1	13	Marshfield,	1	4
Dighton,	1	3	Medfield,	1	536
Dover,	4	210	Middleborough,	1	8
Dracut,	4	63	Middleton,	1	1
East Bridgewater,	1	7	Milford,	2	167
East Longmeadow,	19	182	Millbury,	8	274
Easthampton,	15	139	Millis,	2	148
Easton,	3	140	Milton,	1	187
Egremont,	2	12	Monson,	2	219
Erving,	3	31	Montague,	1	18
Essex,	3	23	Natick,	2	137
Everett,	1	35	Needham,	8	495
Fitchburg,	17	765	New Bedford,	2	81
Foxborough,	3	94	Newbury,	2	19
Framingham,	4	323	Newburyport,	5	61
Freetown,	1	24	Newton,	7	505
Gardner,	10	284	Norfolk,	3	276
Gill,	2	266	North Adams,	10	407

City or Town.	Herds.	Animals treated.	City or Town.	Herds.	Animals treated.
North Attleborough,	2	61	Sterling,	4	98
North Reading,	3	120	Stoneham,	1	13
Northampton,	11	880	Stoughton,	1	584
Northborough,	1	1	Sudbury,	3	111
Northfield,	3	124	Sunderland,	3	36
Norton,	1	2	Swansea,	2	333
Norwell,	1	15	Templeton,	2	19
Norwood,	2	19	Tewksbury,	2	850
Oxford,	1	1	Townsend,	1	7
Palmer,	1	7	Tyngsborough,	6	213
Paxton,	1	84	Wakefield,	1	10
Peabody,	7	454	Walpole,	3	41
Pepperell,	1	18	Waltham,	15	4,252
Phillipston,	1	3	Watertown,	3	359
Pittsfield,	43	1021	Webster,	1	25
Plymouth,	4	197	Wellesley,	2	68
Quincy,	2	5	Wendell,	2	16
Raynham,	1	5	West Boylston,	1	43
Revere,	7	2,864	West Bridgewater,	1	17
Richmond,	1	15	West Newbury,	1	55
Rockland,	1	61	West Springfield,	4	42
Rockport,	1	22	Westborough,	1	151
Rowley,	1	16	Westfield,	21	561
Rutland,	2	277	Westford,	2	16
Salem,	3	2,016	Westminster,	3	49
Saugus,	3	183	Weston,	4	78
Scituate,	17	54	Westport,	1	27
Seekonk,	6	1,025	Westwood,	3	142
Sharon,	1	3	Weymouth,	4	93
Shelburne,	1	2	Whitman,	2	34
Sherborn,	7	136	Wilbraham,	5	144
Shirley,	3	78	Williamsburg,	1	18
Somerville,	1	37	Williamstown,	13	133
South Hadley,	3	75	Wilmington,	5	202
Southampton,	1	41	Winchester,	2	51
Southborough,	2	16	Woburn,	4	100
Southbridge,	1	9	Worcester,	10	5,929
Springfield,	42	2,790	Wrentham,	2	97

Since the inception of this work we have repeatedly called the attention of the public to the fact that the true value of this process of immunization against hog cholera, as in any other form of preventive medicine, lies in its application while the animals are in a healthy condition, rather than after a herd becomes infected. When this is done there are no losses from natural infection, the cost of the treatment is minimized, and, as shown by our statistics, there are practically no losses following immunization; whereas when the work is postponed the financial loss entailed by the death of animals which have not been immunized, together with the cost of the extra amount of serum necessarily used when infection is present, is considerable. We have anticipated that as these facts became more apparent to swine owners a smaller proportion would postpone immunization until infection occurred; and it is extremely gratifying to be able to show a decided increase in the number of herds immunized with no infection apparent at the time the work was done.

The following table covering four years is offered in illustration: —

	1914.	1915.	1916.	1917.
Herds infected at time of treatment, ...	65	150	192	282
Herds apparently healthy at time of treatment,	2	95	113	470
Totals, ...	67	245	305	752

It will be seen from the preceding table that the number of herds infected at the time of treatment, as well as the apparently healthy herds, in which the immunization process has been carried out, has increased. On first reading this table it might seem that there had been more infected herds each succeeding year. As a matter of fact, however, although more are reported, there are actually fewer outbreaks of the disease. The increase in the number of known infected herds is due to this fact: a larger number of owners are becoming aware that immunization will save a large proportion of their animals, and they therefore report the outbreaks and call for our assistance, whereas formerly this was not done. In this connection it must be remembered that inasmuch as a large proportion of Massachusetts swine are garbage-fed, the premises on which they are kept must be considered as permanently infected, and that in the larger piggeries hog cholera has been a constant factor since the inception of the business, which in many cases extends over a period of twenty-five years.

