Sixteenth Annual Meeting

OF THE

United States Live Stock Sanitary Association

CHICAGO, ILLINOIS

DECEMBER 3, 4 and 5, 1912
Report of the
Sixteenth Annual Meeting
OF THE
United States Live Stock
Sanitary Association

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NOTICE

OWING to the high cost of publication and our limited revenue, the proceedings have been condensed as much as possible without eliminating essentials.
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OFFICERS—1913

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Committee on Programme and Publication.
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Committee on Competitive Tick Eradication Work.
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PETER F. BAHNSEN, Atlanta, Georgia.
C. A. CARY, Auburn, Alabama.
Committee on Extension Work of International Tuberculosis Commission.

M. H. Reynolds, St. Anthony Park, Minnesota.
John R. Mohler, Washington, D. C.
J. J. Ferguson, Chicago, Illinois.

Committee on Uniform Methods for Control of Hog Cholera.

Paul Fischer, Columbus, Ohio.
M. Dorset, Washington, D. C.
A. T. Kinsley, Kansas City, Missouri.
W. H. Dalrymple, Baton Rouge, Louisiana.

Committee on Suggested Meeting at Panama-Pacific Exposition San Francisco, 1915.

J. J. Ferguson, Chicago, Illinois.
S. H. Ward, St. Paul, Minnesota.
Constitution and By-Laws

As amended and approved by the Association at the annual meeting Chicago 1909.

CONSTITUTION

Section 1. This association shall be known as the "United States Live Stock Sanitary Association."

Section 2. The purpose of this association shall be the study of sanitary science, and the dissemination of information and methods pertaining to the control and eradication of infectious diseases amongst live stock.

Section 3. The officers of this association shall be a President, five Vice-Presidents and a Secretary-Treasurer.

Section 4. The elective officers of the association shall constitute the Executive Committee.

BY-LAWS

Section 1. The duties of the several elective officers shall be those generally performed by such officers in similar organizations.

Section 2. The executive committee shall select the place for the meeting of the Association and execute such other duties as the Association shall direct.

Section 3. The several officers of the Association shall be elected by ballot at each annual meeting, and a majority of all the votes cast shall be necessary to a choice.

Section 4. The standing committees of the Association, in addition to the executive committee shall be a committee on publication, legislation, finance, credentials and resolutions. They shall each consist of three members who shall be appointed by the President at each annual meeting or as soon thereafter as may be practicable.

Section 5. Any person engaged in live stock sanitary work for Federal, State, Territorial, County or Municipal Governments shall be eligible to membership in this Association, and any other person interested in live stock sanitation may be elected to active membership upon the recommendation of the executive committee and a two-thirds vote of the members present.

Section 6. Each application for membership shall be submitted in writing and shall be referred to the executive committee for consideration and recommendation of the Association.

Section 7. The revenue of this Association shall be derived as follows: Each member shall pay an annual due of one dollar, payable in advance.
the sale of the annual reports of the Association at a price to be annually fixed by the committee on publication, said annual report to be copyrighted.

Section 8. Order of Business:—

Roll call.
Reading of minutes.
Unfinished business.
President's address.
Report of Executive Committee.
Report of Standing Committees.
Reports of Special Committees.
Report of Secretary-Treasurer.
Reading of papers, discussions, etc.
New business.
Election of officers.
Appointment of committees.
Adjournment.

Section 9. The meetings of this Association shall be held annually at such time and place as may be designated by the executive committee.

Section 10. A suspension of the By-Laws may be made by a two-thirds majority for the purpose of changing the order of business to facilitate important business.

Section 11. All proposals for the alteration of the constitution and By-Laws shall be submitted in writing, and no alteration shall be acted upon until it has been referred to the executive committee and presented anew by them at the next meeting of the Association.
Report of the Proceedings
OF THE
Sixteenth Annual Meeting of the United States Live
Stock Sanitary Association

MORNING SESSION DECEMBER 3RD.

The meeting was called to order by the President, Dr. Mazyck P. Ravenel.

The President: Members of the United States Live Stock Sanitary Association—We are particularly fortunate this year in having to give us the address of welcome Dr. George B. Young, Health Commissioner of the City of Chicago. I take great pleasure in introducing Dr. Young.

Dr. George B. Young: Mr. President, you made one statement that is open to question, and one statement that is not true, and considering the brevity of your address that is rather a high score. The statement that is open to suspicion is that "we were happy to have, etc," and the one that is absolutely untrue is that Dr. Young will deliver an address of welcome, because Dr. Young will deliver no address of any kind. The Lord in the fullness of his wisdom gave me certain capacities, no doubt, but the capacity for delivering an address was not one of them. But I do want to say to this Association just a word of welcome, and while this welcome is in a sense a sort of a conventional thing and has to be said in a conventional sort of way, I do not mean that it shall be only a conventional thing nor do I want you to so understand me, because I feel, as does every other head of a city health department who has to deal with problems which grow out of the milk supply and some other resources of food supply, that unless we can get along faster than we have been in arousing public opinion as to the importance of the kind of work that is done by this Association, and get the voter to understand in a more appreciative kind of a way what it really means to him to have the right sort of sanitary control of the live stock situation, we will make progress very,
very slowly. We feel this very keenly here in Chicago, because, as some of you know, perhaps most of you know, the question as to what was the best thing to do in regard to the sanitary control of the cattle furnishing the milk supply to Chicago was settled by a test that is even more mysterious in its workings in some respects to our minds than are the workings of the tuberculin test itself to the minds of some of the illiterate people in the dairy business. It was settled by a test that was purely and entirely, and completely, and absolutely political. It was an expedient thing for the political fortunes of certain gentlemen that the control of the milk supply of Chicago should be taken out of the hands of the city as far as the tuberculosis situation was concerned, and therefore it was taken out of the hands of the city of Chicago.

Now, I believe that your Association is bound to become, as it grows in usefulness, a powerful organization; that it will through its activities so inform the public and enlighten the public that it will be impossible in the future, either in Illinois or anywhere else, to put over any legislation in regard to the sanitary control of live stock which has for its being no better reason than that it may temporarily enhance the political fortunes of some individual.

Gentlemen, the Mayor requested me to say in his behalf that he wished me to extend to you the welcome of the city, and I hope your deliberations will be profitable and that your stay here will be pleasant. The Mayor, of course, in making this request probably felt, as necessarily chief executives of great cities do, that it was in a way a somewhat conventional thing, that it was a thing that the Mayor was expected to do, but it was a thing that he did very gladly, did very heartily, and when he sent me for that purpose I felt that it was, to me at least, something very much more than a conventional thing, and I was very glad to be allowed to do this, because it gave me an opportunity of meeting you gentlemen and of saying to you just what I have said. I realize most fully that until we can get the influence of this Association extended even more widely than it is today, extended to the producers and the dealers and all other agencies that control the production of live stock, there will always remain problems to be solved by the practical sanitarian and the city municipal health department, problems that will remain more or less unsolved for many years to come.

Gentlemen, I bid you welcome to Chicago. (Applause.)

The President: The reply to Dr. Young's words of welcome will be given by Dr. Peter Bahnsen of Georgia.

Dr. Peter F. Bahnsen: Dr. Young, Mr. President, and members of the United States Live Stock Sanitary Association. I feel very
much in the predicament of the traveling salesman who arrived at the railroad station just in time to see the train pull out, and rush up to the ticket window and sputtered something like this: "Give me a ti-ti-ti-ti-ti—give me a ti-ti—oh, hell, ship me by freight to Chattanooga." The agent said, "Well, why do you want to go by freight to Chattanooga?" "Be-be-be-because I can't express myself." (Laughter.)

Gentlemen, that is just exactly the way I feel. I don't know what to say. I am completely lost; in fact I don't see why in the world the Secretary did not select from among this great number of people some one who is more able to speak and respond properly than I am. There are many among those present who are more able to make a reply to an address of welcome, for instance, I would have suggested Dr. Stanford of Arkansas, who Dr. Gibson assured us yesterday could say more in less time than anybody; in fact he could have made short work of it, or we could have Dr. Gibson himself, who I am sure is far more capable than I am, and while he is not such a rapid speaker, he makes up in volume what he loses in speed. So I am not the man, I really think, to reply to this address of welcome.

However, we are glad always to come to Chicago. When I say we are glad I mean particularly myself, and if there is any gentleman here who does not want to endorse the expression I make this morning why I want you to file a dissenting opinion with the Secretary and we will have that go on record. As I say I am always glad to come to Chicago, the greatest city on earth. Now that requires perhaps an explanation to most of you, because it is generally conceded that London and New York City outrank Chicago in size; but when it comes to the size of a city I am very much in the position of an old darky who lived in the South. Long before the War and shortly after the War when circuses used to travel through the country over the public highways, when railway trains were rather rare in the country, John B. Robinson, the old original John B., was the circus man of the South, and every nigger had seen John B. Robinson's circus. They had grown up to see that particular circus and that was their standard, but after awhile railway transportation became more available and other circuses invaded the Southern territory. So after awhile the Sells Brothers and Adam Forepaugh and even Barnum & Bailey came down South. Two niggers were standing on the street corner one morning and one of them says "Sam, the biggest show on earth is coming up here. Are you goin' to that circus?" He said "Sure, nigger, you know I'm goin'." He said "It must be John Robinson." "No,"
he said, "it ain't John Robinson." "Why," the other said, "every nigger on earth knows that John Robinson is the biggest show on earth." "Well, that is not what it says on the board. Let's go down and see." And so they went down and saw a big bill pasted all over the whole board which said "Adam Forepaugh and Sells Brothers—biggest show on earth." He said "Don't you see, nigger, there is what it says: 'Adam Forepaugh and Sells Brothers—biggest show on earth'?” The nigger scratched his head a minute and then looked at it again and found a date line over to one side which said S-e-p-t 1, the date line of the show. He brightened up and said, "there it is, nigger, Adam Forepaugh & Sells Brothers—biggest show on earth 'cept one; and that is John Robinson.

So London and New York are the biggest cities on earth except one, and that is Chicago. (Laughter.)

Now, gentlemen, I just want to say that we are always glad to be welcomed, especially in our capacity as sanitarians, because generally we are not so heartily welcome where we are most needed. I hope that same thing is true in Chicago and that we are not needed here very much. I thank you. (Applause.)

PRESIDENT’S ADDRESS.

By Mazyck P. Ravenel, Madison, Wis.

Gentlemen:

In almost all societies and associations there exists a custom which requires the president to deliver a speech called the presidential address. I often think that if the members could foresee the character of this address they would be more careful in casting their ballots. Our own Association shows a peculiar wisdom in putting the presidential address in the beginning of the meeting, when the members are fresh in mind and body and can stand a good deal. With these thoughts I must ask you to bear with me in patience and overlook my shortcomings.

I have taken for my subject the relation of bovine tuberculosis to human health, a subject to which two very important contributions have been made during the past year. The first is the final report of Drs. Park and Krumwiede. This report is a continuation of one made by the same authors in 1910. They give the following figures in their summary:

Of 63 children dying of tuberculosis at the Babies' Hospital, 59 cases proved to be human infection and 4 bovine, a percentage of 6 1-3.

Of 9 children dying of tuberculosis at the Foundling Hospital, 4 proved to have derived their infection from human sources and 5 from bovine, a percentage of 55.

Of a total of 88 children under five years of age who died of tuberculosis, 77 proved to have derived their infection from human sources and 11 from bovine, a percentage of 12 1/2.

Combining the cases studied in New York with those of other observers in different parts of this country and Europe, the following results are obtained:
Adults, 787 cases—777 human and 10 bovine infection.

Children, five to sixteen years, 153 cases—117 human and 36 bovine infection.

Children under five years, 280 cases—215 human and 65 bovine infection.

I would, however, call especial attention to the report from the Foundling Hospital in New York, where cow's milk is used exclusively. In this hospital 55 per cent. of those children who died of tuberculosis had received their infection from bovine sources. Dr. Park very justly says that there is no reason to suppose that New York is differently situated in regard to its milk supply from other large cities in this country. We are justified, therefore, in concluding that the percentage of deaths in other large cities of our country compares very closely with that of New York. Applying these percentages to the total death rate from tuberculosis in the city of New York, Dr. Park concludes very conservatively that upward of 300 children die every year in that city from bovine infection. These percentages are based entirely on unselected cases.

Further than this, only fatal cases are considered in the above figures. The amount of disease due to bovine infection is unquestionably much greater than is shown by the number of deaths, as there are many cases of bone, joint, and glandular disease which disfigure the person and produce greater or less permanent injury without causing death.

Passing from Dr. Park's report, we have the final report of the British Royal Commission appointed in 1901. You will remember that in 1908, in Washington, Koch denied that the bovine tubercle bacillus produced pulmonary tuberculosis, and would not accept as correct the cases presented at that time for consideration.

The British Royal Commission have discovered two cases of pulmonary tuberculosis in which the bovine germ was isolated from the sputum after every precaution was taken. I quote from the report in full on this point Page 12, Paragraph 2; (see also Appendix, Vol. I, p. 9):

"The two cases which showed only bovine bacilli in the sputum deserve special notice. The cultures in these two cases grew like bovine bacilli on artificial media, and gave rise to fatal generalized tuberculosis in both calves and rabbits. There was no evidence of the presence of eugonic human bacilli in the sputum. One examination in these cases was not considered sufficient. From one of the patients, H. 127 'R. R.,' additional specimens of sputum were collected on three separate occasions at intervals of 76, 117, and 118 days after the collection of the first specimen. Cultures were obtained direct from the sputum. The investigation of these three specimens gave the same results as the first. The sputum yielded only bovine tubercle bacilli. From the other patient, H. 128 'D. D.,' one additional specimen was obtained 118 days after the first. This, like the first, yielded only bovine tubercle bacilli, which were isolated from the sputum direct and produced fatal tuberculosis in calves and rabbits. These two cases were therefore definite cases of pulmonary tuberculosis caused by bovine tubercle bacilli, and, as far as could be ascertained during life, they were cases of primary pulmonary tuberculosis. In neither of the patients was there any evidence of tuberculous disease elsewhere, such as disease of the cervical glands or of the intestinal tract when the sputum was collected."

Another question arises here which was discussed at the meeting of the National Association for the Study and Prevention of Tuberculosis last year by Dr. Welch and myself, namely, the possibility that the bovine bacillus may so change its characteristics by residence in the human body that it
becomes impossible to make sure of its origin. Koch and others have held that such a change is improbable, if not impossible. I last year cited my own experiments, showing that the human bacillus could be changed in morphology, cultural characteristics, and virulence, so that it was identical with the bovine bacillus. I cited also the work of Professor Eber, of Leipsic, on the same point.

The British Royal Commission, in studying cases of lupus, found certain cultures which did not correspond entirely either to the human or to the bovine type. The question arose at once as to whether these cultures were or were not degraded types of the bovine bacillus. If we exclude the possibility of a change of type in the tubercle bacillus, it becomes necessary to assume that every case of lupus receives its infection from some preexisting case of the same type, a supposition which is manifestly impossible. So far as known, all cases of lupus receive their infection from some preexisting case of mammalian infection, either the bovine or the human bacillus. In order to gain some light on this question the British Royal Commission carried out experiments by passage through animals. I quote at length from their report, showing that it was possible to raise the virulence of these irregular types to that of typical bovine cultures (page 18, paragraph 26):

"In view of the above facts and on a working assumption that the dysgonic tubercle bacilli found in lupus might be degraded bovine bacilli, it was sought to increase their virulence by passage through animals. Certain of the viruses were accordingly thus tested, the tissues of calves and rabbits being regarded as most likely to induce intensification of their virulence. These viruses were the six which are shown in the Table (2). One experiment with Virus H 100 'R. S.' may be quoted to illustrate the result obtained. The culture derived from the original material through a guinea-pig was injected subcutaneously into a calf (1409) in a dose of 100 mgm. The animal was killed in 119 days, and only a limited tuberculosis was found: a cyst at the seat of inoculation, a few tuberculous lesions in the nearest glands and in the lungs, and in a few lymphatic glands of the body—a result very different from that which follows inoculation with 100 mgm. of a culture of bovine tubercle bacilli. A culture obtained from the mediastinal gland of this calf was inoculated into another calf (1543) in a dose of 50 mgm. This second calf was killed, when dying, in 34 days, and showed general miliary tuberculosis. Two other experiments with the same virus on similar lines, lasting respectively 73 and 122 days, gave like results. The cultures obtained from the passage animals in each series were also fully virulent for rabbits. In another experiment the virulence of Virus H 100 was found increased for the rabbit by residence for 337 days in the body of the rabbit. Apparently, therefore, residence in a calf for 73, 119, and 122 days of the bacilli obtained from the lupus lesion was sufficient to raise the virulence of the bacillus to that of the bovine tubercle bacillus, and residence in the rabbit for 337 days had like effect.

"Similar results were obtained with Virus H 108, 'H. R.' "But in the cases of Viruses H 105, 'G. S.,' H 53 'D. H.,' H 107, 'H. H.,' and H 85, 'H. B.,' the result was different; neither a single residence in the calf or rabbit, nor passage through a series of calves, led in these cases to an increase of virulence up to the standard of the bovine tubercle bacillus. In one case, however, (H 105, 'G. S.),' the virulence for the rabbit was slightly increased by passage through the calf, and in another (H 53, 'D. H.a'), for the monkey, by passage through the monkey.

"To sum up the results obtained in these nine cases of lupus in which a bacillus was obtained presenting the cultural characters of the bovine tu-
bercle bacillus, in only one case did the bacillus obtained from the original material possess the high virulence as well as the cultural characters of the bovine tubercle bacillus. The other eight viruses, though their bacilli exhibited and retained the cultural characters of the bovine tubercle bacillus, proved less virulent than that bacillus, not only for the calf and rabbit, but also for the monkey and guinea-pig. It was found possible in two cases to increase the virulence of the culture from the original material by residence in the tissues of the calf and rabbit, so as to bring it up to the high virulence of the bovine tubercle bacillus."

In studying cultures obtained from horses similar experiments were carried out. These I quote at length (page 23, paragraph 43):

"Passage Experiments with Virus E II.—Four separate passage experiments were undertaken. (See Chart, Appendix, Vol. IV, p. 105.) The first passage experiment was through calves, two series of these animals being tested concurrently, and lasted two and a half years. Cultures were used, the dose for the first animal being 10 mgm., while the succeeding calves received 50 mgm. each. As a result of the passage the virulence for the calf was perhaps increased slightly, but for rabbits it was definitely increased.

The second passage experiment was carried out, like the first, through a double series of calves, and lasted two years and seven months. In one branch of the experiment the virulence of E II for the calf became increased up to the standard of the bovine bacillus. In the other branch the virulence was not increased.

The third and fourth passage experiments each included 4 calves, and lasted one year and four months and one year and seven months respectively. In both experiments there was an increase of virulence of E II up to the standard of the bovine tubercle bacillus.

In parallel experiments on rabbits performed with each of the cultures isolated during the passage through calves it was found that the results obtained with the rabbits coincided with those obtained with the calves. The cultures which produced slight tuberculosis in calves had not the virulence for rabbits of the bovine bacillus, whereas those which killed the calves with acute tuberculosis killed the rabbits with acute disease. In one instance the culture obtained from one of the calves which died of generalized tuberculosis was found fully virulent for the monkey, while in another instance in which, at the end of the passage, the calf had only slight tuberculosis, the culture obtained from it was found not to be increased in virulence for the monkey. Throughout all the passage experiments the cultural characters of the bacillus remained unaltered. In one experiment a culture derived from a rabbit which had been inoculated with a culture from the original material of E II was found to have increased virulence for the calf, in which it produced severe generalized tuberculosis.