Recently the owner of one large herd where the swine are now being immunized, cholera controlled, and losses entirely prevented informed us that a conservative estimate of his losses in young pigs from hog cholera for the past twenty-five years would be at the rate of 2,000 animals per year, or 50,000 animals. Previous to this year he never considered it worth while to report his outbreaks to the live-stock authorities. This is given as one of several examples which might be cited of the practical value of immunization.

The control of hog cholera simply by disinfection and the "serum only" treatment, under Massachusetts conditions, is practically impossible. Garbage containing pork scraps is a

means of reinfecting premises almost as soon as disinfection can be accomplished. The only way to prevent losses from hog cholera in these garbage-fed herds is, therefore, to keep all susceptible animals immunized against the disease by the simultaneous method. In this connection it is interesting to note that there is every evidence of these herds being infected at all times, as the following facts will show: —

It is our custom to immunize all the mature stock by the simultaneous method. Pigs born of sows so immunized are given the "serum only" treatment when they are six weeks of age. When these animals are twelve weeks old and weigh 40 pounds or over they are given the simultaneous treatment. There has been a tendency on the part of some swine owners — who had always experienced yearly losses from hog cholera, but who, on account of our immunization work, have had no losses for a year or two — to believe the disease to be eradicated from their herds, and on that account they do not have their young pigs promptly immunized at the proper time. We find in almost every instance of this kind, if young pigs from immune sows are not given the "serum only" treatment at six weeks of age, that cholera develops among them; and in other cases pigs which have been given the "serum only" treatment at six weeks of age, but which do not receive the simultaneous treatment when they weigh 40 pounds (at twelve weeks), promptly develop hog cholera. In these same herds, where the work is promptly attended to as advised, generation after generation is raised without having an outbreak of the disease.

In this connection a comparison regarding the length of time during which passive immunity exists following the "serum only" treatment will be of interest. We find in Massachusetts that this passive immunity will generally last for six weeks, only two exceptions to this rule having been so far found. We are informed that through the middle west, however, such immunity lasts as a rule only four weeks, and in the extreme west it lasts approximately eight weeks.

During the year outbreaks of hog cholera developed in three herds under circumstances which again illustrate the wisdom of our policy as adopted three years ago of not administering

the simultaneous treatment to pigs under 40 pounds. At the time this policy was adopted it had been found, in almost every instance where garbage-fed pigs were immunized when weighing under 40 pounds, that these animals failed to develop an active immunity, but did develop a passive immunity lasting seldom more than six to twelve months. There were three herds, however, in which such "breaks" did not occur, and apparently the animals were permanently immune. During the past year in each of these three herds all the mature stock which had been immunized when weighing less than 40 pounds developed hog cholera, whereas all of the animals immunized when weighing 40 pounds or more, although in contact with the affected animals, failed to develop the disease.

The following table, giving comparative statistics for the four years in which we have been engaged in this work, presents the results more concisely than can be done in any other way: —

Comparative Statistics on Hog Cholera for 1914, 1915, 1916 and 1917.

	1914.	1915.	1916.	1917.
Outbreaks reported in which a negative diagnosis was made,	20	122	57	42
Number of herds known to be infected,	80	227	253	359
Number of herds known to be infected in which serum treatment was not administered,	–	77	43	77
Number of infected herds in which serum treatment was administered,	65	150	192	283
Herds Infected at the Time Treatment was administered.				
Number of animals receiving "serum only" treatment, including infected animals and those too young for simultaneous treatment.	428	10,300	14,747	24,828
Mortality from hog cholera following "serum only" treatment (per cent.),[1]	9.5	7	3.7	1.75
Number of animals receiving the simultaneous treatment. These are "apparently healthy" animals in herds infected at time of treatment.	591	5,826	13,643	15,524
Mortality from hog cholera following the simultaneous treatment in infected herds (per cent.),[1]	2	1.2	.6	.44
Total number of animals treated in infected herds,	1,019[2]	16,126	28,390	40,352
Total mortality following both "serum only" and simultaneous treatment in infected herds (per cent.).[1]	5.2	4.9	2.21	1.24[3]

Preventive Inoculation in Herds in which no Infection was Apparent.				
Number of herds immunized,	2	95	113 [4]	470 [4]
Number of animals immunized,	104	863	7,657	10,870
Number of animals which died from hog cholera following immunization,	0	1	0	3
Total number of animals treated,	5,123	16,989	36,047	51,222

[1] These figures show percentages, not animals.

[2] Plus 4,000 which were treated, and died or were killed before results could be ascertained. These deaths were due to the use of serum which was impotent and virus which was not virulent, before the present regulations were made.

[3] This does not include approximately 50 animals which died on one farm, on which a final diagnosis has not been made. Clinically, and by autopsies, it was impossible to determine whether the disease was hog cholera or hemorrhagic septicemia. Laboratory examinations indicate the latter, but before the work could be completed the losses stopped, and more material which was needed for a final diagnosis was not available.

[4] The large majority under this classification are herds which in previous years were classified as infected herds and which had yearly sustained heavy losses from hog cholera. The majority of them are garbage-fed, and experience shows that should immunization be stopped an outbreak of hog cholera would follow very closely. They are therefore classified as herds in which no infection was apparent at the time of treatment, whereas in reality they are infected herds in which the disease is kept completely under control while immunization is continued.

The number of herds treated in most instances represents more than one visit on the part of our agents. Thus, although the total number of herds in which immunization was carried out was 753, this represents 1,541 visits at which animals were immunized, and approximately 400 visits at which it was necessary to postpone work on account of unsanitary surroundings or other conditions which would make it inadvisable to immunize. In addition to the above, approximately 250 visits were made to herds which were reported as infected and where no treatment was administered.

During the year our co-operation was requested by the leaders of the different pig clubs throughout the State. Although the majority of the boys and girls belonging to the pig clubs feed their animals grain rather than garbage, these animals are in close proximity to garbage-fed herds and to known infected herds. It was therefore considered wise to advise the immunization of as many of these pigs as possible. Unfortunately the work was undertaken rather late in the year, and consequently was not carried through as thoroughly as might otherwise have been the case. Notwithstanding this fact a considerable number of animals of this class were immunized, and inasmuch as in the majority of cases the owner had only one pig, it can readily be seen that this called for a tremendous amount of work and travel on the part of our agents, it frequently being necessary to travel several miles to immunize one pig. Undoubtedly this work will be even greater in the coming year.

Attention to the prevalence of secondary infection associated with hog cholera is becoming increasingly important in our work. We have less of the acute true septicemic form of hog cholera and more of the less acute type combined with secondary infection than is seen in the west. While this has always been true it is more apparent at present than at any time since our work started. This prevalence is due largely to the fact that garbage-fed swine are as a rule in poorer condition this year than usual. The entire year just passed has been a hard one on swine on account of weather conditions, and their already weakened vitality has been further lowered by the rapid decrease in the quality of garbage. This renders

them more susceptible to secondary infection caused by *Bacillus suisepticus*, *Bacillus suipestifer* and *Bacillus necrophorus*, as well as to parasitic infestation. This makes our work increasingly difficult, and indicates the necessity of our agents being able to diagnose secondary infection clinically. Under such conditions a decided decrease in the mortality following our work in infected herds is especially worthy of notice.

A perusal of our records for four years' work in herds in which no infection was apparent at time of treatment should prove conclusively that there is little or no danger following the simultaneous treatment in non-infected herds. Attention should here be called to the fact that in our work as recorded we have used only serum and virus of the highest standard possible, and which has passed a thorough bacteriological and physiological test, and that our technique of administration has been carefully executed.

The long-continued high price of pork during the latter part of 1916 gave us every reason to believe that there would be a decided increase in the number of swine in Massachusetts during 1917. As anticipated, the demand for young pigs during the spring months of 1917 was undoubtedly greater than any which has ever been experienced in this State. The demand for six weeks' old pigs, at prices varying from $10 to $14 per animal, greatly exceeded the supply, and it was at first believed that this condition would result in a decided increase in the permanent swine population of the State. As time progressed, however, and the price of pork was continuously placed higher until it reached the unprecedented figure of 24 cents per pound, the movement reached the other extreme, and resulted in the slaughter of thousands of animals which should have been kept for brood purposes. This has, however, had a tendency to maintain the unusual market for young pigs, so that the swine population of this State is at the present time not far from normal.