44. Passage Experiments with Virus E IV.—Three passage experiments were performed, two of which were negative and one positive. (See Chart, Appendix, Vol. IV, p. 123.) The first passage lasted two years and four months, and began with a dose of 10 mgm., injected subcutaneously into a calf. A culture from this calf, passed on in doses of 50 mgm. into two calves, produced only slight disease. Cultures from each of these two calves passed on in a similar dose into each of two other calves also produced but slight disease.

"The second passage experiment lasted one year and seven months; a dose of 50 mgm. was injected in the first instance and the experiment was
performed in the same way and with the same number of calves as before; it was also negative.

"The third E IV passage experiment lasted one year and seven and a half months, and began with a calf (502) which received 50 mgm. subcutaneously; only slight disseminated tuberculosis was produced in this animal. The culture isolated from the lung of this calf was passed on into two calves (630 and 614) in similar doses. One died in thirty-one days of generalized tuberculosis, the other in thirty-three days of pneumonia with some tuberculous lesions. Another calf (602) inoculated with a culture from the suprarenal body of calf 502 was killed in ninety days, and showed progressive but not severe generalized tuberculosis. The culture from this calf, injected in a 50 mgm. dose into another calf, killed the animal in thirty-nine days of generalized tuberculosis. The virulence of E IV for the monkey was also increased at the end of the passage."

I quote further experiments upon this same point in which nine separate viruses of human origin were used (page 33, paragraph 70; see also Appendix, Vol. I, p. 55):

"In further experiments with the human tubercle bacillus nine separate viruses were used. With six of the viruses passage experiments were carried out on calves, the number of animals included in each experiment varying from two to seven, and the total duration of the residence of the bacilli in the calf's body varying from 247 to 512 days. There was no alteration in the characters of the bacillus at the end of the passage in any of the cases. After continued residence in one case for 484 days in the bodies of three rabbits consecutively, and in another 725 days' single residence in the body of one rabbit, the human cultures were found unchanged. Similar results were obtained in two experiments on the rat after residence in the one case for 454 days in the body of one rat, and in the other for 1614 days in the bodies of eight rats consecutively. Single residences in a cow for 529 days, in a pig 378 days, a guinea-pig 320 days, a dog 413 days, produces no change in the characters or virulence of the cultures of the human bacillus.

"These particular experiments, therefore, failed to effect any modification in the bovine or human tubercle bacillus."

It will be seen that in this last series of experiments no change in virulence took place. What conclusion is to be drawn from these experiments? I confess that I am unable to give an exact answer. It has been demonstrated conclusively that certain cultures may be raised in virulence so that they resemble the bovine in this and in all other respects. Are we then to suppose that only those cultures which we succeed in changing in this respect were originally derived from bovine sources? This does not seem a tenable proposition. However, if it is true, it proves that the bovine bacillus can and does undergo what may be called retrograde changes and approaches the saprophytic type. There is here a fertile field for further experimentation. It has not only an academic, but a practical, value. Personally, I do not hesitate to express my belief that the tubercle bacillus, from whatever source, may be changed in its characteristics by the influence of the soil in which it grows.

I would once more emphasize my belief that this question, from beginning to end, can be determined only by careful laboratory work. Clinical reports, in my opinion, are valueless. As a proof of this I would call your attention to the fact that for years the leading men of New York City stated that the bovine tubercle bacillus was not dangerous to children, and I believe that they exercised no precautions whatever in this respect in selecting milk for the feeding of babies. I have given you above the results of the investi-
gations made by Dr. Park in that city, showing that upward of 300 children die every year from the bovine infection. This has proved that these men were absolutely wrong, and entirely incapable of telling the difference clinically between bovine and human infection. For this reason I have not gone into consideration of the report of a collective investigation made in Germany by correspondence concerning the danger of milk from tuberculous cattle. I consider it as of no value whatever in settling this question. Again I repeat that only careful laboratory work is capable of giving correct information concerning this matter.

1 once more quote from the report of the British Royal Commission (page 13, paragraph 18):

"Of the total of 108 cases of human tuberculosis investigated, 84 yielded human tubercle bacilli only, 19 yielded bovine tubercle bacilli only, and 5 both bovine and human tubercle bacilli. Although the bovine tubercle bacillus may, as it appears, be solely responsible for certain cases of pulmonary tuberculosis (consumption), and though it may be present with the human tubercle bacillus in the bronchial glands, it is evident, from the data recorded, that the majority of cases in which the bovine tubercle bacillus is the infective agent in the human being are cases of alimentary tuberculosis. Such are cases of cervical gland and primary abdominal tuberculosis. In the latter class of cases at least the tubercle bacillus has unquestionably been swallowed. Received in this way, the tubercle bacillus, whether human or bovine, may pass through the pharyngeal or buccal mucous membrane and infect the cervical glands, or, getting into the small intestine, it may produce several different lesions, such as ulceration of the gut, tuberculosis of the mesenteric glands attached, and of the peritoneal covering. The percentage of these cases of alimentary tuberculosis due to the bovine tubercle bacillus is very large. Taking both classes of cases (cervical gland and abdominal) together, numbering 88, there are 17 in which the bovine bacillus alone was found, 19 in which the human bacillus alone was found, and 2 in which both were found. Taking the primary abdominal cases alone, it is seen that in 16 out of 29 the bovine bacillus was found; in 14 of these it was the sole infective agent present."

Page 40, paragraph 77:

"Meanwhile we, in view of the evidence adduced by us, regard ourselves as called upon to pronounce on administrative measures required in the present for obtaining security against transmission of bovine tubercle bacilli by means of food. In the interests, therefore, of infants and children, the members of the population whom we have proved to be especially endangered and for the reasonable safeguarding of the public health generally, we would urge that existing regulations and supervisions of milk production and meat preparation be not relaxed; that, on the contrary, Government should cause to be enforced throughout the kingdom food regulations planned to afford better security against the infection of human beings through the medium of articles of diet derived from tuberculous animals.

"More particularly we would urge action in this sense in order to avert or minimize the present danger arising from the consumption of infected milk. And in this connection it may be convenient for us to repeat certain facts observed by us in reference to the conditions tending to the elimination by the cow of bovine tubercle bacilli in her milk—facts in our opinion of such importance that they formed the subject of our Third Interim Report.

"Bovine tubercle bacilli are apt to be abundantly present in milk as sold to the public when there is tuberculous disease of the udder of the cow from which it was obtained. This fact is, we believe generally recognized, though
not adequately guarded against. But these bacilli may also be present in the milk of tuberculous cows presenting no evidence whatever of disease of the udder, even when examined post mortem. Further, the milk of tuberculous cows not containing bacilli as it leaves the udder may, and frequently does, become infective by being contaminated with the feces or uterine discharges of such diseased animal. We are convinced that measures for securing the prevention of ingestion of living bovine tubercle bacilli with milk would greatly reduce the number of cases of abdominal and cervical gland tuberculosis in children, and that such measures should include the exclusion from the food supply of the milk of the recognizably tuberculous cow, irrespective of the site of the disease, whether in the udder or in the internal organs.

In conclusion let me say, as I have said so often before, that the facts which we now have before us force the conclusion that bovine tuberculosis is a real menace to human health. It makes no difference whether only one person in one thousand or one in ten thousand dies from bovine infection—I feel that they are entitled to protection just as much as though their numbers were greater. It is our duty, both as an association and as individuals, to urge the passage of laws protecting citizens from this danger. It is also our duty to obtain health officers who will see that such laws are carried out. Let us continue this campaign and protect people from every source of infection. This can be done only by recognizing the bovine source of the disease as well as the human.

**TICK ERADICATION A FUNDAMENTAL PRINCIPLE NECESSARY TO CONSIDER IN THE AGRICULTURAL DEVELOPMENT OF THE SOUTH.**

By E. M. Nighbert, Atlanta, Ga.

Mr. President and Gentlemen:

I shall confine my remarks to the economic phase of the cattle tick question, because eradication is based on a business proposition and involves a fundamental principle in southern agriculture.

The experimental stage of tick eradication work has long since passed. The question now is, how and in what way may rapid headway be made in disinfecting the whole infected area? What I shall say must not be considered as any criticism, but really a frank statement in a broad way of conditions observed and the experience obtained in this class of work.

The work of tick eradication advances just so fast and in a certain way, no matter in what way the subject is presented to the public. To do the final work requires the same methods put into operation, and these methods, one or the other, must apply in every instance; that is, time to disinfect premises, no matter what the method. Nature helps in exceptional instances as it did in the flooded districts the past year. Exceptional opportunities, however, are hard to take advantage of in an effective manner. For that reason, floods, cold weather periods, etc., that sometimes happen in the infected area, have never accomplished much in the long run because it takes time to reach the people and put the machinery in operation quick enough to make the effort a success except in isolated sections.

Today the people who are directly interested and concerned are actually dealing with the conditions that have for more than a century hindered progress in a whole region, a condition and situation that has absolutely prevented and deprived a people from extending and permanently developing agricultural operations especially, in a general satisfactory and profitable manner. This, gentlemen, is the condition existing in the states and parts
of states that are still suffering the presence and depredations of the cattle fever tick. Some may differ with me, but a study of the history and the actual conditions from the above standpoint has proven to my satisfaction that the statement in principle is a fact and so far no one has disproved it.

Cattle of the right type and quality in any region of the United States are a fundamental industry. If there is any region that cannot or does not foster and encourage this industry, such a region lacks in general thrift and vigor, physically, financially and commercially. The people of a section or region are either gaining or losing in progress no matter what their engagements. Commerce and industry cannot stand still, they must go forward or backward.

Sometimes headway is made temporarily without considering the fundamental principles involved, but every time such headway is made, failure is the final result. There are no short cuts to permanent agricultural progress along any line.

Every nation, every region, every section of a region, and every community is what the people respectively make it. Every evil, every crime, every restriction, every hindrance to essential, legitimate, honorable and permanent progress along any line anywhere is the result of the attitude of the people.

We are prone to charge all our difficulties to natural elements and to Nature herself, while Nature deals apparently exceedingly unkind; yet a close study of her operations, we find her gentle and just, and her way of dealing an absolute necessity. Without her ways, the people of a nation would rapidly decline in every way.

It was never intended that a people should remain in a savage state. It was never intended that a people should progress and become enlightened without a great struggle and an honest effort.

The cattle fever tick is a factor and must be considered in the states affected before permanent and satisfactory improvement of cattle can be made. The tick must be considered before permanent improvement of farms so affected will be satisfactory and successful. The cattle fever tick must be considered before the principles of intensified farming can possibly be successful. The cattle fever tick must be considered in the states so affected before the intention and principles outlined in our land-grant colleges and research stations can possibly be permanent and successful.

Any and all the schemes of rural finance, farm management, ware-housing and holding crops, will, in my opinion, be a failure in the cattle tick infected area, because cattle are a fundamental industry and must be considered before the change of the methods of farming can possibly be successful.

I do not make these statements with the idea of conveying the thought that there are such tremendous profits directly in cattle, or that a cattle industry even with the ticks removed. will be easily established. It is a fact, however, that cattle build up instead of tearing down. Energy, time and crops, marketed, by means of cattle, leave almost as much on the farm as they carry off. Cattle make waste, unprofitable land profitable. Cattle bring in returns every day in dollars and cents. We eat cattle and their products.

It is really painful to see the deep fundamental principle of the necessity of cattle on southern farms overlooked. When the boy is told the steps necessary to take to make large crop yields, he is told to gather larn-lot manure and put it under his crops. The boy becomes encouraged with his little plot of intensified cultivated land and he may branch out on a larger scale. He will naturally desire cattle and other live stock. He may replace his scrub sire with a pure-bred one, to improve cattle, and if he fails or has not been taught that the cattle fever tick is a factor in producing good cattle,
he will become discouraged and disappointed, because if the susceptible animal is placed in contact with ticks, it usually dies; if it should survive, the animal is a disappointment in appearance and quality and does not compare with the original.

I believe in science and scientific teaching. Of all the scientific agricultural facts, so called, the absolute scientific facts concerning the cattle fever tick, its life history, what it does, and the positive plans of complete extermination, are achieved absolute positive facts. This cannot be said of any other paramount farm problem. When it is said the cattle tick can be permanently removed from any farm, it is a definite statement in fact, while on the other hand, no one has ever or can he lay out a plan to assure certainty in crops or yields, no matter what his experience, knowledge or scientific training. It is remarkable and to the everlasting credit of those who discovered and worked out the life history of the cattle tick and the plans of its eradication and to those who are engaged in actually extending and applying the methods that our country may be freed of this serious cattle disease carrier, that all are of one opinion in this great discovery and the work of its eradication. This is not because we are such saints and possess such amiable dispositions, but because the facts demonstrated year after year forced this opinion. People, no matter what their station in life, like to differ in opinions and plans in doing things, but with the work of tick eradication, one or other of the plans only will work, all others are failures.

Of all the animals with which I have had anything to do (and I have broken mules and persuaded persons to eradicate the cattle tick from their farms) man is the big proposition in tick eradication.

The problem of eradicating the cattle tick, if it is a problem, is not with the tick, but the people. People are human beings, they think and talk. They have opinions and a right to opinions. These opinions must be considered in our work; in fact, the consideration of the action and opinions of men with whom we have to deal in the tick infested area, are what makes eradication of the cattle tick a problem and a big undertaking.

"Blessed are the facts," we have them,—we know the plans will work one hundred per cent of the time. This places us in a strategic position for defense. Unlike the scientific agricultural teacher, who may instruct to plow deep, prepare the soil well, and sow pure seed, even then he cannot assure a satisfactory yield; while the expert in tick eradication work can apply the plan and assure results, no matter what the conditions of climate or soil. If the operator fails on his respective farm and we think we have the physical ability, we can look him in the face and say, "D—-n you, you failed to carry out the plans in the way we said."

Present day conditions and the rural status that exist in the United States or any region of this country, may be accurately and honestly charged to ignoring the deep fundamental principles that have all these years been yearning to come to life. These conditions are the result of lack of knowledge and thinking among our teachers and statesmen. Present-day conditions in the tick infested area are the results of a desire to override and ignore a fundamental principle, a desire to make short cuts to success.

It has been said and I concur in the statement that there has been in the past enough high-grade, well-bred cattle imported into the tick infected states, to make the whole region a leader and a competitor in marketable well-bred cattle throughout the country, but they died or retrograded into unsatisfactory, unprofitable property. I desire to state of my own volition that there is not a dairy or pure-bred beef herd in the infected area that
still harbors natural infestation that is satisfactory and profitable. Those satisfactory are maintained free of infection.

A great many people seem not to realize the significance or importance of the work of cattle tick extermination now in progress in the southern section of this country. It seems satisfactory to some to charge its presence to the opening of "Pandora's Fabled Box," that it is a necessary evil here to stay, not realizing that an enlightened people are entitled to all the comforts and blessings commensurate with the great effort, that liberty and pursuit of happiness may be achieved.

The cattle tick and its depredations enslaves people of whole sections and states to one crop, one market for cattle, one price, and above all and the most serious, continued debt. It is only the experienced and close observer that realizes all these facts. To illustrate, it is interesting to note how a people will endeavor to accommodate themselves to conditions and environments under which they have lived for generations. Generally, a steak or roast ordered by persons living outside the large cities used to the kind of meat that comes from inferior animals in the tick infected area, want it cooked well done. Why? Because it cannot be eaten or relished any other way; it is tough. A sirloin or rump-roast marbled with fat, is pushed aside as undesirable. Only the red muscle of native stock suits, because they are used to it and have not the knowledge of the better kind. It is interesting also to note that the daily consumption per capita of milk in the tick infected area is less by half than in other sections of the country. Why? Milk is scarce.

In every nation or part of nations of the world that suffers cattle fever tick infection, is where the agricultural possibilities, speaking broadly, are greatest. The climate, seasons and rain-fall actually favor the highest development in every phase of agriculture, because such conditions naturally favor luxuriant growth of vegetation and long growing seasons. If it were not for the fever tick, cattle would solve the problem of high development of the land. On the other hand, every nation or part of a nation that stands at the top in agriculture pursuits and productions, including farm economics, cattle have been and are the "key" to success. Look at Holland, Denmark, the Channel Islands and the cattle breeding and feeding sections of our own country.

Today there are too many in the "flowery beds of ease" of popular agriculture. In such a state of alchemy, fundamental principles are overlooked and even ignored, if observed. What I mean is, that any imaginary power or process of transmitting the common into the precious by not first considering the real fundamental principle, is a failure and always has been. "Give me the guy that put the dip in the vat, the guy that put the arsenic on the tick, the bats in his batteries have accomplished something." He's the guy.

The Southern Commercial Congress says that the South possesses greater possibilities than any other section of our country—in sea-ports, harbors, inland waterways, good road extensions, manufacturing, mining, jobbing and agricultural, all of which need further development. Let's grant this and take agriculture as the basis of all wealth, which is a fact. Now all hindrances to the development of agriculture to a higher degree must be considered as a factor and a fundamental principle in developing all these great natural resources. To develop agriculture something must be done for the man who lives in the country and tills the soil. We must be careful to consider the little man who operates in a small way, because it is the little man on the farm that feeds and clothes this whole nation, not for a year, but year after year. The millionaires and trust companies are not
supplying our market with cattle, hogs and sheep, it's the little man everywhere. He produces seven-eighths of our raw products. It is readily seen then that the fifty to one-hundred million dollars' annual loss, the result of the cattle tick, strikes the very heart and core of our greatest asset in the South, farming.

With the cattle tick removed from southern farms, the benefit is apparent at once. How? Briefly, because the way is clear and not until then, to make the principles of intensified farming now taught and urged a success. If this explanation is not well taken, I will relate a story of an Irish Brigade which was in the West Indies during the great plague of "Black Death." One soldier was carrying out the order of the army surgeon in feeding the living and hauling away the dead. He was loading the wagon with dead bodies. In one corner was sitting a Chinese cook apparently dead. He was grabbed and thrown into the wagon along with the gruesome deal bodies. He began to struggle and shout. "No, no, me no dead, me no dead." "Shut your mouth," said the brave Irish soldier. "Do you know more than the doctor?" Seriously, then, the cattle fever tick is a factor in the further agricultural development of the South.

The eradication of the cattle tick, which transmits "Southern," "Splenetic," or Texas Fever of cattle, from the South, is a far-reaching business proposition. It is a movement along the line of general farm improvement so earnestly and forcibly pressed by every factor interested in advanced agriculture. Citizens, business men, associations and organizations of all sorts, who have the interest of the agricultural development of the South in mind, cannot overlook the very necessity of a cattle industry.

The South is a great farming region; it is advertised to the world as such and the prospective settler is informed of the advantages and opportunities along every line. The presence of the cattle tick is a menace to the cattle industry. Cattle are more than likely to be one of the objects of the settler; therefore it is apparent what the present condition means.

Of the feeds available for the southern stock raisers, the one that first attracts attention is the product of the cotton field, cotton seed meal, and if we are to judge the fitness of a region by its feed, this alone would brand the South as intended by nature for a livestock section. The cotton states produce enough cotton seed meal to supply protein to over six million cows for each year, but we are not dependent upon cotton seed meal alone, because a ton of pea-vine hay will produce 320 pounds of digestible protein, and we all know that the land that will not make a ton of pea-hay per acre is exceedingly scarce.

Dairy farming is increasing in almost every section of the country, because the dairy cow maintains the industry whose products are worth more than the wheat crop, hay crop or "King Cotton." These products go to almost every one of the nineteen and a half million families of the nation as milk, butter and cheese, and largely because dairy farming is recognized as one of the most economical forms of agriculture, where soil fertility is considered. Where dairying and cattle feeding are practiced the farms show little diminution of fertility.

The cotton states produce about four and a quarter million tons of cotton seed annually. This material should be fed to stock and should never be applied to the soil in the form of raw material, for the annual manurial value of the cotton seed fed through stock is worth more than fifty million dollars, while the market value is something like forty million dollars.

During the past season a commission known as the "Royal Tick Commission of New South Wales and Queensland, Australia," visited this country
for the purpose of studying American methods of tick eradication. It is interesting to note their interview with a press reporter before leaving the south-eastern southern states. "The members of the commission stated that ticks are proving a great menace to the cattle industry in their country in the way of market restrictions, deaths of animals, and the expense of maintaining quarantine to prevent the disease from spreading to uninfected territory. They stated that in former years in their country great numbers of susceptible cattle died of the fever, but since the people have been aroused to preventive measures, loss by death has decreased. The statement follows that ticks prove a menace when one considers that in Australia they have grass for grazing the year around and from the fact that where they find 5,000 head of cattle in Georgia and South Carolina in a given area, they have from thirty to forty thousand on the same area. They stated they were surprised at the small attention given cattle raising in the southeastern states that had been visited, considering the excellent opportunities for people to engage in the business. They pointed out, however, that the sections so far visited have the advantage of their experience, since the farmers here are in a position to eradicate the ticks before the cattle industry is undertaken in such proportions. The commission stated that in a small area of New South Wales, about the size of two Georgia counties, their state government alone spends $125,000 annually in fighting the tick and that the cost is equally as great to the stockmen. The fact was pointed out that on the same ship on which they sailed for America, three thousand tons of chilled beef and mutton were transported to American shores."

I want to again call the attention of this association to the important point of prohibiting the transportation of tick infested cattle either within a state or from one state to another. Animals of the infected area susceptible to tick infestation, if infested, or exposed, should be denied transportation anywhere anytime. I believe this is right in principle and should be advocated and taught and provided for by law.

This association, whose very function is to deal with matters along live stock sanitary lines that are national in character, therefore should go on record outlining a plan to bring about the above significant point. How this is to be done and how such a law may be applied, is left with you for your discussion, that definite action may finally be had. The Georgia plan of requiring all shipments of cattle of the infected area of the state to go on board cars or boats free of infestation, under oath of shipper or owner, effective after December 1, 1912, is worthy of your consideration and discussion.

The question of tick eradication and its importance to this nation has received the attention of the public during the recent past in a very effective manner, and the question must ever and always be uppermost in the minds of those who have the responsibility of extending and completing the work.

Farmers and stock-growers appear not to give enough thought to the future of the live stock industry of this country. For their benefit I want to say the American people are meat eaters, always have been and always will be. We have been born, bred and brought up to the present high standard of efficiency and ambition with milk, butter, beef-steak, pork and lamb chops as our mainstay in diet. The past centuries of our lives and make-up make this dairy, meat and meat-food products a necessity for existence, besides a great commercial asset and means of permanently improving our land. Cattle are a fundamental industry that must always be fostered and encouraged in this country.
Dr. Kiernan: Mr. President, and gentlemen, the excellent papers discussed by Dr. Nighbert and Dr. Bahnsen\(^1\) presented fundamental and economic principles of tick eradication, and it is true that they are fundamental principles and are of economic importance to the people of the South and also to the people of this great American nation. Not more than fifty per cent of the land of the South is being utilized. All that unused land will grow grass. If the opportunity is given it is possible to develop a cattle industry in the South that will reach an immense magnitude. In Denmark there are 31 cattle raised to every 100 acres of land. In Germany there are 25; in the Southern states but 3. Taking a conservative estimate, if 10 cattle are raised to every 100 acres of land in the South it will increase the number of cattle from 10,000 to 30,000,000. The average value of cattle in the Southern states today is about $15 per head. With the eradication of the tick and the development of the cattle industry it is not unreasonable to expect that in years to come the value of cattle will be increased to what the average value is in the state of Illinois, which is $30 per head. With 30,000,000 cattle at $30 per head the resources of the Southern states will then amount to about $900,000,000, as against $150,000,000 at the present time, and that is something for everybody in this country to give a little attention to, the possibilities of the cattle industry.

Now in the early work of tick eradication there was no means of interesting the people to destroy the tick as the people of the Northern states were interested in stamping out the diseases of their live stock. As Dr. Bahnsen well said, the United States regulations permitted the movement of cattle from the quarantine area for immediate slaughter. They did not raise any pure bred cattle. They were not looking for any other market than the market for immediate slaughter. Therefore there was no way to coerce them into accepting the work of tick eradication, as a number of the states were trying to help themselves by stopping the interstate movement of scabby sheep or the interstate movement of scabby cattle. So in the early efforts to interest the people in tick eradication work it was necessary for the Government to spend a large amount of money, against a small amount of money spent by the counties and the states. That the people of the Southern states have appreciated this problem and have responded in a generous way to the co-operation lent by the Department of Agriculture I will attempt to show later on. In the matter of laws and the enforcement of laws with regard to tick eradication work, I think we people of the Northern states can look with

\(^1\) The stenographer failed to record Dr. Bahnsen's address.
pride to our fellow Americans in the southern states and learn a great lesson from them. In four of the Southern states the Supreme Courts have upheld the regulations and the laws that were called to their attention by the efforts made by the officials of those states to enforce tick eradication regulations. This is a work, of course, that is bound to create a good many theories as to how it should be conducted. When the work was undertaken in 1906, we started at the point of least resistance in the northern tiers of counties and worked south. Well, naturally we encountered at different intervals opposition or indifference. We undertook to lay out a tier of counties and accomplish the work in those, and then move to the next tier of counties, but sometimes we found that the next tier of counties were indifferent, would not spend any money to co-operate in stamping out the disease, so that it was necessary to go to counties where the people were willing to spend money, and we can show later on that that action was justified by the result. In our efforts to create interest among the people in our territory we undertook the organization of live stock associations, and this year there were organized seventeen county live stock associations. Now in place of the officials—the Government men and the state men and the county men—assuming all the responsibilities of combating the difficulties that are encountered, we get the live stock associations to assume the greater amount of that burden. If we had difficulty in a neighborhood or with an individual, in place of going to the court officials and swearing out a warrant for him, we go to the county live stock association, ask the president and members of the association to try and prevail upon the members in that neighborhood, or that individual, to cooperate, and have met with great success.

Another effort to disseminate the knowledge and create further interest was the distribution of the literature that we had, some of which was distributed here last year. Hundreds and hundreds of thousands of pamphlets, gotten out by railroad companies and corporations were distributed throughout the quarantine areas, and the people responded almost spontaneously. In areas where this literature was sent out and meetings held the work was taken up in a very short time.

Another means of creating further interest was in the distribution of some bull calves as prizes, subjects that were touched upon at the meeting here last year, when a committee was appointed to investigate it. I was out of the room when the committee reported. I don't know what the report was, but in these tick eradication contests in Mississippi this year we had fourteen pure bred bulls contributed, mostly by people in the Northern states, one by the Inter-
national Live Stock Exposition and another by the International Harvester Company, and yet another by the pure bred breeders throughout the country. In that contest there were seventeen counties engaged all this season, and I will attempt to show in a few minutes that this project created interest in those counties and produced results. At the State Fair in Jackson, Mississippi, held last October, those calves were distributed. We gave each of the seventeen counties two calves, a beef calf and a dairy calf, and the calves were accepted at the State Fair and taken out on the race track and awarded by the Governor of the State. That created interest, and that interest will spread to other counties and we hope next year that we will be able to get up contests something like that.

Now I want to call your attention to something of the business end of tick eradication, and I will be just as brief as I possibly can. I want to say to you gentlemen, that the Southern people have responded to the call to co-operate in exterminating a great disease. They are attacking and exterminating it, without having a live stock industry that was threatened with extermination like the live stock industry of Pennsylvania or Kansas or New York was threatened by the foot-and-mouth disease, a disease that has existed for years in the Southern states and that the people had submitted to, a disease that was their master and to which they bowed and gave their obedience. They were willing to submit to the tick, but when this effort to eradicate the tick was introduced to them the people of the South responded to it more nobly, I believe, and more generously than the people of our great stock raising states have responded to any other efforts made to exterminate disease.

In the year 1909 in the state of Alabama, the Bureau of Animal Industry spent $20,000 in round numbers and the state and counties spent $7,000. In 1912 the Bureau of Animal Industry spent in Alabama $9,000, the counties spent $13,000. In 1909 the Bureau of Animal Industry spent almost $3 to every dollar spent by the state and counties, and in 1912 the state and the counties spent almost $2 to every dollar spent by the government. In 1909 in the state of Mississippi the government spent $10,000, and the counties spent $3,000. The government spent $3 to every dollar spent by the state and the counties. In 1912 the Bureau of Animal Industry spent $41,649.31 in Mississippi and the state and the counties spent $85,893.45. In 1909 the Bureau of Animal Industry spent $3 to every dollar spent by the state and counties in Mississippi. In 1912 the state of Mississippi and the counties in Mississippi spent $2 for every dollar spent by the Bureau of Animal Industry. In 1909 the Bureau spent $31,000 in Tennessee and the state and counties spent $18,000
in Tennessee. In 1912 the Bureau of Animal Industry spent $111,000 in Tennessee and the state and counties spent $21,000 in that same state. In 1909 the Bureau spent $2 in Tennessee to every dollar spent by the state and counties. In 1912 the Bureau spent one dollar to every $2 spent by the state and counties. Summarizing, in 1908 the Bureau of Animal Industry spent $40,000 as against $21,000 in the states of Alabama, Mississippi and Tennessee. In 1909 the Bureau of Animal Industry spent $62,000 against $29,000 for the states and counties. In 1910 the Bureau spent $58,760 against $56,531. In 1911 the Bureau spent $79,000 against $92,000. In 1912 the Bureau spent $62,520 against $125,877. Since 1908 in Tennessee, Alabama and Mississippi the Bureau of Animal Industry has spent $303,325 and the states and counties have spent $321,415.05. So from 1908 to 1912 the states of Tennessee, Alabama and Mississippi have spent dollar for dollar with what the Bureau has spent. And then in our efforts and in those of the Bureau and the state to eradicate foot-and-mouth disease, $300,000 was spent by the Bureau and $113,000 was spent by the states and the counties involved.

Now, taking up just for a moment the proposition that Dr. Bahnsen made regarding the prohibition of the movement of tick infested cattle. That was something that was spoken of last year, and while at that time it was in a theoretical state it has been tried out since. In several counties in Tennessee efforts have been made for several years to take up the work. At one time, two years ago, we went to those counties and told them that by taking advantage of the zero weather that they had they could at a very small cost stamp out the tick, with the help of one or two inspectors, at a cost of not more than $2 or $3. They said “No, we will not spend a cent on it; the people don’t want it.” Well, we could not work with such people, but the interest had been spreading throughout the state, and the desire of the state to clean up led them to adopt a regulation prohibiting the movement of tick infested cattle throughout the state, preventing the movement of cattle on the public highways and on the public grass, and also notifying the railroad companies that no cattle could be moved out without a permit; and to prevent their movement the railroad companies’ stock pens were locked with chain and lock. In sixty days every one of those counties took up tick eradication work, and I am here to tell you gentlemen that we have never had such hearty co-operation as we have received in those counties that were coerced into taking up the work, and the people have told us on repeated visits to those counties that “while we opposed this work for years and would have opposed it for a number of years more, now that we have taken up the work the people are almost
unanimously in favor of it," and they say that it is the only way that they would ever have taken up the work, and I am sure that we will hear from representatives of other states on this subject as to the progress that has been made in various states. (Applause).

AFTERNOON SESSION.

The President called the meeting to order at 1:45 P. M.

Dr. George R. White: Mr. President and members of this Association, I consider the subject of tick eradication entirely too important to us of the South, and also to you people of the North, to go by and be only discussed by one member of the Association. We realize, gentlemen, that the disease which you people in the Northern states consider the paramount disease or the most important disease for consideration is hog cholera or bovine tuberculosis; but, gentlemen, to us in the South there is no disease which rivals Texas Fever in importance, in our estimation. I think Dr. Bahnsen of Georgia demonstrated to you people beyond a shadow of a doubt that while Texas Fever interested us in the South from a cattle raising viewpoint slightly more than it did you people of the North, that indirectly the people of the North were as much interested in tick eradication as those from the Southern States. In my opinion entirely too little attention has been paid by this Association to tick eradication work in the South. Gentlemen, it is a problem which is of concern to all of us. It concerns every man. It concerns the railroads, it concerns the state, it concerns the Federal government. Now, in Tennessee we have made progress in tick eradication work; I mean by progress, that we have made slow progress in Texas Fever tick eradication work. In 1906 when this work started in Tennessee we had fifty-one counties in that state under quarantine, on account of the presence of this disease. There is a map of Tennessee showing the conditions there at that time. This work has gradually progressed under the direction of the Federal Government, with the co-operation of the state and counties involved, until now this map shows the conditions in Tennessee. That shows you, gentlemen, that we only have seven counties yet remaining in quarantine on account of the presence of this disease. Now if Texas Fever ticks can be eradicated in forty-three counties in Tennessee out of fifty-one, there is absolutely no reason why Texas fever ticks cannot be eradicated at a reasonable expense and in a short time in those six other counties, and if ticks can be eradicated in fifty-one counties in Tennessee there is no doubt but ticks can be eradicated in a short time at a reasonable expense in every other state where Texas Fever tick exists.
One year from now we hope to have Texas Fever ticks entirely eradicated in Tennessee. If we do we will enjoy the distinction of being the first state in the Union to entirely eradicate the Texas fever tick from our borders. The regulations providing for the interstate movement of cattle, not alone on the part of the Federal Government but by the various states, are entirely too lenient. There is absolutely no doubt about that, gentlemen. As long as we allow transportation companies to drag these tick infested cattle around to the four corners of the country, you not only stand a chance of infestation in your state, but you discourage measures to eradicate tick in our state. As long as your markets are open for the reception of those tick ridden cattle, with almost no exceptions, then our people are not induced from a monetary viewpoint to eradicate these ticks. The time has come when there is absolutely no doubt that these regulations should be tightened up and tightened up considerably.

Now our market centers are Cincinnati, Louisville, East St. Louis and Chicago. That means that the regulations of the states of Ohio, Kentucky and Illinois are the ones which interest us most. On account of the fact that most of our cattle from the Southern States go to East St. Louis and Chicago, we consider the state of Illinois a menace to the live stock raising industry of the South. Yes, you are a menace in Illinois, because your restrictions are not sufficient to prohibit the movement of these tick infested cattle into the state. And I hope that the Federal Government and the states of Kentucky, Illinois and Ohio will tighten up their regulations and help us out, help us do this work, because at the present you greatly handicap and hamper us. (Applause).

Dr. W. H. Dalrymple: Mr. President and members of the Association, I feel that I might say a few words in connection with this big problem. And I wish to add to and emphasize the proposition that this is not a sectional question, this question of tick eradication. I will never forget what Secretary Wilson said at the time we were appealing to Congress for an appropriation. He spoke to the Committee on Agriculture and this is what he said: "Gentlemen, this is not a sectional question, this is a great national question. And it is more than that, it is an international question, because it was this Texas Fever that gave Germany her first excuse to discriminate against our meat products."

We in the South look upon it as probably the greatest industrial problem we have to deal with, and when our country is free from this parasite it is going to open up the field for the Northern breeders, because we will have to depend on the North for
breeding stock for many years to come. That we can raise stock
down there as well as anywhere in the country was proven a few
years ago at our station in Louisiana, when we shipped a carload
of black Angus grade steers to this market that topped the market
by 40 cents. Then we had to immunize these steers against the
fever, which held them back considerably in their development, but
even then we got forty cents higher than any man in the market that
day. That shows the possibilities that there are down there, and as
I say, it is a great industrial problem. If it were not so the railroad
companies would not be taking it up, the great southern commercial
organizations would not be taking it up, and it is progressing very
wonderfully considering the amount of ignorance that has prevailed,
and that still does prevail. It is a question of education to a large
extent yet, but there is nothing that seems to educate the people
there more than the dipping vat. The results are so splendid that
opposition simply melts away after a dip or two of the cattle in
the arsenical solution, and we find, that though we have plenary
power, that is, our live stock sanitary board, to promulgate regula-
tions, we find that the best way is to try to get the people to appro-
priate money in the different parishes—we are the only state with
parishes—to build dipping vats and give the people an opportunity
free and for nothing to prove for themselves that dipping is an ex-
cellent thing for tick eradication. We have adopted that in some of
our parishes where we are not yet working systematically, but the
people now would not take anything for the experience they have
had, people that were very much opposed to it at one time, and the
result is that we are going ahead now and doing considerable work
in this way. We had one great calamity in the lower Mississippi
Valley, the overflow. We took advantage of the overflow condition
of the various counties on the west side of the river and which were
practically free from ticks, and where the refugee cattle were taken,
and we got right after that condition, and by circular letters and so
forth tried to prove to the people that if they would take these
refugee cattle that were taken away from the overflow land and
brought over there and get them rid of ticks before they returned
them, why they would have a tick free country. And we have one
parish in Louisiana which commenced work after the overflow, and
from what Dr. Wight, Bureau inspector in our section, reports,
that parish will be free from ticks next summer, and that work
has been commenced only since the overflow of the Mississippi River
this year. So we are going ahead, but to do this requires consider-
able attention. Some of the people will tell you that the Lord sent
the ticks to us, and it is a gift of God, and that it is wrong to get
rid of them. Of course we have to get that out of their heads. It is very nice, I suppose, to philosophize in that way, but we think more of the cattle than of our ticks, and it is such a simple proposition, simply dipping the cattle into this solution, and they will be free from this trouble.

As I said at the beginning I just want to emphasize the fact that this is a big problem that affects not only the South, but the whole of this country. It is a National proposition, and we would like you gentlemen from above the tick line to feel that in helping along with the work down there you are helping not only that district and those sections, but the entire country, because what is helping the people down there will be of great benefit to the rest of the country. You will find that it is opening up big markets for beef cattle especially, and for dairy cattle, and so it is not merely the people down South that are going to be benefited by this, but it is the whole United States. (Applause).

Mr. W. N. Waddell: Mr. President and gentlemen of the convention, I am sorry that Texas has not a man here that will be able to tell you our troubles in proportion to the amount of trouble we have got on hand. Probably all of you understand that Texas today has about one-third of the tick infested area of the United States. Two-thirds of the state of Texas is infested with the tick, and while there is not a man within the sound of my voice that would like to see radical legislation looking to the extermination of the tick off the ranges of our country and thereby bettering our condition more than I would like to see it, I merely get up here to say this, that radical legislation or radical recommendations by this Convention or by this Association and radical laws promulgated in Congress might engender a spirit of retaliation on the part of the Legislature of Texas. We have inaugurated in Texas in the last eighteen months a system of education among our people. We have advanced the work, I am going to say with a certain degree of modesty, more than it has ever been advanced during the existence of the Sanitary Board in our state, but if we were to commence now and impose radical regulations on our people of Texas, we might incur a retaliatory spirit on the part of the Representatives and Senators in our Legislature and destroy what we have already done. I want to again impress on you that I favor those radical regulations, but we have got a large proposition in Texas. It staggered me when I look at the map and think of an area of country, five hundred miles one way and six hundred miles the other way that is infested with ticks, and that I am called upon to inaugurate a system of cleaning that country up. The work de-
volves upon myself and Dr. Allen, representative of the Bureau of Animal Industry, and in so far as the laws that we have got, give us authority, and in so far as, you might say, running a bluff over the people can be done, we have done, we feel, exceedingly well. We are educating the people, and I feel I am safe in saying to this convention that we have done better the last year than ever before. I told you a year ago here that I would make a better report now than I could make last year. I am prepared now to make that report, and it is better, and our conditions are better, our people are in better harmony with the Sanitary Board, and there is only one thing that is in our way now. The one thing that we have got to do in Texas is to promulgate regulations that these large cattle interests can live up to. We are differently situated from any other state. In Texas we have got herds of cattle ranging from 5,000 to 60,000 head of cattle under one holding that are tick infested. You cannot work them like you can a farm or little bunch of cattle, and so I say, if this Convention and the Bureau of Animal Industry will help us inject these little practical measures that come up for the handling of these cattle and let us in our way adopt the policy, you might say, to be carried out in Texas, we will show you year after year a gradual improvement in our condition. And it will not be so gradual. It will be a tremendous improvement. I anticipate that in the spring of the coming year we will commence to clean up an entire tier of counties across the state of Texas; we will start an entire tier of counties in the work, and have them clean up. I don’t approve of going in indiscriminately inside of the quarantine line in our tick eradication work. Where there are infested cattle running into another man’s land you cannot keep them free. I thank you.