With the increased number of persons desiring to keep swine came an increased demand on their part for garbage to be utilized in the feeding of these animals. This demand was principally in the neighborhoods or districts where garbage had previously been disposed of in some other manner. During

the summer the office of the Department was besieged with letters from all parts of the country requesting information regarding garbage feeding. Large numbers of persons who were in many cases without previous experience in this respect started piggeries, using garbage for feed. It was thought that this movement would be beneficial in two ways, — first, in the better utilization of a waste product; and second, by a large increase in the amount of native pork available in the local markets. Most persons undertaking this new venture have been successful, some extremely so. On the other hand, some individuals have been unsuccessful, generally due to the fact that they did not have proper sanitary surroundings or necessary equipment for sheltering their animals. The matter is very completely summarized in the following quotation from a circular issued by the United States Department of Agriculture on the subject, entitled "Disposal of City Garbage in Feeding Hogs:" —

> If garbage in good condition is fed with proper surroundings, there is no reason why pork from this source should not compare favorably with pork from grain-fed hogs.

During the latter part of the year an unlooked-for complication in the swine industry arose. Both the quantity and the quality of garbage has decreased very rapidly since August, — an effect due to the high price of food and the efforts toward food conservation. This situation is to-day of serious concern to those who depend largely or entirely on this product as food for their swine. It is estimated that in many cities the quantity of garbage now being received is from 30 to 40 per cent. less than the average amount previously obtained. The quality of garbage, when considered from a food point of view, is approximately 40 per cent. lower than it was previous to conservation efforts. It has been found necessary in almost all garbage-fed herds to very materially reduce the number of animals kept. In some instances it has been found necessary to either sell the herd or to discontinue the feeding of garbage, inasmuch as its nutritive value does not offset the cost of procuring it. Notwithstanding this, the fact must not be over-

looked that garbage is extremely valuable as a food for swine, being probably nearer a balanced ration than any other one food product.

It can be estimated for those who are not familiar with this method of feeding that ordinary city garbage, if in good condition and maintained so until fed, will cause an increase of 1 pound live weight for every 37½ pounds fed, or 1 pound of dressed weight for every 50 pounds fed. It is stated by those who are authorities on the subject that pork from prime garbage-fed swine is of equally good food value, texture and color as pork from grain-fed animals. On the Boston market, at least, garbage-fed swine are paid for at the same price per pound as those which are grain-fed. It is estimated that under normal conditions 1 ton of garbage per day will care for 100 shoats. The fact should not be overlooked, however, that as the nutritive value of garbage decreases, the number of animals which 1 ton would accommodate must correspondingly decrease. In consideration of the above facts, the utilization of garbage by feeding to swine should become more general in many sections of the country where heretofore it has not been thought practicable.

There are certain factors which should be taken into consideration by the garbage feeder. It should be remembered that it is practically impossible to feed garbage without the swine becoming infected with hog cholera, unless these animals have been immunized against the disease. For this purpose the following suggestions are made regarding disease control, all of which have been obtained from our experience in the execution of our four years' work.

1. The simultaneous treatment is always preferable to the "serum only" treatment.

2. Swine under 40 pounds should never be given the simultaneous treatment.

3. The virus which is used in immunizing garbage-fed swine must be the most virulent which can be procured, and larger doses are advisable than for grain-fed swine.

4. The fundamental principles of immunology must never be lost sight of, and it should be remembered always that in herds where garbage has been fed for several years, a highly developed

resistance to the disease has been developed among the mature stock, and that as a result of this a greater amount of inherited immunity is transmitted to the offspring from these mature animals. In this connection the immunization of garbage-fed swine is radically different from that of swine fed on grain.

5. Because of the different nature of the food and the less sanitary surroundings, *Bacillus suisepticus*, causing hemorrhagic septicemia or swine plague, and *Bacillus necrophorus*, causing the foot-and-mouth forms of this disease, are ever present, and are an added menace to the health of these animals.

Miscellaneous Diseases.

Anthrax. — This is a disease existing in many different parts of the world, causing the death of many thousands of animals and occurring secondarily in man. The infection is found in horses and also in cattle, sheep and other cloven-hoofed animals. The most common method of transmission to the human subject is by the handling of hides taken from animals which have been infected with the disease.

On an occurrence of an outbreak at any point in the State it immediately becomes necessary to prevent the spread of the infection in every way possible, and our work in this direction consists of a preventive inoculation of all animals on the premises where a case of the disease is found, and of particular attention to the destruction of the carcasses of animals which have died. As the spores of the causative agent of this disease remain lodged in the soil in an active state for a long time, we require that entire carcasses be deeply buried and covered with quicklime, and the surrounding soil burned over and thoroughly fenced, so that other animals may not graze at that particular point. Inoculation of the remaining animals is in a majority of cases effective in immunizing them for a period of twelve months at least, and therefore this preventive inoculation is continued from year to year on many farms where the disease has once appeared. As infected animals ordinarily die within a few hours of the onset of the disease, the first animals attacked in a particular locality all generally die before treatment can be applied.