Dr. Bahnsen: I take exception to the statements made by Mr. Waddell of Texas. He says that we ask for radical measures. No measure is radical that is easily carried out and that can be profitably carried out and executed. As a matter of fact the eradication of the tick, whether it is in Texas in a tick infested area or whether it is on the border, can be done at an expense of less than one-third of what it costs to feed the tick. It is merely a question of getting the people interested, and we know that you cannot get some people interested when it requires a certain amount of labor in order to carry out the recommendations that you expect to bring into force. Now, as a matter of fact the state of Texas is not at all in a real bad position when it comes to tick eradication. Our greatest difficulty is not with the man that has a number of cattle, and I think the conditions are not far different in any other state. It is the
man that has got a little bull yearling worth three or four dollars that gives us trouble. The man that has a few cattle that are worth something, you can go around to and explain what tick eradication means and he will find some way to get rid of them, he will find it to his own individual interest to get rid of the tick. He can appreciate the value of that. A man or a corporation, whatever it may be, that has got fifty or sixty thousand head of cattle, can put in a hundred vats and thoroughly clean their herds of ticks, and they can make money on that, and surely they can ship them tick free, and that is all we expect. We don't expect to restrict the movement of cattle at all, except in so far as they carry ticks, and the proposition is not only sensible, but it can be easily carried into effect, very easily. Cattle need not be shipped with ticks on them.

Dr. White: We have heard this same play I think, from Texas, for the last ten or fifteen years, and I don't believe it is right for Texas or any other state to continue to hamper the Texas Fever Tick eradication work in the other states.

Mr. Waddell: I wish to say to Dr. Bahnsen that you do not understand our conditions exactly in Texas.

Dr. Bahnsen: I was raised there and I ought to know.

Mr. Waddell: I tried to make it plain that we have got to contend with the Legislature in order to get an appropriation for carrying on this work. Sixty-six and two-thirds per cent of our Representatives and Senators are below the quarantine line, and we have got to pat those fellows on the back in order to get them to help us in this work. We have got to adopt that attitude. It is not that we are opposed to radical legislation, it is a method that we have to pursue in order that we may be provided with facilities to carry it on. I don't want Dr. Bahnsen to go away from here thinking that we are behind in wanting to do anything, but we have got a condition there different from most of you; we have got to palliate these fellows in order to get this appropriation and be allowed to do this work.

Dr. White: Now Mr. President, I wish to say that we also in Tennessee have a majority of the Legislators under the quarantine line, we did when this work commenced, and we in Tennessee, as in all other states, had to depend on the Legislature for appropriations to do the work, and I won't take that as an excuse from Texas for their failure to take up Texas Fever tick eradication work in a systematic manner.

Now in order to induce our people to complete eradication work in these counties, it becomes necessary, gentlemen, to force them, and what I mean by forcing them, is that we put a regulation
into effect which required the railroad to lock the chutes and the pens and prohibited the movement of any cattle out of these counties at any time to go anywhere for any purpose. Now some people said that could not be done, but it has been done in Tennessee, and it can be done in any other state.

Dr. Nighbert: I want just to straighten out a point there. Now the point made by Mr. Waddell that the greater portion of the State of Texas is in the infested area, and the State Representatives live there has no bearing on the subject. The entire state of South Carolina was in the infested area, and they passed this law. In the state of Georgia all but seven counties were in the infested area, and they passed this law. Now if we cannot depend on state officials to see the significant point of this work, and the importance of it and put this thing right up to the people, then whom can you depend upon? You cannot depend on the layman and on the cattle interests, and so that is the point I want to make, that all this country that we are working on now was infested, and we got the laws and appropriations and we got convictions in every county in which there was a violation.

IMMUNIZATION AGAINST HEMORRHAGIC SEPTICEMIA.

By John R. Mohler and Adolph Eichhorn, Washington, D. C.

The term hemorrhagic septicemia was first applied by Hueppe in 1886 as a collective name for all those diseases which were caused by the ovoid bacterium, the \textit{Bacillus bipolaris septicus}. The designation of Hueppe included chicken cholera, rabbit septicemia, hemorrhagic septicemia of cattle and swine plague as the original group. Later investigation proved that there are a number of other infectious diseases in animals which directly or indirectly are etiologically identified with the \textit{Bacillus bipolaris septicus}. Thus, this organism was found to be responsible for the buffalo disease (so-called Barbone), infectious pneumo-enteritis of sheep, and the infectious pleuro-pneumonia of calves. This enumeration of diseases does not embrace all affections in which this germ is involved, as there are other infectious maladies, such as influenza of horses, catarrhal pneumonia of calves, and distemper of dogs, in which the ovoid bacterium is held to be an important factor. Its association with the latter diseases, however, has not yet been satisfactorily established; nevertheless some of the pathological changes observed are caused by this microorganism, and at least it must be considered in these instances as a secondary invader.

All species of domestic animals are susceptible to the infection, although the pathogenic action of the organism for a certain species is usually higher than for other species, and under certain conditions may even be absent; nevertheless it is known that under appropriate conditions the organism may gain in virulence and become a typical pathogenic agent for any of the species. Thus it has been observed that after an outbreak of hemorrhagic septicemia in cattle, hogs have become affected with swine plague on the same premises, and likewise the disease in sheep has developed subsequent to an infection of hogs.
It is therefore apparent that the group of these diseases is caused by the same germ which possesses only a variance in virulence for the different species of animals. This fact is also substantiated by the morphological and biological characteristics of the germ.

These ovoid bacteria live as saprophytes but under the influence of certain conditions they become parasitic, in which state they sometimes attain a very high virulence. After some generations they gradually lose their parasitic nature and return to their original saprophytic state. As parasites in their passage through the animal body they show certain characteristics, as a result of which they are known as a variety of the *Bacillus bipolaris septicus*. Thus as a rule the diseases of the different species of animals are caused by these specific varieties, viz., the hemorrhagic septicemia of cattle by the *B. bovisepcticus*, swine plague by *B. suisepcticus*, chicken cholera by *B. avisepticus*, the disease in sheep by *B. ovisepticus*, etc. These varieties, however, have a common saprophytic origin which justifies their being grouped into one family, and all diseases caused by microorganisms with the following characteristics should be included in this group: Ovoid bacteria without motility, Gram negative, polymorphous with involution forms. They do not liquefy gelatine, and do not coagulate milk nor change its reaction. The bouillon cultures have a peculiar odor. On acid potatoes they form no visible growth and in pancreatic bouillon no indol is formed; they are usually aerobic, but may grow anaerobically. They produce no spores and have no flagellae. They possess a greatly varying virulence which is usually very high. These specific characteristics are invariable and the absence of any of those enumerated would exclude the organism from the hemorrhagic septicemia group.

The group relation of the organisms of this family is substantiated by the following observations: Chickens may be immunized against chicken cholera with cultures of the rabbit septicemia organism with the same satisfaction as with the attenuated cultures of chicken cholera (Kitt). Likewise Jensen immunized chickens against cholera with the bacteria of calf septicemia. Mayr and Kitt immunized rabbits against swine plague and chicken cholera with sera of the latter diseases. Perroncito produced a fatal septicemia in calves with inoculations of the swine plague organism. Galtier found swine plague bacteria infectious for sheep, goats, calves and horses. Voges has even succeeded in producing a disease as fatal as cholera in chickens by feeding them swine plague bacteria. Further, it has been proven that in spontaneous outbreaks, hogs may become affected with the virus of chicken cholera. Finally, Lignières in his exhaustive experiments proved the virulence of the hemorrhagic septicemia organism for all domestic animals, in which the most varied clinical picture may result from the infection.

These together with the findings and observations of other investigators have established the close relationship of the different varieties of organisms of this group. Moreover through this knowledge it has been possible to prepare a polyvalent vaccine from the different varieties which gave satisfactory results in the control of outbreaks and which is still being recommended and employed in various localities.

Immunization against the various forms of hemorrhagic septicemia has engaged the attention of numerous investigators since the time the causative factor was identified. Pasteur was the first to work out a method for immunization against chicken cholera, which, however, failed to come up to the desired expectations. He employed for the immunization an attenuated culture of the chicken cholera organism. The attenuation was accomplished by exposing the cultures to atmospheric air for a certain length of time. He found that cultures subjected to these conditions lost their virulence to a certain
degree if they were then cultivated at body temperature. The material obtained from this attenuation was then used for the immunization against chicken cholera. The failure of this method in practice can be attributed chiefly to the fact that cultures exposed to this method of attenuation will not in all instances produce a uniform product, and therefore it can be readily understood why in some instances great losses were sustained from the use of such vaccine.

Later, other investigators prepared vaccines for the immunization of the different varieties of these diseases, and while the results were encouraging they have not in all instances succeeded in their purpose. Lignières' method appears to have been the most satisfactory and its utilization in practice has also been probably more extensively adopted than any of the other methods. The method of attenuation he employed consists of growing the cultures of the respective organism at 42 to 43°C and preparing from the cultures grown at this temperature two different strengths of vaccines. The weaker vaccine is grown for five days at this temperature, whereas the stronger vaccine for the second injection is grown for only two days.

Kitt was the first to establish that the attenuated vaccine prepared from one of the varieties of the germ may also prove effective against other varieties. The proof of this fact is of very great importance in the control of the disease, since it may not make material difference whether the vaccine used originates from the bacteria of the particular variety it is desired to immunize against or another variety. Thus, it is possible to immunize chickens against cholera with the vaccine prepared from the organism producing rabbit septicemia.

On the other hand, it must be recognized that immunization against a disease of this group cannot invariably and uniformly be successful with vaccines from another variety of the disease, and it should therefore be considered that the best results can only be expected when the vaccine is prepared from the organism of the same variety. Hence, in all cases where it is possible to employ an autogenic vaccine such should be used. The preparation of the polyvalent vaccine is highly recommended by Lignières, and according to his experience it may be used with satisfactory results in practice. The polyvalent vaccine is prepared from a mixed culture of the hemorrhagic septicemia organisms originating from sheep, cattle, dogs, horses, hogs and chickens. The culture is grown under the attenuating influences of a high temperature as described above. The practical application of the polyvalent vaccine is at the present time receiving the recognition of certain workers in the control of the disease among various species of animals.

The serum immunization against these diseases has also been investigated quite extensively. Potent sera can be prepared which will have an immunizing effect against the respective disease, but the application of this method of immunization in practice has not proven practical, since a serum inoculation produces only a passive immunity which conveys to the animals a resistance that remains for only a relatively short period.

In consideration of the laborious task of preparing a horse to furnish the potent immunizing serum and also the length of time which this preparation requires, one can readily see the advantage which would be derived from a vaccine in preference to an immune serum. This feature was particularly emphasized in a recent experience where it was necessary to immunize animals within the shortest possible time in order to prevent further losses from the disease in a buffalo herd.

In the following report our experience with vaccine immunization against hemorrhagic septicemia is described, and in consideration of its success, further
applications of this method in outbreaks of hemorrhagic septicemia among other species seem advisable.

Hemorrhagic Septicemia of Buffalo (Barbone).

During the month of December, 1911, the Department of Agriculture received information from the Department of the Interior of the existence of a fatal disease in the buffalo herd in the Yellowstone National Park with the request that an expert be sent to make an investigation of the disease.

Dr. E. J. Cary, veterinary inspector of the Bureau of Animal Industry, was detailed to carry out the investigation at the Park. In all twenty-two animals died between December 3 and December 15, young animals especially being victims of the disease. The symptoms and particularly the post mortem findings were confusing and it was therefore deemed advisable to forward some of the tissues for diagnosis to the Pathological Division. The bacteriological examination as well as test inoculations proved an infection with hemorrhagic septicemia, as the specific micro-organism (Bacillus bipolaris bubalisepticus) was isolated from all tissues, and test animals which were inoculated with material from the specimens died of typical hemorrhagic septicemia, the specific organism being also recovered from the blood of these animals.

This disease of buffalo, known also as barbone, was first recognized in Italy in 1886, while three years later its presence was established in Hungary. No previous outbreak of barbone has been recorded in this country. In Russia, Egypt, Indo-China, and the Dutch West Indies, the disease occurs frequently in enzootic form and in the latter place over 11,000 buffaloes succumbed between 1888 and 1891. It usually appears as a disease of the soil in marshy pastures where large numbers of buffalo are kept. Its appearance in such a remote and isolated place as the Yellowstone Park, however, is difficult of explanation, although the bacilli are known to be widely spread in nature and to occur not infrequently in the digestive tract and air passages of healthy animals. As a result of certain unknown conditions which might include those influences that weaken the resistance of the tissues, as exposure, starvation, anemia, etc., the bacilli become virulent and produce characteristic lesions. It is not an uncommon experience with hemorrhagic septicemia to have it appear periodically in certain localities without any apparent connection to which the introduction could be traced.

The authorities in charge of the buffalo herd at the Yellowstone Park were immediately notified of the nature and cause of the infection among the animals and preventive measures were recommended for controlling the spread of the disease. At the same time it was deemed advisable to undertake the vaccination of the entire herd with bacterial vaccines prepared from the recovered organism. For this purpose two vaccines were produced of different strength. The vaccine for the first inoculation was prepared by growing the organism five days at 42.50 C., while the vaccine for the second injection was cultivated at the same temperature for only two days.

For this preparation of vaccine Erlenmeyer flasks of pepton bouillon medium were inoculated with the organism after it had been cultivated for several generations on agar, and the bouillon cultures were then placed under temperature conditions stated above. The straight attenuated culture after thorough shaking was used for vaccinations in some of the animals, while others received the same vaccine to which 1/4 of 1 per cent of carbolic acid had been added. This was undertaken in order to determine whether the preserved vaccine possesses the same immunizing qualities as the unpreserved material.
Two varieties of the hemorrhagic septicemia organisms were utilized for the preparation of vaccine, the one strain representing the germ isolated from the buffalo disease in the Yellowstone National Park, while the other was a variety of hemorrhagic septicemia of cattle isolated from animals which died of that disease in Colorado. The vaccines prepared from these two varieties were tested for their potency on laboratory animals and also on sheep, a comparison of the action of the two different vaccines being carefully made.

The virus isolated from the buffalo disease was especially virulent for rabbits. Inoculations of these animals with 1 cc. of a suspension of salt solution containing only 1-15 of a loopful of bouillon culture killed the animals in from 12 to 18 hours, while 1-20 of a drop of blood from rabbits dead from the disease was fatal to other rabbits in less than 24 hours on subcutaneous inoculations. The virus of the cattle variety was not as virulent, although test animals succumbed to subcutaneous inoculations on the third day, showing on post-mortem examination the characteristic manifestations of the disease.

Both strains of vaccines were employed in parallel tests on a group of rabbits and also at the same time on sheep. For immunizing purposes subcutaneous injections of the vaccines were given to the animals at 10-day intervals. For the first vaccination the more attenuated, and for the second vaccination the less attenuated vaccine was injected. The injections invariably were made subcutaneously on the inside of the thigh. The dose for the rabbits was .2 cc. per injection, while the sheep were given .7 cc. of each vaccine. Likewise another series of animals was tested, using the same amount of a vaccine which was preserved with 0.5 per cent carbolic acid.

In the sixth day following the second inoculation the immunized animals were given a subcutaneous injection of the pure culture of the organism. Those which were immunized with the buffalo variety were injected with the virulent culture of this organism, while the others received the cattle variety. At the same time check animals which were not immunized were employed for each group and these were injected with the same quantity of virulent culture as given to the immunized animals. The immunized rabbits failed to show any indication of disease from the injection of the virulent culture, while the control animals succumbed in the usual time. The same results were noted in the sheep, although one of the immunized animals showed a slight elevation in temperature which, however, subsided after one day. On the other hand, the control animals of this group succumbed to the infection with typical symptoms and lesions of the disease. The fact that the animals immunized with the carbolized vaccine showed the same immunity as those immunized with the straight attenuated cultures is an interesting feature of this experiment, and while this condition appears at first hand to indicate the advantage from the use of the preserved vaccine, subsequent complement-fixation tests undertaken on these immunized animals showed that those animals which were immunized with the straight vaccine gave a partial fixation of the complement for a much longer period than those which were immunized with the carbolized vaccine.

The results of these tests further substantiate the view that the vaccines of one of the varieties of the organism are potent against diseases produced by the other varieties of the germ. Thus, rabbits and sheep were successfully immunized with the vaccines prepared from the Bacillus bubalisepticus and the Bacillus bovisepticus.

After obtaining these favorable results the vaccine was sent to the veterinarian entrusted with the vaccination of the buffaloes, and instructed
to vaccinate all animals of the herd by the same procedure at 10-day intervals. One cubic centimeter of the vaccine constituted a dose for each animal.

Following vaccination, the herd was carefully observed and no immediate effects were noticed from the vaccination, and up to the present time there has been no indication of the recurrence of the disease among the buffaloes.

In the progress of the preparation of the vaccine, experiments were also conducted in the laboratory to determine whether the complement-fixation test could be applied for the diagnosis of the disease, and also for the purpose of determining the relative degree of immunity conferred upon the vaccinated animals in artificial immunizations. An antigen was prepared from the original organism recovered from the outbreak among the buffaloes in the form of a shake extract. The hemolytic system consisted of sensitized rabbit serum (amboceptor), guinea pig serum (complement), and washed sheep corpuscles. The test was employed with the sheep serum and rabbit serum of artificially infected animals, and the results proved entirely satisfactory. A complete fixation was obtained in all instances when applied to 0.1 cc. of serum of infected animals, while the controls showed no fixation whatsoever.

After the vaccination of the sheep and rabbits, blood serum was obtained from these animals and tested with the complement-fixation test. The results in these instances also showed a fixation of the complement, although not as complete in the infected animals, but nevertheless indicating that the animals responded after vaccination with the production of immune bodies. This reaction has been noted even three months after the vaccination, and the testing of the blood will be continued from time to time in order to determine the length of the period in which the animals possess immune bodies subsequent to vaccination.

The utilization of the complement-fixation test in the diagnosis of hemorrhagic septicemia, and also its value in determining the relative immunity established by vaccination, are of great importance, not alone in this disease, but also in the possibility of its application to other diseases.

**HEMORRHAGIC SEPTICEMIA.**

By S. H. Ward, St. Paul, Minn.

Mention of this peculiar disease of cattle and sheep is rarely seen, even in the most recent text books. Hutyra and Marek perhaps give the most concise account of the disease, yet there are points met with in our autopsies which differ materially from those given by these authors.

The specific organism was isolated from cattle by Wilson of Minnesota and from sheep by Beebe of Minnesota, hence there is no doubt as to the causative factor. Numerous outbreaks occur in Minnesota, and undoubtedly in other states, and it is very possible the disease may be confused with anthrax, which it closely resembles. The most virulent outbreaks occur among cattle during the months while animals are on pasture. In sheep the disease, while by no means as prevalent as in cattle, appears frequently enough to cause severe losses to owners.

Two great peculiarities are noticed; first, the extreme virulence of the disease for a short time. Ten or 20 per cent of the herd will die perhaps within twenty-four hours with no further loss, although animals may be kept in the same pasture and under similar conditions. The second peculiarity is that outbreaks are far removed from each other, with no history or possibility of exposure and no recurrence of the disease on the premises. Outbreaks are seen on high sandy land, as well as in low lands. Some are of the opinion
that outbreaks are more frequent on the higher sandy lands. Weather and pasture conditions seem to have no bearing upon outbreaks.

Symptoms of the acute form in mature animals are usually ushered in by a general dullness, temperature about normal, cessation of appetite, rumination and milk secretion, bloody diarrhea, and sometimes a frothy pinkish discharge from the nostrils. In the chronic form usually met with in the late winter months, especially when cattle are poorly kept, we find about the only symptoms exhibited are the cessation of appetite and a paralysis of the hind extremities.

In young animals the acute type is manifested by totally different symptoms. In these cases we have animals staggering, running into objects, bawling as with fright, falling over, legs drawn up to body, and eyes rolling in the sockets.

Sheep.—In these animals we have had occasion to see but three outbreaks, each, however, being of the acute type—animals dying within twenty-four hours after first noticed. As a rule there is a slight mucous discharge, accelerated respiration and marked dullness.

Autopsies.—Hemorrhages in all the serous and mucous membranes. Hemorrhages are seen in the subcutaneous tissue and between the muscles in various parts of the body.

In cattle there is frequently seen a gelatinous infiltration under the skin. The spleen, especially in sheep, is seen to have large wine colored areas. In other cases the hemorrhagic areas are much smaller. The condition of the spleen in cases coming under our notice is at marked variance with the findings of Hutyra and Marek who state: "the spleen preserves a normal appearance."

Treatment.—Nothing in the way of treatment can be suggested, owing to the rapid course of the disease. A recent article on the "Treatment of Rinderpest and Hemorrhagic Septicemia with Parmanganate of Potash" by Major C. K. Walker of the Indian Civil Veterinary Department, published in the September issue of the Journal of Comparative Pathology and Therapeutics, says the result of this drug in the treatment of hemorrhagic septicemia seems to be hopeful.

The ordinary dose for medium sized cattle may be stated to be 2 drams, and calves may receive $\frac{3}{4}$ to 1 dram.

It is evident from the table that accompanies the article that the cases met with in India are more of the chronic type, as most of the cases quoted are from two to five days in duration, while the cases met with in Minnesota result in death in an exceedingly short time, making it extremely doubtful if even intravenous injection of this drug would accomplish very much.

As to control measures, it is obvious no restrictions on infected farms can be put into operation, as the disease does not spread and after attacking a certain number of animals no further loss is experienced, nor has the disease continued on the premises.

The President: I would like to ask Dr. Mohler one question. When Dr. Wilson worked on this disease, and Dr. Mohler probably remembers the trouble we had in Pennsylvania about the same time, he failed utterly to isolate these germs except in the field, and as I remember Dr. Wesbrook's work he failed also to isolate the germ except when he got the animal directly in the field and killed it. That is my remembrance of it. In Pennsylvania we had a great deal of this at the same time that the Minnesota outbreak took place, and
we failed in every single instance when the tissues were sent to the laboratory to isolate that germ. I understand that these tissues were sent to Washington and the bacilli of hemorrhagic septicemia isolated.

Dr. Mohler: I recall the trouble they had in Pennsylvania some years ago, and in the report of State Veterinarian Pearson for 1902 I believe you will find a record of the organism having been isolated in the laboratory at that time. I understand that quite recently, in the last six months, some specimens were sent to the laboratory at Philadelphia and that the bacillus bovis septicus has been isolated by Dr. Meyer. As far as the work in Washington is concerned, instead of inoculating the ordinary culture media with the infected material received, we immediately injected experimental animals and isolated the bacillus from these animals by means of plating on Petri dishes. As you say, it was a very difficult proposition to recover the organism from the Pennsylvania outbreaks and for a long time they were unable to isolate this causative agent. Some of you may remember that at the A. V. M. A. meeting in Minneapolis Dr. Pearson asked Dr. Wesbrook or Dr. Wilson regarding their technic for recovering the organism from the tissue, and I recall that Dr. Wesbrook remarked with reference to media inoculation that when he attempted to obtain cultures by inoculating media in ordinary test tubes the results were negative, but by the inoculation of 500 c. c. of bouillon with small cubes of infected tissues he invariably recovered the organism in those flasks.

Dr. Reichel: If I may I would like to add that in the work referred to by Dr. Mohler as having been done by Dr. Pearson, they lost the cultures when they brought them to the laboratory. They seemed to have a great deal of difficulty in getting the subcultures to grow. They successfully isolated them in the field. If I recall correctly the work of Dr. Meyer resulted in the same thing; the work was done in the field and brought to the laboratory. I may be wrong about that but that was my understanding.

I would like to ask Dr. Mohler one question in regard to the preparation of his vaccine. He stated that he obtained a growth on serum bouillon which he later subjected to the temperature of 42 degrees for four or five days, and that he added to the culture, or some of the cultures, carbolic acid in forty-eight hours. I would like to ask if he proved that the cultures were killed in those instances by the long exposure or by the carbolic acid.

Dr. Mohler: That was the very point we tried to accomplish. The cultures that were grown at 42 degrees for five days were not killed, they were attenuated, and rather than start up an enzootic
of disease again in the herd of buffalo by inoculation we took the double precaution of carbolizing this attenuated growth, and by the addition of five-tenths of one per cent of carbolic acid no growths developed on media inoculated with such carbolized vaccine.

The President: In some of that Pennsylvania work that took place before I left we inoculated entire herds of animals, including calves, directly with large quantities of tissue, as you may remember, Dr. Mohler, and we did not succeed in killing the calves or in isolating the bacillus from any of the inoculated animals. We only succeeded when we made the culture inoculations in the field.

Dr. Marshall: During the summer of 1912, specimens were collected from reported cases of hemorrhagic septicemia. In six cases post-morters were made and specimens collected by the laboratory assistants. In two cases from Kane, Pa., and two cases from Bellefonte, Pa., post-mortems were made by the local veterinarians and specimens sent by them by express to the laboratory. In each of these cases the post-mortem lesions were characteristic of hemorrhagic septicemia and the bacillus bovisepticus was isolated from the specimens in the laboratory. In most cases the organism was obtained from liver specimens.

Cultures were made and the disease was transmitted to rabbits, two yearling bovines, and in a recent case a horse was killed by the organism during its period of preparation for a curative serum against hemorrhagic septicemia. We have in the laboratory numerous specimens from these outbreaks, cut sections from which show the bacillus bovisepticus, and we have also a large number of cultures of this organism growing at the present time.

This work was done under the direction and supervision of Dr. K. F. Meyer, assisted by Drs. Crocker, Hardenbergh and Underhill.

Dr. Haslam: I would like to ask Dr. Mohler in regard to the so-called corn stalk disease of cattle which very frequently shows post-mortem lesions resembling hemorrhagic septicemia, the symptoms of which agree in many ways with hemorrhagic septicemia, and especially with the form which Dr. Ward described, in which animals show the marked nervous trend of symptoms. I would like to know what his opinion is in regard to the identity of the two affections.

Dr. Mohler: Mr. President, I don't know that the etiology of this corn stalk disease has ever been satisfactorily settled. It is a peculiar condition affecting the cattle in the Missouri Valley after they have been placed in cornstalk fields. Dr. Moore worked with it some years ago and published a report on it, but personally I have never studied the disease, so I am not in a position to formulate an
opinion from personal observations. In some text books you will find it classified as one of the forms of hemorrhagic septicemia, and I believe in the works of Wilson and others in Minnesota they so considered it. The symptoms and lesions of these affections are strikingly similar, but I do not recall that the same organism has been found in both. In fact certain observations indicate that the affection is due to toxic substances in the standing stalks, as in sorghum poisoning, and that the disease may be prevented by keeping cattle out of cornstalk fields or by feeding the stalks after they have been cut and cured.

Dr. Moore: I will say that I did work with that disease some years ago, and the difficulty that we found at that time, was in getting to these animals after the symptoms appeared, and even after they died, before post-mortem changes were so far advanced that it was difficult to tell anything about the real pathological condition. I think in only one instance was I able to see a case that had died of this so-called corn stalk disease within a few hours after death and before any appreciable post-mortem changes had taken place. In that case the lesions or hemorrhages throughout the body were very similar to septicemia hemorrhagica as now described. In a few cases that I saw where the post-mortem changes were not far advanced some appearances were in evidence. I was unable, however, to get anything to grow from those particular cases that I referred to. I had with me Dr. Niles, and we had three or four media of various kinds that we prepared in the laboratory, and we made the cultures, and I got small quantities of medium such as in the test tube from these recent cases, but it was a total failure as to any organisms growing. We were laboring under the impression at that time, as some of the older men here may remember, that this was a specific disease due to some poisoning from the corn stalk, and we were looking for evidences of that kind quite as much as for this other disease. As a matter of fact the comparison between that disease and the septicemia haemorrhagica as it had been described in Europe at that time, was not taken seriously into account, but I had been of the opinion for some years, since the publications of Wilson and Brimhall and others, that that particular case that I saw, while lesions were distinctly in evidence, was a case of septicemia haemorrhagica.

JOHNE'S DISEASE, OR PSEUDO-TUBERCULOSIS.
By J. G. Wills, Albany, New York.

This disease has been variously characterized as chronic intestinal catarrh, chronic enteritis, chronic bacterial dysentery, pseudo-tuberculosis and specific paratuberculosis enteritis of cattle. The name Johne's Disease appears to be quite generally accepted, as it gives due credit to the investi-
gator who first recognized this malady and to whom we are indebted for much information in relation to it. Chronic bacterial dysentery has been suggested as a better descriptive term than some of the others used. In 1895 Johne and Frothingham demonstrated that the disease was of a contagious nature, but considered it a form of tuberculosis, and hence the origin of the term pseudo-tuberculosis. Their conclusions were verified by Bang and Mießner, who produced the disease in calves by feeding them infected material.

Johne's Disease is stated to be very prevalent in Europe, having been reported in Denmark, Holland, Germany, France, Switzerland and in the Scandinavian Peninsula. In Switzerland it is said that 80 per cent of the cases of chronic gastro-intestinal catarrh in cattle may be attributed to it, while in Denmark, though not so prevalent, it is the cause of a large number of deaths in cattle. In the Isle of Jersey, where bovine tuberculosis is said to be unknown, Johne's Disease is frequently found. Its prevalence in America is not extensive, but its presence has been reported from several of the United States. It has, at the present time, to my knowledge, been demonstrated positively in but one herd in the State of New York, although we have reason to suspect that occasional deaths in cattle, the cause of which was not recognized, may have been due to it.

The infection is confined largely to bovines, but M'Fadyean reports a case in a deer and Stockman has found an organism in the intestines of sheep, which is very similar in its appearance to that found in the intestines of cattle affected with Johne's Disease. It is said to be seldom seen in the very young or very old, the statement being made by some European writers that few cases were found in animals under three years of age.

The organism causing this disease is one of the acid fast group, bearing strong resemblance to that of the tubercle bacterium, especially the avian type of that disease for which it was first mistaken. Artificial cultivation of the germ is difficult and therefore the study of its characters in pure culture has not been very satisfactory. It seems to multiply rapidly in the intestinal mucosa of the infected animal, appears to form no toxines and no considerable destruction of tissue. It is said that this organism exhibits a tendency to form in clumps in most cases, is quite resistant to ordinary disinfectants and seems to retain its vitality for some time. Attempts to inoculate experimental animals have proven negative. The disease is generally fatal, Law reporting having seen but one case apparently recover.

The symptoms exhibited by animals affected with Johne's Disease are quite uniform. As a rule a loss of flesh is first noticed, accompanied by little or no impairment of the appetite, a general unthrifty appearance with advancing debility, but no fever or acute pain. An early symptom is a persistent diarrhetic condition at first more or less intermittent, but usually becoming constant as the disease progresses. In the early stages of the attack there are intervals of apparent recovery, but these become shorter as the disease advances and eventually a chronic condition prevails. Emaciation and anemia become very marked, and while the catarrhal condition of the bowel is absent in occasional cases these are rare. Debility and decline are quite rapid and the animal dies from a gradual wasting away of the tissues. The resistant powers of the individual, environment, age and other influences of course affect to a considerable extent the length of time before the fatal termination of the disease. In milking cows lactation is early reduced, some authorities having noted that the decrease in milk production was more pronounced during periods when diarrhea is most profuse. This disease must be considered as distinctly chronic in nature, proceeding slowly
and interfering but little with the bodily functions of the subject, with the exception of the nutritive processes.

The incubative period is not known, but apparently varies from six to twelve months or more. Affected animals live for several months or even a year after the development of physical evidence of the disease. Treatment is of little effect, although astringents and tonics at first appear to check its progress.

The post-mortem conditions found in animals dead from Johne's Disease are not usually conclusive. There is little pathological change except in the walls of the intestinal tract. The intestinal mucosa appears thrown in folds or convolutions and is much thickened, the surface being covered with a dirty white or greyish slimy fluid easily scraped from the surface, apparently a degeneration of the surface cells. Ulceration of the wall is seldom observed, the tissue change being of a chronic nature not sufficiently rapid to produce any inflammatory condition and slight, if any, congestion. The acid fast germs are found in the mucosa and sub-mucosa of the intestine, being present in enormous numbers. The adjacent mesenteric lymph glands are usually enlarged and the specific organism can often be found in these tissues. Affected lymph glands when cut exude a watery fluid which is somewhat characteristic. The mucous lining of the bowel seems to be the only part of the body involved, the small intestine being evidently first affected. Hypertrophy of the mucous coat without a corresponding increase in the muscular wall of the intestine causes the wrinkling or folding of the mucosa previously referred to.

The diagnosis of Johne's Disease from the post mortem appearance alone is difficult, and the previous history of the case is of value in arriving at a definite opinion, although additional microscopic examination is usually necessary. The characteristic clumping of the bacteria under the microscope is said to be a means of differentiation from tuberculosis, while the non-infectivity of guinea pigs is also diagnostic. The use of the ordinary tuberculin test will enable us to quite positively exclude the presence of tuberculosis in the living animal, while the absence of typical tubercular lesions on post-mortem will be sufficient to prove its absence if no test is made, although the appearance of the affected animal might be strongly indicative of that disease. From conditions which might simulate Johne's Disease and which might be produced by parasites, the absence of such cause at post-mortem examination will be sufficient. It is said that tuberculosis and Johne's Disease are seldom found in the same animal. Why this should be no one has apparently attempted to explain and it is doubtful if it should be accepted as a general rule.

The elimination from the infected host of the causative germ is evidently largely through the alimentary tract, the organisms not having been reported as present in milk or other fluids of the body. Ingestion of infected food or water seems to be the principal if not the only means by which the disease is acquired by susceptible animals. Investigations that have so far been made tend to show the danger of infection being spread by means of contaminated pastures or stables, and it would thus appear that the difficulties in controlling and preventing distribution of the virus were even greater than those met with in many of our common contagious diseases of animals.

The detection of the disease in the living host has been quite extensively studied and the use of avian tuberculin administered subcutaneously in a manner similar to that in conducting the usual tuberculin test has given quite encouraging results as a means of diagnosis. Olaf Bang has reported a number of cases where this method has proven satisfactory. Our limited experi-
ence has so far shown a similar conclusion. At the present time, however, sufficient tests have not been made to warrant our considering it as specifically diagnostic as is mammalian tuberculin in the detection of bovine tuberculosis. It would seem from our present knowledge that prevention rather than cure would have to be depended upon, since attempts to treat the infection have not been successful. Strict isolation of the diseased animals is advisable and all communication with other cattle, even indirectly, should be prevented. The immediate slaughter of any animal found infected would seem to be the most economic method; and by extreme precautions in relation to disinfection of premises and destruction of infected materials, doubtless it would be possible to check its spread to a considerable extent. Should the use of avian tuberculin prove practical such test would be of value in detecting its presence in suspected herds. The following is a brief account of our experience with this disease in the State of New York.

The herd in which we have found Johne's Disease existing in New York is composed of valuable pure-bred Jersey animals. A number of them are imported cattle. It is somewhat significant that of ten animals which have died in this herd within the past three years six were imported, while the other four were born in this country, but were the offspring of ancestors recently brought from the Island of Jersey. The ages of the cattle that have died varied from four to six years and symptoms of the disease were manifest from three to ten months before death occurred, except in one or two cases where they were killed after a few months' illness, when recovery seemed hopeless. Of the total twelve animals affected two are now living, and one—a bull—died in the latter part of August of this year. One test with avian tuberculin was made upon this bull on August 1 and 2, 1912, and also upon cow No. 1, which is still living. The results were as follows:

**Cow No. 1**—Breed, Jersey. Weight, 800. Sex, female. Age in years, 6.

<table>
<thead>
<tr>
<th>Date, Aug. 1, 1912.</th>
<th>Hour</th>
<th>Temperature.</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 3:15 p. m., before injection, was</td>
<td>101.6 degrees</td>
<td></td>
</tr>
<tr>
<td>At 5:15 p. m., before injection, was</td>
<td>102 degrees</td>
<td></td>
</tr>
<tr>
<td>At 8:00 p. m., before injection, was</td>
<td>102 degrees</td>
<td></td>
</tr>
<tr>
<td>At 9:30 p. m., before injection, was</td>
<td>102.2 degrees</td>
<td></td>
</tr>
</tbody>
</table>

Injected at 8:10 p. m. Date, Aug. 1, 1912.

Amount of tuberculin, 3 c. c.

Avian tuberculin made at N. Y. S. Veterinary College.

Date, Aug. 2, 1912.

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</tr>
<tr>
<td>At 4:10 a. m., after injection, was</td>
<td>101.8 degrees</td>
</tr>
<tr>
<td>At 7:00 a. m., after injection, was</td>
<td>102.8 degrees</td>
</tr>
<tr>
<td>At 8:30 a. m., after injection, was</td>
<td>103.2 degrees</td>
</tr>
<tr>
<td>At 10:30 a. m., after injection, was</td>
<td>103 degrees</td>
</tr>
<tr>
<td>At 12:30 p. m., after injection, was</td>
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</tr>
<tr>
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</tr>
<tr>
<td>At 2:30 p. m., after injection, was</td>
<td>101.2 degrees</td>
</tr>
</tbody>
</table>

**Bull**—Breed, Jersey. Weight, 1,100. Sex, male. Age in years, 6. Date Aug. 1, 1912.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Temperature.</th>
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<tbody>
<tr>
<td>At 3:15 p. m., before injection, was</td>
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</tr>
<tr>
<td>At 5:15 p. m., before injection, was</td>
<td>102.6 degrees</td>
</tr>
<tr>
<td>At 8:00 p. m., before injection, was</td>
<td>102.6 degrees</td>
</tr>
<tr>
<td>At 9:30 p. m., before injection, was</td>
<td>102 degrees</td>
</tr>
</tbody>
</table>
Injected at 8:10 p. m. Date, Aug. 1, 1912.
Amount of tuberculin, 3 c. c.
Avian tuberculin made at N. Y. S. Veterinary College.