During the past year there has been a decrease in the prevalence of this disease, only 6 cattle on three different premises having been found to be affected. Of these 6 animals 1 was in the town of Berlin, 3 were in Bolton and 2 in Shrewsbury. The preventive inoculation has been applied to 78 head of cattle and 9 horses located on five different premises, and from the fact that our records show such a marked decrease in the number of cases from previous years we believe that our efforts in prevention have probably saved quite a few animals which have been exposed to the same conditions, pasturage and feed as those which have died.

Reports of the existence of anthrax in four different towns proved upon investigation to be unfounded. In one case the cause of death was found to be a digestive disturbance. In another case the cause of death was malnutrition. On the cases reported from one of the four towns laboratory diagnosis was negative, and the specimens submitted from another town were too decomposed for a proper examination.

Some of the symptoms of this disease so resemble those of hemorrhagic septicemia that a positive diagnosis can only be made by laboratory examination. It is therefore our custom in all cases reported to have such laboratory examination immediately made.

No unusual prevalence of this disease has been known to exist this year in surrounding States, so that the quarantine order restricting shipments to Massachusetts has not been necessary.

Blackleg, or symptomatic anthrax, also called *quarter ill,* is another disease which causes the death of large numbers of animals in different parts of the world, especially such as have not reached adult age. Young cattle are the animals generally attacked, but the disease has been found in some instances in sheep and goats. It is characterized by swelling, œdema, and emphysema of the muscles and subcutaneous tissues of the infected parts. Infection appears most commonly in the shoulder or hind quarter, and presents certain characteristic symptoms that are seldom mistaken for those of any other disease. The same necessity for yearly preventive treatment exists in the control of this disease as in that of anthrax.

Preventive treatment is very successful, and although the number of fatal cases of the disease in Massachusetts is very small compared with the mortality records of other sections of the country, we nevertheless are anxious to save as many animals as possible from its ravages.

During the past year 17 animals have died from this disease on 13 different premises, and the preventive inoculation has been applied to 764 animals on 103 different premises in 36 towns, as follows: —

	Premises.		Premises.
Adams,	1	Northampton,	2
Ashburnham,	4	Orange,	6
Ashby,	10	Pittsfield,	1
Ashfield,	1	Prescott,	5
Athol,	3	Princeton,	1
Becket,	3	Rowe,	5
Colrain,	1	Savoy,	1
Granville,	1	Shelburne,	5
Great Barrington,	5	Southampton,	2
Harvard,	2	Sterling,	2
Hardwick,	1	Townsend,	1
Holyoke,	3	Tyringham,	2
Lee,	2	Warwick,	3
Leicester,	3	Washington,	1
Lenox,	1	Westhampton,	1
Littleton,	9	Williamstown,	3
Montague,	5	Winchendon,	2
New Marlborough,	4	Windsor,	1

Our records show that whereas the increase in the number of deaths from this disease in Massachusetts during the past year has been 10 animals, we have applied preventive inoculation to 603 more animals than were inoculated last year. This particular branch of the Department's work seems to be increasing more or less rapidly as cattle owners become more generally informed that their animals can be successfully protected against the disease without interfering with their health or development.

Hemorrhagic Septicemia. — This is a disease which seems to be increasingly prevalent each year, and has been diagnosed not only in Massachusetts cattle but also in swine, large numbers of which have been found to be affected this year. Dif-

ferential diagnosis is sometimes difficult in the field as between anthrax, blackleg and hemorrhagic septicemia, and a positive diagnosis in such cases can only be reached as the result of laboratory examination of specimens from the carcasses.

Our records show that the disease has appeared in 16 head of cattle on premises in 6 different towns, — Ashby, Harvard, Lowell, Orange, Southbridge and Sturbridge. We have found the disease this year causing considerable loss among swine, and our attention has been directed in many instances to this class of animals on account of our active work in the suppression of hog cholera, as we are frequently called to herds supposed to be affected with cholera where a careful diagnosis proves the infection to be hemorrhagic septicemia. Treatment against this disease by inoculation is being applied at several different points, and a further reference to our work in this direction is made later in this report under the heading "Laboratory." This may be found on page 51.

Actinomycosis is another disease classified in the law as contagious, a few cases of which are yearly brought to our attention. Whether or not this disease is contagious according to the strict scientific meaning of the term is a question, but it is certainly transmissible from one animal to another if conditions are favorable, and therefore the Department deems it necessary to quarantine animals affected with it. In some instances it is allowable for the animals to be kept for the purpose of fattening and then released for slaughter only.