Date, Aug. 2, 1912.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Temperature</th>
<th>No. hours after injection</th>
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<td>14½</td>
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<td>103 degrees</td>
<td>16½</td>
</tr>
<tr>
<td>At 1:30 p. m., after injection</td>
<td>102 degrees</td>
<td>17½</td>
</tr>
<tr>
<td>At 2:30 p. m., after injection</td>
<td>101.8 degrees</td>
<td>18½</td>
</tr>
</tbody>
</table>

No particular systemic reaction was noticed, but the cow did show a slight disinclination to eat from about the eighth to the twelfth hour after injection of tuberculin.

The post-mortem of the bull showed the characteristic corrugated intestinal mucosa, a much atrophied heart and very pronounced general emaciation; otherwise a practically normal condition. From the intestinal mucosa the specific organisms were positively demonstrated.

A subsequent test on cow No. 1 at New York State Veterinary College and cow No. 2, another recently developed case, on October 1 and 2, 1912, gave the following results, both showing a quite typical reaction with no constitutional disturbance.

Cow No. 1—Date, Oct. 1, 1912.

<table>
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<tr>
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<tbody>
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</tr>
<tr>
<td>At 10:00 p. m., before injection</td>
<td>101.2 degrees</td>
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</table>

Injected at 10 p. m. Date, Oct. 1, 1912.
Amount of tuberculin, 4 c. c.
Tuberculin prepared by N. Y. S. Veterinary College (Avian).

Date, Oct. 2, 1912.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Temperature</th>
<th>Injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 6:00 a. m., after injection</td>
<td>100.6 degrees</td>
<td>8</td>
</tr>
<tr>
<td>At 8:00 a. m., after injection</td>
<td>100.3 degrees</td>
<td>10</td>
</tr>
<tr>
<td>At 10:00 a. m., after injection</td>
<td>102.6 degrees</td>
<td>12</td>
</tr>
<tr>
<td>At 12:00 a. m., after injection</td>
<td>102.5 degrees</td>
<td>14</td>
</tr>
<tr>
<td>At 2:00 p. m., after injection</td>
<td>103.3 degrees</td>
<td>16</td>
</tr>
<tr>
<td>At 4:00 p. m., after injection</td>
<td>102.6 degrees</td>
<td>18</td>
</tr>
</tbody>
</table>

Cow No. 2—Date, Oct. 1, 1912.

<table>
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<tr>
<th>Hour</th>
<th>Temperature</th>
<th>Injection</th>
</tr>
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<tbody>
<tr>
<td>At 8:00 p. m., before injection</td>
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</tr>
<tr>
<td>At 10:00 p. m., before injection</td>
<td>101 degrees</td>
<td></td>
</tr>
</tbody>
</table>

Injected at 10 p. m. Date, Oct. 1, 1912.
Amount of tuberculin, 4 c. c.
Tuberculin prepared by N. Y. S. Veterinary College (Avian).
Date, Oct. 2, 1912.

<table>
<thead>
<tr>
<th>Hour</th>
<th>Temperature</th>
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<td>6:00 a.m. after injection</td>
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<tr>
<td>8:00 a.m. after injection</td>
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<td>10:00 a.m. after injection</td>
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<td>12:00 a.m. after injection</td>
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<td>2:00 p.m. after injection</td>
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<tr>
<td>4:00 p.m. after injection</td>
<td>102.9 degrees</td>
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</tr>
</tbody>
</table>

The acid fast organisms have not so far been found in the excreta of these animals.

It may be of interest to note that several of the cattle in the above mentioned herd have passed a very satisfactory subcutaneous tuberculin test, our records showing that the bull above referred to was tested in November, 1911, and May, 1912, the last test being only about three months before his death from Johne's Disease, absolutely no evidence of tuberculosis being indicated.

From the experience of the owner of the herd in question, who has endeavored to control the disease by careful attention to disinfection, segregation of suspected animals and much varied medicinal treatment, it would seem that the suppression or eradication of this malady presents great difficulties. The distribution of the virus by means of infected pastures, stables and yards and probably through other less direct agencies makes control exceedingly complicated.

As before suggested the use of avian tuberculin as a means of diagnosis may be of value in checking the losses from Johne's Disease, although I have been unable to find any very definite data as to how soon the reaction may be expected. If the elimination of the acid fast germs takes place before the animal would show evidence of the disease by this test we could not hope to receive any great aid by such a diagnostic method. It would appear that there was an opportunity for much careful study on this point, and Dr. V. A. Moore, to whom I am indebted for some of the information given herein, is now making quite extensive investigations in the study of this disease with two apparently affected animals, which are now being kept at the New York State Veterinary College. It is essential that veterinarians and others having to do with live stock should be on the alert to detect conditions which may be due to this trouble. Any bovine showing chronic catarrhal conditions of the intestines, accompanied by a general decline and lack of vitality should be immediately kept under careful observation, a full history obtained, and if we can determine that the condition is not due to any of the ordinary diseases or causes we should keep in mind the possible existence of this practically unknown, but nevertheless important infection.

Dr. Reichel: The disease was first recognized clinically in Pennsylvania by Dr. Pearson, who suggested the name of chronic bacterial dysentery, and he was of the opinion that the disease existed in Pennsylvania for a large number of years, fifteen or twenty years, he even said. In fact the material from one particular farm was sent to the laboratory of the Live Stock Sanitary Board year after year, and it was not until 1908 that I had the satisfaction of seeing the organism for the first time in this country received in smears made on the case. Not much seems to have been done with
the disease up until 1910. In 1910 Johne and Frothingham of England succeeded in isolating the organism for the first time. They succeeded in that they were able to destroy the other organisms that are usually found in the intestine and growing the organism on a special medium that contains tubercle bacilli or other acid-fast bacilli. Since that time I have been told that the organism has been successfully cultivated in this country, as it happens, in the same laboratory where it was first seen, by Dr. Meyer. He has recently grown the organism from material obtained again in Pennsylvania. It is interesting to note that Johne made an extract of this organism, and he has also worked with human and bovine tuberculin and failed to get the reaction with the extract from those specific bacilli. Some eight months ago I received a culture from Professor Bang with which he prepares his tuberculin in testing out cows suspected to be immune from disease, and although we succeeded in getting an apparently good growth, we did not succeed in getting satisfaction in early or late cases. Neither were Twort and Ingram successful in getting those reactions. It was rather disappointing to read in their report that they did not get successful results with the organism. Some ten days ago I received four strains of this bacillus from them, which I am trying now to grow on meat broth and incidentally test upon infected animals, of which I have several. The most satisfactory way of proving that an animal is infected up to the present time seems to me to note the feces. They are of a greenish purplish tinge, and all through the disease there are minute air bubbles in them, and if a large amount is spread over a large plate or glass you are apt to see shreds of mucous membrane, and if those are picked up in turn and smears are made you will very frequently be able to demonstrate the bacilli and prove in that way that the animal was infected. In fact that is the way the animals that were tested were proved to be infected.

Dr. Moore: We have had a little experience with this, and I question very much whether the reaction that we have gotten, is sufficient to enable one to diagnose this disease. We have one case under observation in our institution at the present time which we brought there for study and for clinical purposes; that is not so far advanced, but it does not give a reaction of more than 102.8 degrees. In a recent article by M'Fadyean you will find a number of reports of tests made in which they report very few cases, if any, above 102.6 or 102.8 degrees, which is not quite enough, it seems to me, to be sure of this reaction. And I wish to say that in connection with one of the cases that Dr. Wills reported, which was examined post-mortem very carefully last Wednesday, there was absolutely no evidence of tuberculosis present.
The Value of Physical Examination and Clinical Diagnosis in the Control of Tuberculosis in Cattle.

By Veranus A. Moore, Ithaca, N. Y.

At the request of the Secretary I consented to discuss the question of physical examination and its value in the control of bovine tuberculosis. From statements emanating from various sources it appears that there is difficulty in understanding the value and the limitations of the various methods for the detection and control of this insidious and at the time most serious disease of cattle. With the coming of newer methods for diagnosis there is a tendency to reject former procedures. Physical examination formed the basis of all diagnosis in the earlier years and more than any other method continues to bring into operation the power of observation and the skill of the practitioner, as distinguished from that of the herdsman. It is to be regretted that in our own country this method should now be surrounded by so many doubts and misgivings. It is in America only that veterinarians have tended to depart from this fundamental method of diagnosis.

In the development of knowledge and methods for the identification of specific diseases, there is a tendency to accept the last discovered reaction based upon some element or product concerned in the symptom-complex of the disease as the most reliable procedure. Already there are filed on our shelves many descriptions of methods that have, because of their limitations, been excluded from regular routine, but reserved, perhaps, for use under certain conditions and at the proper time. For this reason, one can not intelligently follow the evolution of methods of diagnosis without feeling the great importance of clearly differentiating between the fundamental and the supplementary methods. Again, one cannot read the history of diagnosis without recognizing the dependence of a one-time satisfactory procedure upon some subsequently devised method of precision. As knowledge increases diagnosis becomes more and more difficult. The close resemblance in symptoms, in lesions and even in the etiological factors, compel one to be less hasty in making positive statements.

In this country, where emphasis is constantly being placed on the most recent observations, there has come to be more or less confusion in what is meant by physical examination and clinical diagnosis. Instead of carefully differentiating between these two methods and understanding the value of each in its entirety, our people seem to be better satisfied with snatching some element of diagnosis and surrounding it with the dignity of a method. As did the artist of old, so let us return to the schools of the masters and see what is meant by each of these methods for detecting and identifying morbid conditions.

The term "physical examination" means the systematic study of the various parts of the animal body by means of the ordinary senses. This was the only method known to the veterinary profession from the time of Claude Bourgelat in 1762 to the dawn of the newer pathological procedures a hundred years later. During this time all knowledge of specific diseases and their differentiation one from another, were based on the findings of a careful examination of the body. There developed methods of physical examination consisting in the orderly arrangement of the knowledge of various organs. In applying this method, each system, such as the respiratory or the circulatory is carefully examined in every part possible so that any deviation from the normal at any point that can be reached by the human eye, hand or ear can be detected.
As disease is a variation from the normal, it is essential that before one attempts to determine a morbid condition he should know what the healthy one is. The physical examination enables one to ascertain by means of inspection, palpation, percussion and auscultation, whether or not the normal condition exists and if deviations occur to ascertain in which of the anatomical systems and at what points they are located. The acquisition of the knowledge and ability to make an efficient physical examination is one of the most difficult tasks for the student of human or veterinary medicine. In the veterinary schools of Europe the teaching of this subject occupies a prominent place in the curriculum. In this country, on the contrary, we often hear teachers and practitioners refer to it with an air of contempt, and American veterinarians have become conspicuous for their disregard of this first and fundamental requirement for detecting morbid conditions.

As a physical examination has for its purpose the determination of the condition existing in any part of the living body that can be ascertained by the unaided senses, the question naturally arises as to the degree of accuracy of such examinations in identifying any particular disease. It is clear that a careful examination of the subcutaneous lymph glands would indicate whether one or more of them was enlarged. It would be difficult, in fact impossible from that indication alone to state the specific nature of the trouble. The same would hold with abnormal findings in other parts. If, however, the morbid changes are well advanced they usually take on a form that is more or less characteristic of the disease they represent. This is not always true, for not infrequently diagnosis based on such findings proves to be erroneous. There are certain specific diseases, such as tuberculosis, actinomycosis, glanders and some others that can be identified in a very large percentage of cases when the tissue changes have advanced to a certain stage. If the nature of each of the diseases is thoroughly understood, it is possible from the course, location and general character of the lesions to be reasonably sure of the particular disease present. The degree of accuracy of such a diagnosis, is necessarily determined by the knowledge possessed by the examiner of the course of the disease and the relative frequency of other causes giving rise to apparently like conditions. In all cases the positive diagnosis depends on special tissue changes that can be determined by a microscopic examination only or by the presence of some specific reaction or the etiological factor. The diagnosis, therefore, by physical examination in case of specific diseases is presumptive. This presumptive diagnosis stands in exactly the same position as other presumptive tests employed in laboratory work. Thus in the analysis of water the fermentation of certain carbohydrates with the production of a definite quantity of gas and acidity is a presumptive test that the colon bacillus is present; the finding of acid fast bacteria in a microscopic examination of milk or excreta would be a presumptive test for tuberculosis; a normal temperature in a certain percentage of cattle following the use of tuberculin is presumptive that such individuals are free from tuberculous infection, yet no one familiar with these subjects would be positive as to the accuracy of the diagnosis from the findings of such examinations alone. In like manner the presence of obvious tissue changes suggestive of tuberculosis warrant the same degree of consideration as other presumptive tests which are accepted as sufficient evidence for action.

With the growth of definite knowledge of the cause, tissue reactions and tests for specific diseases, methods for positive identification supplemented the findings on physical examination. The combination of these constitutes the "clinical diagnosis." Clinical diagnosis means, therefore, the finding of morbid conditions on physical examination and identifying the disease by any
means or test that may be applied to the living animal, such, for example, as microscopic examination of excreta, chemical analysis of secretions or specific reactions. The terms physical examination and clinical diagnosis are often erroneously used as synonyms. A careful study of the literature will show that the specific tests which are often considered in this country as special methods are really but fragments of the various mechanisms or technique employed in clinical diagnosis. It is well, therefore, to recognize that physical examination and clinical diagnosis may be like two variables gradually approaching the same limit.

The question before us is, to what extent can tuberculosis be controlled by the use of physical examination only? As the first element in control is diagnosis, the question resolves itself to the determination of the extent and accuracy of the physical examination in making the diagnosis. As tuberculosis in most cases is a local or localized disease which develops slowly, often requiring years for its manifestation, it is obvious that its presence can be detected in very few cases at any one time. Again, as tubercles often develop first in the mesenteric glands, liver and other deep seated organs where ordinarily they cannot be detected until the organs themselves become sufficiently affected to interfere with their function, and further, as minute lesions can not be detected in the sub-cutaneous lymph glands, lungs or udder, their presence can not be determined on physical examination in the early stages of the disease. In animals where the lesions can be detected, positive diagnosis is impossible without confirmation by some of the methods included in clinical diagnosis, such as a bacteriological examination or the application of tuberculin. In other words, the physical examination makes possible a presumptive diagnosis in those cases where lesions can be located.

The significance of the physical examination, however, is not measured by the percentage of infected individuals it will detect. Its true value rests in the fact that the few cases which can be detected by it represent the greater number of the immediately dangerous animals—those that are actually eliminating the specific bacteria or are liable in the near future to do so. It is not presumed that a physical examination will detect every case that is spreading the infection, but it is known experimentally that it will find most of them. The physical examination, if properly made and repeated at short intervals, will detect most of the animals as fast as the lesions approach the stage where they become a menace. If all such animals are removed, slaughtered or isolated, the chances for the disease spreading to other animals in the herd, especially to the calves, are wonderfully reduced. We have records where badly infected herds have been purified, as determined by repeated tuberculin tests, by frequent inspection and the removal of all suspicious cases. Both Ostertag and Poels affirm that if carefully applied a system of physical examination with the prompt removal of the suspicious cases will check the spread of the disease, allow healthy calves to grow up to replace the diseased animals. The fact must ever be borne in mind that the physical examination will not detect the occult cases. For detecting these, tuberculin must be used. Physical examination affords little protection against the transmission of tuberculosis from one herd to another.

In applying a method, in a system of control, that will detect but a small percentage of infected individuals it is necessary to understand the situation in its entirety. The extent and nature of the disease must be reckoned with. Th capriciousness of tuberculosis, especially in its earliest stages, regarding its progress and arrest, renders it impossible to state what a considerable percentage of tuberculin reacting animals will do. When however, lesions have developed to the point where they can be detected, all admit that such
animals should be removed from the herd. Fortunately it is being clearly demonstrated that in most cases it is possible to detect the presence of the lesions before they discharge the specific bacteria. If, therefore, the examinations could be carefully made at short intervals suspicious cases could be removed before damage was done. It means that the spread of the virus is largely if not entirely checked and that gradually the infected animals will be eliminated. Tuberculosis can be likened to a weed in that it is the product of a certain definite seed. A weed-free garden is not made so at once, but so fast as the weeds appear above the ground and before they have produced seed, they are destroyed by the gardner. Eventually all the seed that will germinate have manifested themselves and been removed; thereafter weeds will not appear if care is taken not to introduce more seed from without.

The physical examination in this country should include all that the Germans hope for by the clinical diagnosis. They find the suspicious case on physical examination and then proceed with methods of precision to make a positive diagnosis. We should remove the suspicious cases and if they are kept they should be held in quarantine until the positive diagnosis is made. If this were done, the physical examination here would mean all that the clinical diagnosis means in Germany. If this were applied in all herds it would be a great addition to the present methods in eliminating tuberculosis.

We are not wise guardians of the health of the cattle, to say nothing of our responsibility to the children of the land, if we do not recognize the truth regarding the nature and distribution of the disease in question. The facts are that tuberculosis is widespread in our dairy districts and that in many herds a large percentage of the cattle is infected. The effort to control this disease by legislation has been centered on the elimination of all infected animals regardless of the stage of the lesions. The appropriations for indemnity and cost of testing have in general not permitted the thorough and repeated tests of all the infected herds and slaughter of reacting individuals. In many states, not more than one to five per cent of the cattle are tested annually and the reactors removed. While a great deal is being said about the control of tuberculosis, the actual purification of tuberculous herds is progressing very slowly in many badly infected districts. Meantime the disease is continuing to spread after its own methods in a large number of herds. Great emphasis has been placed on a few herds while the greater number is untouched.

There is no question but that the tuberculin test applied and properly repeated to all herds with the slaughter of the reactors would be the quickest way to eradicate tuberculosis. There is no doubt of the statement that badly diseased herds have been purified and in localities where there is but little tuberculous the method of testing now in vogue has been successful and is to be urgently recommended. The actual conditions, however, that exist in a majority of dairy districts demand that the spread of the disease be checked in more than from 1 to 5 per cent of the herds. It is because of existing conditions in the great dairy districts that it seems desirable to add to the more stringent methods that are being applied in a few herds some measure to eliminate from all herds the cows with recognizable tuberculosis of the lungs, intestines, uterus and udder. Check the spread of the virus in every dairy herd, should be the slogan of the live stock sanitarian. Until public sentiment changes and legislatures find ways and means for providing indemnity, and breeders see their way to supply healthy stock, we cannot hope for the successful enforcement of stringent tuberculin testing laws and the removal of all reactors. If a general system of careful physical examinations is enforced and all suspicious cases removed at least most of the spreaders would be
eliminated. It is for this reason that I believe a general physical examination added to existing efforts would be most helpful. It is not advocated as a panacea but as a valuable adjunct to present methods in combating this disease. Why not apply some method that will check its spread in tens of thousands of tuberculous herds where under existing conditions nothing is being accomplished?

The educational value of the physical examination is very marked. In my own city the appointment of a veterinary dairy inspector last June has already resulted in the elimination of a number of advanced cases of tuberculosis and the request from the owners of several herds for the tuberculin test. Judging from experience, and the reports of scientific investigations, I am personally convinced that a general, frequent, honest and skilled physical examination of dairy cattle and the exclusion of advanced and suspicious cases would hold tuberculosis in check and in many herds eliminate it absolutely. It is important to recognize always where the value of a physical examination begins and ends. The following seems to be determined:

1. A physical examination will enable a skilled examiner to detect advanced cases of tuberculosis in cattle.
2. It will enable one to detect the presence of lesions in less advanced cases so that the suspicious animals can be removed.
3. The physical examination will not detect more than from 1 to 5 per cent of the infected animals at any one time. For this reason its value is very largely restricted to the intra-herd control of the disease.
4. A physical examination cannot be relied upon to detect all infected cattle and consequently it is of little value in inter-herd control. For this protection tuberculin is the only diagnostic agent we have.
5. Finally, it is believed that a physical examination will detect, if properly carried out, from 80 to 85 per cent of the animals which are actually spreading the virus.