Nine cases of actinomycosis have been reported to the Department during the year, 1 each in the city of Attleboro and the towns of Dudley, Lanesborough, Lee, Richmond, Wareham, West Brookfield, and 2 cases in the town of Plymouth. One case reported in 1916 has been killed during the past year in the town of Tisbury. Of the 9 cases reported in 1917, 7 have already been killed and 2 have been released as having been cured. One case was found at the Brighton Stockyards in a cow brought in from the State of Maine, and the animal was immediately slaughtered.

Tuberculosis in Swine. — Cases of tuberculosis in swine are occasionally reported to us by slaughtering establishments, all the larger slaughtering concerns having been requested to re-

port cases of this disease found at time of slaughter, as it generally happens that its source can be found among cattle on the premises where the swine have been kept, especially if they have been in close contact with the cattle, or have been fed on unpasteurized milk from tuberculous cattle. It is our custom upon receipt of report of this sort to cause an examination to be made of the cattle on the premises where the swine have been kept. Fourteen such cases have been reported this year.

Mange. — This very troublesome disease seems to have been much less prevalent in Massachusetts during the past year. In 1916, 449 head of cattle in 17 different herds were reported to this Department, whereas in 1917 only 157 head of cattle have been reported as affected with the disease, found on 18 different premises, and a few horses on 3 different premises. The premises on which this disease in cattle has appeared are in Abington, Dartmouth, Duxbury, Grafton, Hanover, Hingham, Lexington, Lincoln, New Marlborough, Phillipston, West Newbury, Whitman and Williamstown, and the horses were found in the cities of Boston, Chelsea and Newton.

Treatment of this disease is generally successful if the owner or attendant can be induced to faithfully carry out simple directions for local application and medicinal treatment, which treatment is inexpensive but somewhat inconvenient to apply.

Foot-and-mouth disease has not appeared in Massachusetts during the past year, although we have had reports of its existence in the towns of Merrimac, Princeton and Westwood. Prompt investigation of these reports, however, proved that they were unfounded.

Diseases of Sheep. — As there has evidently been quite an increase in the number of sheep kept in Massachusetts the past year, we have found that there has been a corresponding increase in reported cases of disease among them. Sheep are especially susceptible to diseases of a parasitic nature, and the one which seems to be the most prevalent is what is known as *nodular disease.* Cases of this disease have been reported from the towns of Auburn, Bedford, Blandford, Granville, Lincoln and Norwood. This disease is due to an intestinal parasite which causes serious loss through the death of many

young animals, and also in the prevention of proper growth of others.

The Department has frequently been called upon to make examination of animals supposed to be affected with disease of a contagious character, which upon thorough investigation has been found not to be the case. As we are anxious at all times, however, to be thoroughly informed as to an outbreak of contagious disease, we frequently make investigation in cases where the services of a private veterinarian should have been obtained, because of the non-contagious character of the disease. This investigation work has been frequently rendered upon application of citizens.

Among the non-contagious diseases to which our attention has been called during the past year may be mentioned the following: acute indigestion, fistula, foot-rot, forage poisoning, lice, lung worm, neck ail, rheumatism, stomatitis, stomach worm, ulcerative vaginitis and sheep scab.

Particular attention may be called to a case of tuberculosis in a horse in the town of Reading, diagnosis of which was made on post-mortem examination and subsequently confirmed in the laboratory. Tuberculosis in the horse is of such rare occurrence that it is worthy of particular record.

The Laboratory.

During the year 71 specimens were submitted to the laboratory for examination and diagnosis. The majority of these were sent in during the latter part of the year, which would indicate that there will be an increase in this work during the coming year. Specimens were submitted from horses, cattle, sheep, swine, goats and rabbits; and in order to make diagnoses, bacteriological examinations, pathological examinations and animal inoculations have been resorted to.

Inasmuch as commercial ophthalmic tuberculin which the Department had been using was not giving dependable results, it was decided that it would be advisable for the laboratory to do experimental work along this line, and at the same time to investigate the possibility of producing a tuberculin to be used for retests which would give more accurate results than the one which was being used. In August, therefore, the

laboratory started the production of tuberculin for departmental use. Since that time 413 doses of special retest tuberculin, 383 doses of ophthalmic tuberculin, and 260 doses of tuberculin as regularly used in the original test, have been furnished. It has been found that with this special retest tuberculin for subcutaneous use the results are much more accurate than with any previously used. The results as checked by post-mortem examinations are accurate in a larger percentage of cases, and if a reaction occurs it is much more decisive and sharply defined than with other tuberculins. The ophthalmic tuberculin has given us considerably better results than commercial ophthalmic tuberculin, but we cannot depend upon it to the same degree as upon the subcutaneous retest tuberculin. However, with a combination of the two, accurate results are being obtained in nearly all cases.