WEDNESDAY, DECEMBER 4, 1912
MORNING SESSION.

The meeting was called to order at 9:30 o'clock A. M. by the President.

STATE CONTROL OF CONTAGIOUS DISEASES IN LIVE STOCK.

By J. I. Gibson, Des Moines, Iowa.

My subject first applies to the control of the disease within the state, and if thoroughly worked out would fill a volume as large as the entire proceedings of this Association. In a short paper there is but time to touch upon a few points to be observed in attempting to control disease.

Control work must be thorough if we expect to get results. A compromise with contagion or infection means defeat. Therefore, if we would expect success in this line of work, we must be thorough, first, in our regulations, and secondly, in the carrying out of the same.

The first regulation in the control of most diseases is quarantine. Quarantine might be construed to mean the perfect isolation of all diseased or suspected animals from direct or indirect contact with healthy animals, as well as exclusion of healthy animals from premises or grounds whereon said suspected or diseased animals are or have been kept. The quarantine in each specific disease should include such special regulations as are necessary to prevent the
spread of such disease, and in order to intelligently institute quarantine against a given disease, the sanitarian must needs understand the manner in which such disease is transmitted, or carried from one animal to another, or from one premise to another. For instance, a quarantine for the control of an outbreak of glanders need not be so complex in its stipulations as a quarantine in case of an outbreak of anthrax or hog cholera, nor need it be maintained upon an infected premise nearly so long; therefore we would state that the control of glanders is not nearly so difficult as the control of anthrax, hog cholera or tuberculosis. However, each quarantine must be prepared to suit the conditions in which it is to be maintained, as well as the nature of the disease it is hoped to control. The writing of a quarantine in each and every instance, is to the sanitarian equivalent to the writing of a prescription by the physician for an individual patient. Taking this view of the matter, it is at once evident that the sanitarian should master the situation in all its phases in instituting a quarantine to prevent the spread of a disease, and further accepting this as true we must admit that it is practically impossible to standardize a quarantine blank and issue it in printed form in sufficient detail to fully apply to the various diseases with which we have to deal.

We must admit that in many instances the kind of quarantine established is of little value because the sanitarian does not take time to study the conditions surrounding the outbreak, and on account of lack of time or pressure of other duties he neglects to connect up, link by link, as in a chain, all the avenues through which the disease in question may find exit, or be carried beyond the borders of the infected territory. This being true, he often fails to control the outbreak just as an attorney fails after having woven a chain of evidence up to a certain point and then skips a link or two, and though the links be small they may be accountable for his failure to convict at court, or to control in the case of a contagious or infectious disease. Many of these failures are due to the fact that too much is expected of each individual engaged in sanitary work. In this connection, I would state that the writer is now expected to do the work of at least half a dozen men for about half the salary one competent man should receive.

The first main step in connection with the control of disease in any state should be the placing of strict restrictions or regulations against the introduction of diseased animals into the state. For a number of years the state of Iowa was unprotected so far as importations of diseased stock were concerned.

The original law creating the Office of State Veterinarian in Iowa provided for no safeguards against the outside world, but in its phraseology attempted to hold the State Veterinarian accountable for the eradication or control of all diseases of live stock, whether in the state or in transit through the state. This, you will grant, was something beyond the power of mortal man.

The first advance legislation of any real value in the control or eradication of disease was passed by the Thirty-first General Assembly, which required that the importation of all registered cattle, or cattle eligible to registration for breeding and dairy purposes, be prohibited except when accompanied by health certificate with record of tuberculin test.

The Animal Health Commission at its first meeting in July, 1911, made a ruling extending the application of this statute to all dairy and breeding cattle, so that in this law and supplementary ruling we feel that the state of Iowa is protected to a large extent against the importation of tubercular cattle.

In years past there have been times when we had reason to believe there was not a case of glanders in the state, but in a short time a number of outbreaks of glanders would spring up and upon investigation we invariably found
that these outbreaks traced directly to shipments of horses from western states. With these facts in view, the Animal Health Commission passed a ruling requiring that all horses imported into the state from states west of the Mississippi River be accompanied by health certificate with record of mallein test. Instances are coming to our knowledge frequently of shipments from the states that formerly sent us our glandered horses, where animals being tested for shipment to Iowa have reacted to the mallein test, and therefore the shipment has been prevented. We feel quite sure that we can successfully control glanders in Iowa with the aid of this ruling, although we are having some trouble with unscrupulous dealers, and shippers, who resort to every possible means to avoid compliance with this ruling.

The most important question before us is the control of hog cholera. Professor J. W. Kennedy, Director of the Agricultural Extension Department at Ames, aided by Dr. Cline of the same Department, has been investigating the cholera situation in the state, and has recently made the statement that our farmers will lose one million hogs this year, of an average value of $12.00. This figures up an immense loss to our state, a large percentage of which we believe might be prevented with proper restrictions or control work, which would necessarily have to be backed up by a liberal appropriation on the part of the Legislature.

We believe that these widespread outbreaks of cholera could be prevented and circumscribed by the instituting of strict quarantine and sanitary regulations with the intelligent use of Dorset-McBryde-Niles serum. In order to successfully combat cholera it would be necessary to have a staff of field veterinarians especially equipped and competent to deal with this disease. Back of those field veterinarians it would be necessary to have at least one person in each township who would act as informant to the Veterinary Department, and on the first appearance of the disease in any herd of hogs, upon notice of such disease the State Veterinarian could at once dispatch one of his field staff to take charge of the outbreak, destroy the hopelessly sick, treat the balance of the herd with serum, establish a rigid quarantine, prohibit all persons from coming on the premises and the owner and occupants from going on other premises, thoroughly disinfecting the hog lots, burning up all carcasses, together with all contaminated litter and sweepings from the yards, and then circumscribe the outbreak by the use of serum on all adjoining herds. If necessary a second serum treatment should be given the infected herd in thirty or sixty days.

We believe the state could be organized for this work, and that the cost of such regulations fully carried out would represent but a small percentage of the loss which now occurs from neglected initial outbreaks. In undertaking this work, we believe the Legislature should appropriate sufficient funds to equip a proper laboratory in which the production of serum might be carried on throughout the winter as well as during the summer, and that an appropriation of at least $25,000 annually should be set aside for the control and prevention of hog cholera. In our great extremity this season with lack of funds with which to produce sufficient serum for our people, we are under great obligation to the State of Kansas, and to Dr. F. S. Schoenleber, who have kindly furnished us considerable quantities of their surplus serum at the same price they furnish it to their own people. With this aid from the state of Kansas, we are going to be able to save a great many hogs that the farmers would otherwise lose.

The first and most important step in attempting to control hog cholera will be maintaining a rigid inspection of all serum plants doing business in the state, and the enactment of a law, or ruling, absolutely prohibiting the
importation of cholera virus into the state, or the shipping of such virus within the state, except under permission from the State veterinarian or the Animal Health Commission. We favor Government supervision and inspection of all laboratories producing serum for interstate shipments, and state supervision of all laboratories doing business within the state. Any laboratory that was inspected and its products tested and approved by the Government for interstate shipment, might at once be approved by the state authorities of the state in which such laboratory is located. Whilst the Government certificate should be sufficient to admit serum into any state, yet permission to ship virus into the state, or within the state, should be granted only by the state. In this way the authorities of each state would have complete supervision or control of the importation or use of cholera virus within the state.

ADVANCE REGISTRATION FOR PURE-BRED CATTLE FREE FROM TUBERCULOSIS.

By O. E. Dyson, Chicago.

Practically every breeder of live stock recognizes the economic advantages to be gained by securing a certificate of registration from the various live stock record associations for every animal eligible to registration. The reason for such a widespread knowledge of the value of a certificate of registration is, that such certificates are universally accepted as a positive means of establishing and preserving the identity of every registered animal. I am therefore of the opinion that advance registration similar to that now being utilized to officially demonstrate the milk and fat producing qualities of individual cows of the various dairy breeds could be utilized to good advantage in promoting the eradication of tuberculosis in pure-bred cattle herds.

The following plan for establishing advance registration for pure-bred cattle as being free from tuberculosis would make it incumbent upon the various pure-bred cattle record associations, or preferably the Bureau of Animal Industry, United States Department of Agriculture, to provide means for the registration and certification of all such cattle. The requirements for certification in all cases being:

First, a certificate of registration in any herd book officially recognized by cattle record associations.

Second, all cattle exceeding the age of six months maintained upon the premises occupied by the herd must pass two negative tuberculin tests with an intervening period of not less than three months or more than one year, the test thereafter to be repeated annually.

Third, all tuberculin tests to be administered by a competent veterinarian in accordance with the regulations of the U. S. Bureau of Animal Industry, with tuberculin furnished by the Bureau. Before administering the tuberculin test, however, a thorough physical examination of the animal should be made.

In order that advance registration may be made to serve a practical purpose, a change of ownership unless the animal is added to a certified herd, must necessarily invalidate the certificate.

Provision should be made for the free movement of cattle in interstate trade when such shipments are accompanied by a certificate of advance registration, as evidence of their being free from tuberculosis. Such certificates, good for one year from date of issue unless revoked for cause, should be accepted by all state live stock sanitary boards as representing modern sanitary requirements covering the interstate shipment of pure-bred cattle for breeding or dairy purposes. This would enable owners to sell and deliver any number of certified cattle without the annoyance, delay and unnecessary ex-
pense now occasioned by being compelled to subject such cattle to the tuberculin test immediately before shipment.

Under the proposed tentative plans for official registration of healthy pure-bred registered cattle, I think it safe to say without fear of contradiction, that confidence would soon take the place of existing doubt in the mind of the average breeder, as to the healthfulness of all pure-bred cattle, and that a forward movement toward a fixed and profitable standard of health would be participated in by all progressive breeders. This would apply particularly to the various breeds of dairy cattle.

The importance of tuberculosis as a fundamental factor in the breeding of dairy cattle, or in the productiveness of the herd can not be denied. In fact the health of dairy cows should unquestionably take precedence over breeding or productiveness. A combination of health, breeding and productiveness are the principle factors conducive to a profitable dairy herd and must receive just recognition in the future.

In advocating advance registration as a double standard for all pure-bred cattle I realize that it is but a short step for any reputable breeder to take, in fact the double standard is now maintained in every strictly high-class herd. It is not, however, as it should be a matter of authoritative record which would serve as a guide to any one, especially a novice, who desired to purchase only healthy cattle of the various breeds.

Advance registration would also effectively serve to prevent the present active competition between the breeders of tuberculous cattle and of those in perfect health, a competition that is decidedly in favor of the breeder of diseased cattle. Notwithstanding this fact, however, breeders of healthy cattle are apparently willing to endure the handicap without voicing a single word of protest, the significance of which needs no further comment.

In order to promote the foregoing provisions for the advance registration of pure-bred cattle upon an equitable basis for all breeds, the Hon. James Wilson, Secretary of Agriculture, has been requested to appoint a National Bovine Tuberculosis Commission to assist progressive breeders of pure-bred cattle in their efforts to establish, maintain or perpetuate herds that are free from tuberculosis by:

First, detection of infected herds by modern and reliable means.

Second, segregating or otherwise eliminating infected animals from the herd.

Third, guarding against reinfection of the herd by the addition of infected animals.

Fourth, official recognition of all pure-bred herds that are free from tubercular infection.

Fifth, providing for identification certificates for every animal in herds entitled to official recognition.

Sixth, co-operating with state live stock sanitary boards and officials of all pure-bred cattle record associations for the purpose of carrying into effect the foregoing fundamental factors involved in combating the spread of bovine tuberculosis.

Seventh, last but not least, to induce, if possible, the officials of state fairs and live stock expositions to require a certificate of advance registration as evidence of eligibility to compete for prizes in all classes for pure-bred cattle of the various breeds.

Dr. Mayo: There are several things in the papers that I want to refresh myself on. It seems to me a serious problem in connection with this advance registry of a herd for health, is the fact that
it is necessary to follow a herd for a number of years. I am positively convinced of that. It is necessary to follow a herd for years before you can fairly and reasonably put them upon an advance register. I presented to this Association last year a paper dealing with a tuberculous herd that has been under observation for a number of years, some five years now, down at the Virginia Polytechnic Institute. I believe now after five years care, thorough care, we are in shape to begin to put it upon an advance register. I still have some doubts, but I want to call your attention to that one thing in this matter, because you cannot do it in one year, you cannot do it in two years and you cannot do it in three years with an ordinarily infected herd of pure bred cattle, and that is due to the fact that you will in such a herd, I believe, invariably get a number of animals that are immune to the tuberculin test and that do not show the disease in any other way, and you have got to keep it up over a number of years until the disease develops in these animals, and you have got to get your center of infection out of that herd before you can safely put it upon an advance, registry basis.

Another thing that Dr. Cary touched upon and which I would like to say a few words in regard to is men in the field work. I think Dr. Cary is a little pessimistic in regard to the matter, and I think it is due partially to his own careful method of training. Now he prefers men that he knows and has trained to men that come in that in some respects may be better qualified, and in other respects not as well, so I think it depends upon men. I think that the trouble is that most veterinary colleges now do not give the students a sufficient scientific training. Now you can laugh at science if you want to, but I say that if you are going to get anywhere it simply means a careful collection of accurate statistics. Most veterinary colleges train men to treat animals and cure them if possible. They have got to make a living and they want to send out successful practitioners, but when you come to dealing with great sanitary live stock problems you have got to have men that are not only familiar with disease but men that can handle the problem accurately, and after all that is science, to do things accurately. And then more than that, I will say more than the scientific or the accurate training, you have got to have men with lots of common sense, with both a scientific training and plenty of common sense. You know as well as I do that certain individuals can go into a community where there is a contagious disease or go into a herd that has contagious disease and kill those animals and clean things up and when they go away the man will feel that he has done him one of the greatest favors that

1 The stenographer did not record Dr. Cary's address.
could possibly be done. Another individual will come into that herd and will start a fight right then and there, and he will do more harm than a dozen men can do good. Now don’t forget that one phase of the subject. Talk about good laws and regulations and one thing and the other; most any sort of an ordinary law will do if you have got a good man with good sense and tact and resourcefulness to enforce it. If he has all those qualities you can get a whole pile of good out of it.

Now there is another phase, and that is adaptability, that Dr. Cary spoke of. And let me tell this story in connection therewith. When I first went to Cuba to take charge of the animal industry of that Republic I received a good object lesson one day, one of the best lessons I have had. I went down to a place there to investigate an outbreak of disease and while I was on my way I met old Hezekiah Williams from Texas and he said to me, “I have got a bunch of Texas cows and a Cuban is coming in to-morrow morning to buy some.” He said “You will be interested to see him pick out those cows and I would like to have you stay and watch him.” So I rode out a few miles with him into the country to see this. The Cuban came along and began looking over the cows and I watched him and I couldn’t tell for the life of me what he based his judgment on in picking out those cows, so I asked him through an interpreter what the points were on which he selected those cows. “Why,” he said, “I select them with reference to the condition of their horns and the hair and the tail.” That was a new point of judging beef cattle to me. “Why do you select them on account of the horns,” I said? “Why,” he says, “I sell most of my bulls, and I have my cows for work, and I have to yoke them up, and I attach the yoke to their horns, and so I want to pick out cattle that have good, strong horns.” “Why, how about the hair?” “Well, you get these long Texas haired cows in this country and the ticks naturally eat them up.” “Well,” I said, “how about the tail?” “Well, you get an animal with a long, splendid tail, she walks fast, and makes a good working cow.” And so after that I took the local judgment quite frequently rather than my own. (Applause.)

Dr. Reynolds: One very important suggestion that was mentioned in Dr. Dyson’s paper that I don’t think we should pass over so lightly was the recommendation to Secretary of Agriculture, Mr. Wilson, that a National Bovine Tuberculosis Commission be appointed, recommending to the Government this plan of official governmental recognition of pure bred herds of cattle free from tuberculosis, the freedom to be judged by standards satisfactory to the Government. Now, of course it is true, as Dr. Mayo stated, that if
this plan goes into operation, as we have encouragement to think it will, there will be great difficulties met with and a great many hard problems to solve during the first few years of its operation, a good many of them undoubtedly, but I have faith to believe that those difficulties are going to be met and the problems all solved, and personally I regard this as probably the biggest thing in sight just now, the most promising thing in this work of tuberculosis control. Not altogether for its immediate effect upon pure bred cattle, but upon the pure bred cattle first as disseminators of tuberculosis, for the effect upon the agricultural press and the interest which they will take in it, and the influence that radiates out from the pure bred cattle owner to his neighbor who owns grade cattle. The indirect effects are probably greater than the direct effects upon the pure bred herds.

Dr. Dyson: I would like to ask Dr. Mayo how many negative tests he considers necessary before a herd is considered free from tuberculosis?

Dr. Mayo: Well, I should consider at least an annual test for three years, negative tests.

Dr. Dyson: Why not make it oftener?

Dr. Mayo: Well, we have tested every six months, but in our tests so far the indications show that a spring test is about as good as two tests a year, because after your first two tests of a herd and you have cleaned out most of them, you will find that the new cases develop during the winter and not in the summer when the cattle are in pasture. For the last three years or four—I can’t give you the exact period of time now—in the fall tests we have gotten no reaction at all, but in the spring we have almost always gotten a few reactions which would indicate that the conditions of stabling through the winter caused the disease to develop, or they contracted it during the winter. Now I think that in three years most of those new reactors will develop, and there is a question too whether the injection of tuberculin twice a year will not give a very mild—it is doubtful—sort of immunity to reactions, so I think that you ought in the beginning of a test of a herd to make the test twice a year for at least two years, and then after that I believe one spring test in the year is enough, and that is more satisfying.

Dr. Dyson: In the herd you referred to did you ever get two negative tests in succession?

Dr. Mayo: We have the last two.

Dr. Dyson: Well, wouldn’t you consider that your herd was free from tuberculosis now?

Dr. Mayo: Well, I will tell you, I have taken a cow out on
physical examination and assured myself that she had tuberculosis. Now I believe we have the herd clean.

Dr. Dyson: You are sure you did not overlook her when you made the first test?

Dr. Mayo: Oh, she has been isolated. We took her out on a physical examination.

Dr. Dyson: When?

Dr. Mayo: Last week.

Dr. Dyson: How long after the test did she develop physical evidences?

Dr. Mayo: She was tested in the latter part of October or the first of November, I couldn't give you exactly the date, but in January she commenced to show a little, and I took her out on the farm and isolated her. That cow had been tested, I believe, at least eight or ten or a dozen times, and we took her out and tested her, gave her 5 c. c. and she did not react, and we killed her a little later. She was tuberculous.

Dr. Gibson: I would like to ask Dr. Mayo what other means did he resort to to clean this herd and get it clean besides the tests?

Dr. Mayo: Just this inspection and physical examination. Every doubtful case went out. I will say, for instance, on the first test of this herd we got over 40 per cent, on the next test 30 per cent of the remainder, but there were still in the herd fourteen animals who responded once or more than once that did not respond to either one of these tests. I have got one of them in the herd yet.