For some time past it has been apparent that hemorrhagic septicemia is increasing in frequency and is causing considerable loss, particularly in swine. It is a rather common impression among live-stock sanitary authorities that this disease rarely or never exists in swine as an independent disease, but is always associated with hog cholera. To arrive at any conclusion regarding this disease it first became necessary to determine whether or not outbreaks of it do occur when not associated with hog cholera. In this respect we were extremely fortunate, inasmuch as we had by the simultaneous method immunized the swine against hog cholera in the majority of the larger piggeries in the State, and we were thus in a position to study the disease when outbreaks occurred in such immune herds. During the past year nine such outbreaks have occurred. In 8 of the 9 hog cholera could be positively excluded, as was proven by animal inoculation, cultures and filtration experiments. After being convinced that the disease did exist independently our next duty was to endeavor to control it. For this purpose we have used both living and killed cultures of *Bacillus suisepticus*. In all instances we have had better results with the use of living cultures than with killed. In 8 of the 9 outbreaks the losses were stopped and the outbreak controlled almost immediately after the inoculation of the animals with the living culture. In all of these

cases the entire herd had been immunized against hog cholera by the simultaneous method, at periods varying from six months to two years previously. In the ninth outbreak the animals which were infected had received the "serum only" treatment, but not the simultaneous, inasmuch as they were too young for that. The case was not diagnosed by the laboratory, but by clinical symptoms and autopsy. Further investigation when results were not satisfactory proved that the animals were very badly infested with lung worms, which rendered this case of very little value for the purpose of judging results. During the year we have produced a bacterial vaccine for more than 400 swine and 150 head of cattle.

The following interesting points have arisen in our study of this disease: —

1. We have never been able to reproduce the disease in cattle or swine with the blood from animals suffering from it, notwithstanding the fact that the same blood has given us pure cultures of the causative agent, and microscopic smears have shown the organism present in the blood in large numbers.

2. In some cases we have been able to reproduce the disease by rabbit or guinea pig inoculations with this same blood, and in other cases this has not been possible.

3. Pure cultures of *Bacillus suisepticus* and *bovisepticus* are extremely difficult to keep, and vary greatly in their pathogenicity. In some cases the cultures die out in five or six days, while in some others we have been able to make transfers as late as three months, and have found pathogenicity unattenuated.

Considerable work has been done in attempting to make an immune serum for *Bacillus suisepticus* infection by hyperimmunizing cattle. To date, the results have been varied and not satisfactory. In some cases it has protected rabbits and guinea pigs, and in others it has failed to do so. Inasmuch as the results of the inoculation of these animals with pure cultures also vary, it is difficult to determine to what extent the immune serum should be discredited, and how far the cultures fail to reproduce the disease. Used on swine sick with hemorrhagic septicemia, the results have not been satisfactory.

Necrobacillosis has been diagnosed by the laboratory in 11 herds of swine and in 1 case of calves. In the case of calves it is found to form abscesses on the inner side of the cheek along the lower maxillary bone. In these abscesses *Bacillus necrophorus* was present in large numbers, and the animals showed symptoms of calf diphtheria. In swine the disease is practically never seen in the intestinal form, as reported in the west. When found in our garbage-fed herds it manifests itself by a necrotic condition of the feet or mouth or both, and does not cause a very heavy mortality. It is difficult to obtain pure cultures of this organism by culture, and it is usually necessary to resort to animal inoculation, making it difficult to carry stock cultures of this organism. Considerable work remains to be done along this line.

Annual Inspection of Farm Animals and Premises.

In compliance with a direct order of the Commissioner, issued in January of each year to the inspectors of animals of all towns and cities, a systematic inspection of all cattle, sheep, swine and goats, and of the conditions under which they are kept, is made. A date is set for the completion of this work, following which detailed reports must be submitted on blanks provided for the purpose. These reports when tabulated furnish a comprehensive survey of the health and sanitation of animals in Massachusetts kept for the production of food for human consumption. They form an important basis on which to formulate regulations for the control and eradication of contagious diseases among live stock, and are of direct interest in the study of certain public health problems. In addition to much information of importance which the Department derives from the tabulated report of the inspectors of animals, and uses in numberless ways in its work of control and eradication of contagious disease, it furnishes the only correct "census" of animals in Massachusetts that is made. This information is made use of by other State departments, and also by different associations and individuals interested either in dairying or the marketing of beef, pork or mutton, and by persons engaged in general agricultural operations.

The following table is made up from the reports of the inspectors of animals: —

Total number of herds of cattle inspected,	28,582
Number of herds containing not over 5 dairy cows,	23,100
Number of neat cattle inspected,	228,962
Number of dairy cows inspected,	152,141
Number of herds found clean and in good condition,	28,132
Number of stables inspected,	29,450
Number of stables properly drained,	29,299
Number of stables well ventilated,	29,009
Number of stables sufficiently lighted,	28,711
Number of stables found clean,	28,608
Number of stables in which improvements were recommended,	1,303
Number of herds of swine inspected,	10,573
Number of swine inspected,	81,351
Number of herds of swine garbage-fed,	2,140
Number of swine garbage-fed,	47,628
Number of sheep inspected,	13,875
Number of goats inspected,	1,307

Generally speaking, the work of inspection is efficiently attended to, and has the practical result of rapidly correcting unsatisfactory conditions of stabling and of eliminating diseased animals.

The service rendered by local inspectors of animals in the many directions where they are available is of very great aid in the Department's work. They are in many instances the first officials notified of outbreak or existence of contagious disease, and much depends upon their alertness and prompt attention to the duty of quarantine and early report to the Department. Were it not for efficient service by them, much valuable time would be lost in many instances. Their service in reporting arrival, and in subsequently identifying interstate animals in accordance with our regulations, enables us to more promptly attend to the necessary duties in connection with such cases.

From time to time additional inspections are ordered at places where contagious disease has been found, and where the original recommendations for improvement of sanitation have not been carried out. These additional inspections are made by Department agents when the inspectors of animals for any reason have not been able to bring about the improvements necessary.

Financial Statement.

Appropriation for the salary of the Commissioner, chapter 40, Special Acts of 1917,		$3,500 00
Total expenditure,		3,500 00
Appropriation for clerical assistance and contingent expenses, chapter 40, Special Acts of 1917,	$9,650 00	
Brought forward from 1916 appropriation,	6 82	
Credit on account of temporary increase,	146 50	
Amount forwarded from extraordinary expenses,	894 00	
Total amount appropriated,		$10,697 32
Expended during the year for the following purposes: —		
Salaries of clerks and stenographers,	$5,829 96	
Books,	128 64	
Express and messenger service,	241 73	
Extra clerical service,	252 70	
Postage,	788 72	
Printing report,	139 03	
Other printing,	1,137 77	
Telephone and telegrams,	783 15	
Stationery and office supplies,	631 55	
Typewriters,	163 00	
Expenses of the Commissioner,	377 53	
Sundries,	69 45	
Total expenditure,	$10,543 23	
Unexpended balance,	154 09	
		$10,697 32
Appropriation for the extermination of contagious diseases among domestic animals, chapter 40, Special Acts of 1917,		$146,000 00
Expended during the year for the following purposes: —		
1,168 head of cattle condemned and killed on account of tuberculosis in 1914, 1915, 1916 and 1917, paid for in 1917,	$42,816 39	
254 horses condemned and killed on account of glanders and farcy in 1913, 1914, 1915, 1916 and 1917, paid for in 1917,	12,962 00	
Services of regular agents,	31,410 89	
Services of *per diem* agents,	10,875 60	
Labor hired,	395 75	
Traveling and other expenses of agents,	17,964 70	
Veterinary supplies,	112 23	
Expenses of killing and burial,	152 00	
Ear-tags, punches, etc.,	1,218 87	
Laboratory and experimental expenses,	2,952 49	
Expense of travel allowed inspectors of animals,	475 29	
Quarantine expenses,	4 00	
Sundries,	195 46	
Total expenditure,	$121,535 67	
Unexpended balance,	24,464 33	
		$146,000 00

The average price paid for condemned cattle for the year was $36.65.

There has been received during the year from the sale of hides and carcasses of condemned animals $1,209.87, and for the testing of cattle for non-resident owners $3,002.26, a total amount of $4,212.13.

Claims for 85 head of cattle condemned and killed as tuberculous during the year remain unsettled, to be paid for on proof of claims, the appraised value of which amounts to $3,014.

Claims for 32 horses condemned and killed during the year because affected with glanders remain unsettled, to be paid for on proof of claims, the allowance for which under the law will amount to $1,571.

Respectfully submitted,

LESTER H. HOWARD,
Commissioner of Animal Industry.