Dr. Gibson: I think everything depends on the initial condition of the herd when you begin your process. As I understand the Bureau, when they test a herd and find over 50 per cent of the herd tubercular, they call it a tubercular herd. In our state testing, in Iowa, we have herds numbering fifty head that have been tested first probably over fifteen years ago and at various intervals since, sometimes once a year, and we have herds that have never had a case of tuberculosis. We have other herds that were found badly infected to begin with, and we expect to find some cases every year there in our state, and we do find them as a rule. I think that Dr. Mayo is telling us about the difficulty in handling one of those bad herds, in which, of course, those difficulties are multiplied. There would be one great drawback which has not been mentioned in this process, and that is that we find nine cattle breeders who are the right kind of men, and who desire to purify their herds, get their bad cows from their herd, and we get good results because they are willing to do the right thing, but the tenth man may be one of these scamps that we were debating about last night that the devil himself could not
catch nor control. One of that kind of men in each community or even in each state could very easily hamper the process, so as I have said before, there are two classes that must be influenced before we can accomplish the desired result, and those are the cattle men and the veterinarians. I might say that in a meeting last evening of state veterinarians who are in attendance at this meeting, who have formed a little association of their own for their own mutual benefit, it seemed to be that all the veterinarians present were in favor of this plan, and I was very much impressed with the plan just recently adopted in Minnesota. I received the report of the Cattle Commission of Minnesota and I was pleased to see listed there so the whole world could see men who are honestly and anxiously working to get rid of tuberculosis, to purify their herds, and I believe that the acceptance of cattle from such herds should finally become the custom in all our states, with, of course, well defined reasons why any man might be removed from that list and published as a man who had resorted to some dishonest means to gain the advantages of the advance registration and at the same time deal in diseased cattle. We will have to look out for these men very closely, but I believe it is a step in the right direction.

Dr. Connaway: This is certainly a step in the right direction but it seems to me that there are some dangers that we will have to guard against in these herds, and that is the maintenance of the healthy condition of things that we sometimes overlook. In the College herd at the Missouri Agricultural College it had been our practice there to test these cattle every year. This has been carried on for fifteen years, and during that time we never have discovered a case of tuberculosis in animals that we had raised on the farm. Every case that we had was in animals that had been recently purchased. We have one cow, though, that reacted recently that we had had on the farm for about eight years. This cow came from a tuberculous herd. In the original purchase there were five animals selected. One of these reacted. The test was made soon after the purchase, and one of these animals reacted and was slaughtered. The lesions were very slight in that animal. The other animals have not reacted since that time. One of those reacted the last time that we made the test, but whether that was a latent tuberculosis that has been carried along all this time or whether she has become infected since the purchase or not we are not able to determine. There have been opportunities for a reinfection of that particular animal and of others by exposure, possibly, to grounds where untested feeding cattle may run on pastures, and this is one of the things I am sorry was not included in these recommendations.
yesterday, that is that cattle coming into a state for feeding purposes and not for immediate slaughter ought to be tuberculin tested. Dr. Sheldon made a test of our feeding cattle recently and in one of these he found a case of this kind. This happened to be a steer that was being prepared for this Chicago show. And so here is a possibility for the introduction and reinfection of herds in this manner if we are not exceedingly careful in guarding all the avenues of infection.

Dr. Moore: I think this is a very important matter that Dr. Dyson brought out, and I would like to call your attention to one or two difficulties, some of which have been suggested, but others of which I think have not been sufficiently emphasized in dealing with these herds. One of the difficulties that has been experienced in our state, which I guess is general, is in determining from the temperature reaction whether or not the animal has reacted. There has been a tendency to require a certain rise of temperature above the maximum initial temperature in order to condemn, but I think that all those who have worked with this disease and tested large numbers of cattle and made post-mortems, will come to realize exactly what Dr. Poels has published in his reports, that quite a large percentage or a certain percentage of the animals that are on the border-line and that ordinarily in our procedure are eligible to pass as sound, are actually tuberculous, and that a slight rise of temperature is an indication of the presence of that disease. Now, I had this very forcefully brought to my attention a few years ago in a herd where I was advising the owners in which there were seventeen animals, some of them were young, some were yearlings and some a little older, in which there was a temperature reaction ranging from 102.9 to 103.8. These animals had been considered as found not to be reacting, but a veterinarian came in to take charge of the herd, and it was his opinion that those were reactors. My experience had led me to believe that some of them were, and the outcome was that those seventeen cattle were slaughtered and eleven of them were tubercular. Now I think we have let in, especially in these bad herds, a great many animals that are tubercular and showed so on the test, because we have looked for too high a rise in temperature for a reaction, and that is especially true with the old cases or arrested cases.

Now, one other point that Dr. Mayo brought out in regard to the length of time. I know in one herd in which the Bang method was carried out, a cow about ten years old reacted, and she reacted for three consecutive tests in the group of animals that reacted. Then she ceased reacting, and she failed to react for six consecutive
tests made six months apart, that is for three years she failed to react. At that time the herd was replenished, and the few reacting animals that were left were to be destroyed, but here was this animal that did not react; an animal which on the first test had reacted and then continued to react for three consecutive tests and then had ceased to react for six consecutive tests, and the question was, what to do with that animal. The owners replied "Kill her," and she was slaughtered and in the bronchial glands there were old lesions, calcified lesions, and guinea pigs inoculated with these lesions died rather promptly of tuberculosis.

Now, I know of other animals which have been tested and which did not react when the experiments were started, and did not react to any test until four years and a half after, when they did react, and on slaughter old calcified lesions varying in size from a walnut to the size of your closed fist were found in the liver and other organs, well walled off, but besides which were new lesions starting up. Apparently the germs had grown through this wall and had started up a new lesion. And so I think that Dr. Mayo in stating his time has put it rather short for determining whether or not you can clean up a herd. I know of a large herd where they have been trying the best they could to clean the herd, and they have been testing it for over ten years. Now, they were practically clean once and then it started up again, and I believe there are others who know about this, and believe the same thing, that the disease was propagated and appeared later in a considerable number of animals because they did not remove from the herd animals that gave these doubtful or questionable reactions and they thought at the time had passed, but which did not pass. And I think in the cleaning up of the tuberculous herds, especially bad herds, that the interpretation of the temperature reaction along this border line is one of the most difficult problems which you have to meet.

INSPECTION OF CITY MILK FROM PRODUCER TO CONSUMER.

By G. Ed. Leech, Minnesota.

The center of dairy cow population has followed the center of human population, or has been its traveling companion from "Plymouth Rock" to the "Golden Gate."

Civilization and the dairy cow are closely associated. Pioneer gold seekers, sheep herders or ranchers gave little thought to the milk question, using some substitute, but when the real homesteader came he brought the dairy cow, and in a short time he had a herd started, and henceforth he can laugh at the present day bug-a-boo of the city dweller—"the cost of high living."

There are several reasons why this is true, but the main one is that she is several laps ahead of all her competitors in the field. As a producer of food productions (variety considered) with all people she comes first, except with the man with the "Emerald voice," who owes his first choice to the pig.
The dairy cow has also become a great factor in determining the value of the hired man, and herein lies the greatest difficulty in the solution of the question of milk production.

One of the first questions asked of the farmer preliminary to hiring out is: "How many cows do you keep?" And upon the answer to this question depends largely how much the prospective employe will ask, regardless of his knowledge or ability to handle the work. There is no doubt in my mind that the attitude of labor on the farm toward the dairy cow has been a great factor in holding back the advance of the dairy industry in many localities, and the reason for this is not so hard to find, as many dairymen and farmers have contended.

Imagine yourself the hired man, getting an order like the following, and say how long before you would be his counterpart?

"Well, John, you might plow in the north field until eleven-thirty, in the afternoon harrow until six, put up the team and get supper, then start the milking; I may be home in time to help you out; nothing more to do after that until tomorrow." And tomorrow generally begins at four or four-thirty, a.m.

Is it any wonder that that man shies at an alarm clock, and treats the cow kindly with the milking stool? The man who carries a lantern at both ends of the day can not be expected to see things in the same light as the one who has some daylight in which to study Hoard's Dairyman or The Country Gentleman.

Here is where the employer can say to himself: "It is just possible the trouble may be with myself, instead of with the other fellow," and profit thereby.

If one could fly high enough and his eyes were good enough, he might get a view of the dairy industry that would give him a keener appreciation of the responsibilities of the producer and consumer. That there are two sides to this great question goes without contradiction, and there are ninety million people interested to a certain extent in one side or the other, with the inspector, who must of necessity stand between them, neutral of course, but as he must be firm, to yield either way after becoming convinced of a fact, being to lose all that has been gained.

Thirty years ago a man would have been called half crazy who talked dairy sanitation, or inspection, and eight years ago when I took up the work I was called crazy, and I have seen the time since that I actually thought I was myself. It is an easy thing to criticize, but it is a devil of a job to create, especially when the inspector is the creator. Ordinances and laws, rules and regulations, are easy to draft and pass, but it is far from easy to enforce them.

It has been said that the essentials of good milk production are, "Men, Money and Mutual Understanding," and this is true. Evolution has brought about such a change in conditions that to meet the present day demands the dairymen must be thoroughly versed in the art of production. It has become a science, and he must realize that the only way for him to meet these demands is to consult or accept the advice of one thoroughly trained and educated along this line.

The man who not only keeps pace with the times, but just a little ahead of them, sticks out from the main bunch like a large wart on a small pickle.

The great trouble with the milk producer is that he is not willing to even keep pace, and he often has reasonable excuse, for he may take ever so good care of his product. If he is furnishing only clean market milk, his efforts count for naught, as it is usually mixed with other milk drawn with no care.
or pains, and all his energy is wasted as the composite product has lowered his own standard and raised his competitors with no benefit to him financially. Then, he has not learned the art of production, and it is costing him too much to produce his milk, and he complains of no profit for his labor. He will not be convinced, but insists on running his own boarding house.

There are two other conditions for the inspector to contend with that give a great deal of annoyance and trouble. One is the rented farm, which is badly run down and the owner refuses to correct these evils, and the renter will not. The other is where a farm has been purchased at a long price to the original owner, and the present owner is struggling along to carry the load he has bargained for, and refuses to see how to better his conditions. A great deal of milk is being delivered in our large cities from farms in these two classes, and it is no wonder there is continual complaint with respect to its quality. A large per cent of this kind of product is not fit for pig feed. A consumer brought a sample of this kind to me the sixteenth day of November, saying his baby refused to touch it, and he wanted to know what was the matter with it, and when I had finished my examination, I told him he had a right to be proud of that baby for having good judgment; I thought the producer had tried to work all the cabbage and beet trimmings into that one bottle before he lost them by frost. There is little use to force any change in such cases as long as there is more demand than supply, so that the producer can readily dispose of his product. Should he be cut out from the city trade by the inspector he will not care, or improve. His answer will be: "I can take it to the creamery or cheese factory," so it will eventually reach the city, and the buttermilk from such a product reaches the city every day, the result of a very questionable handling.

Too much stress can not be placed upon the quality of the men in the capacity of caretakers and milkers, especially as to whether they are wet hand milkers or not. I have seen milkers sit down to milk with their hands covered with machine grease, and before they had finished the first cow their hands were clean and the grease combined with the milk. I admire the milker who carries a piece of cheese cloth in his jacket pocket to blow his nose on when necessary, instead of using his hand, without washing it before continuing the milking. First-class men for this branch of the work are very hard to secure, in every section of the country.

Another class of men who are very troublesome in this work is the retailer and his crew of handlers within the city. Competency is an unknown quality in this class, and I would dispense with this branch entirely, having all milk bottled, or put up in sealed cans at a central plant, nearest to the point of production under the supervision of a competent inspector, iced and packed in refrigerator cars, sealed and sent to the city for delivery direct from the car. If this could be accomplished, and a systematic delivery carried out within the city that would prevent so many different wagons covering the same ground, there could be a large reduction in the retail price of milk, and yet as much actual profit realized.

Butcher shops, confectionery stores and the average grocery store, which buy bulk milk and retail it from their places of business are a source of great danger as well as generally selling milk of an inferior quality, which has been made so by their careless indifferent handling, even were it of first-class quality when delivered into their hands by the wholesaler.

Means.

There is no question, at least with those knowing something of the inside of the city milk question, about the money necessary to handle the business. It is enormous, and beyond ordinary conception, and every time a new law or
ordinance is drafted and enforced, it calls for a still higher grade and an 
increase in the cost of production, with no provision for compensating the 
producer, who is the first one to feel the effect of every change.

It must be recognized by dairy inspectors, and all public officials, that 
the application of dairy methods, in the dairy and the enforcement of laws 
and ordinances, rules, and regulations, depend upon the readiness and willing-
ness of the public to pay the price. No amount of laws will force the dairy-
man to adopt methods that he can not afford at the price paid for his milk.

To obtain a quality of milk that is beyond suspicion requires the raising 
of the price paid to the producer above that which has been common in the 
last few years. He is not receiving today much more in proportion than ten 
years ago. It will always be possible doubtless to purchase good milk and 
poor milk, but never good quality at the same price as poor quality.

The attitude of the public toward the producer should be one of mutual 
assistance, rather than one of hostility. I have had retailers tell me that 
when they told people how much butter fat their milk contained, and how 
few bacteria, they would reply: “That does not interest us; it is the price; 
can’t you sell it cheaper?” It is the retailer who is selling an inferior qual-
ity of adulterated milk at a reduced price, who is able to, get patrons on the 
route of the honest dealer (through their ambition to save a penny), and he 
thinks he is shrewd until he gets caught in the tangle of the legal net, then he 
blames the inspection for it. This system of dealing with the consuming pub-
lic on a question of such vital import to the health of the milk fed portion of 
the populace is a disgrace, and adds no credit to our American system of deal-
ing with public health matters.

It must be taken into consideration by the consumer that to produce a 
quart of a certain quality of milk requires a certain fixed outlay, which must 
be charged to the finished product, and that no one giving a cut rate can 
maintain the quality. First-class market milk is an article that can not be 
sold on a basis that a bargain counter is run on. A good first-class full-blood 
dairy cow costs a great deal more than the common scrub, but of course pays 
larger returns. Sanitary barns, such as are required by laws and ordinances, 
call for an increased cost of production, and cleanly methods of handling also 
add to the expense. A system for steaming and sterilizing utensils and a 
modern cooling plant also add to the cost of production that is not appreci-
ated by the consumer. All these and many more, such as bottles, perforated 
tickets, covered top milk pails, clean clothing, and a modern toilet room, all 
of which are necessary adjuncts to the handling of market milk, but seldom 
if ever seen, give the producer a very unappreciative view of the milk pro-
duction, unless he can be made to realize that he will be amply reimbursed 
for his outlay.

Mutual Understanding.

The average consumer in the city has just about as good an understand-
ing of all of the necessary cost of production of milk as the old woman who 
lost her cow from anthrax. When the undertaker came around to get the car-
cass he sympathized with her for her loss, and incidentally asked what she 
died from. The old lady, after thinking for a minute, replied: “I really do 
not know, but I believe it was the land tax that killed her.”

Today there is no topic engaging the attention of sanitarians throughout 
the world more than milk inspection, which has for its main object the secur-
ing for the people a supply of a wholesome and nutritious article of food. 
You who are schooled in the art of sanitary science may well be appalled at 
the ignorance of the average producer and I might say of the consumer. Seventy-five per cent of the dirty milk sold is so from the fact that the pro-
ducer does not know how to handle and produce a clean article, and the con-
sumer accepts it because he has not enough knowledge in the matter to refuse
it, or perchance it is sold cheaper than the better grade, and herein often lies
the danger. Wherever it can be done, I always advise the consumer to visit
the producer of his babies' food, at least twice a year, for the purpose of
getting better acquainted with his methods, and if he will do this it will soon
have its effect, and where he can not reach the producer he must accept the
judgment of the inspector. When such suggestions can be achieved, milk in-
spection will be an easy matter; hence I would emphasize the necessity and
importance of a more general system of education. We must of course look
to the younger class to accept this education, for when one's hair gets grey like
my own, one welcomes new ideas very much like the old woman, whose baby
was sucking an unsightly and dirty bottle, containing sour milk. When the
inspector called her attention to the condition, and explained that it was not
healthy, she replied: "Young man, I ought to know more about babies than
you do; I have buried six and have three living."

The Inspector.

There are no inspectors with ideas too exalted, or backed by laws or
ordinances too strong and effective to insure a safe and wholesome supply of
clean market milk. The inspector must be made to order, to please all parties
concerned; he must be of the most amiable disposition, never get vexed, know
all about the business (but keep it to himself), be familiar with all the family
history, ready to sympathize with everyone, and must be able to keep all
feeling kindly toward him. He will hear all about their neighbors' dairy
affairs, whom all are perfectly willing he should compel to obey the laws, and
to live up to them, but "do not touch mine, if you do we will have trouble."

"My neighbor puts his colostrum milk in with the rest of the milk, but
do not tell him I said so. Oh, no! I wouldn't do such a thing on a bet. I have
children in my family and would not think of it."

This is a sample of what you hear every day, but what should he do?
His duty as he sees it?

Every American citizen has the right to and should demand that the milk
he buys is not only what it is professed to be and sold for, but that it is whole-
some and nutritious and free from anything of a noxious nature. He must
make this demand not only for his own personal good, but for those of tender
years who are dependent on him as their legal guardian. The susceptibility of
this delicate article of food to the many and varied changes and the many
possibilities of contamination, require a careful method of production, and
handling. I have often remarked that the Lord takes better care of the cows
and contributes more to their comfort, health and productiveness in the sum-
ter time than man does in the winter, and how easy it would be practically
to carry out the example set by natural conditions in the summer, namely,
plenty of pure air and sunlight, pure water at a body temperature, wholesome,
 Succulent and nourishing food, and cleanly surroundings with daily grooming
and washing. Have you ever thought what nature is doing in such cases that
should be copied? And there is no reasonable excuse or earth why every one
of these natural conditions (except sunlight) cannot be furnished in winter
as well as summer, except the lack of interest and the ambition to execute it.

The inspection of dairies must naturally fall to the hands of the veter-
inarian and he must also avail himself of all the ideas and knowledge possible
to carry out the work. He must be able to detect every form of disease, com-
mon to the dairy herds, of every nature, must be an expert in sanitation and
hygiene, an architect in barn and dairy house construction, must be able to
defect the nature and character of disease in the attendants, be able to testify that the water used in the dairy is not contaminated. Who else but a veterinarian would think of keeping posted along all these lines and be capable of backing his judgment by facts? He must also be familiar enough with all milk conditions to take a bottle of milk and, by fermentation and curd test, tell all about the conditions under which it was drawn, the health of the animal from which it was drawn with references to udder troubles, the quality of the feed from which it is produced and the conditions of the animals and stable. Whether pure or adulterated, once more I say, who but a veterinarian would specialize in all these branches, and will the public be willing to compensate him for his services?

**Education.**

Education is the system that I have advocated for the cure of all these evils. Combined with honesty of purpose and proper equipment, it should bring good results. The right kind of education should begin with the man under the cow, and the maid in the dairy, as well as the kitchen; brushing and cleaning of cows, as well as personal neatness, must be a matter of training and pride, not of law.

You cannot compel cleanliness by law any more than you can make water run up hill. Covered top milk pails, which are the only kind to use that will bring results, must come as a matter of pride in producing milk of a low bacterial count. Steaming and sterilizing of all utensils used must also come from the same cause. Immediate removal to the dairy room and cooling and aerating is just as essential as the drawing, and when this is done the producer is ready to deliver to the central bottling plant. Any one can readily see that such a method of procedure does not involve as much of an outlay of cash as it does of knowledge and pride in the work. The equipment of the bottling plant is the point that involves the outlay of cash, and the soaker and washer is the most particular and necessary part of the equipment; no form of washing by hand that I have ever seen is sufficient to clean bottles as they should be.

The only washer that will give results is one that thoroughly washes and while taking time enough to thoroughly do the work will also do it very rapidly when once it is started. Such a machine is manufactured by Barry-Wehmiller Co., St. Louis, Mo., and is called the National Soaker and Washer.

This has in connection a machine for rinsing and after a bottle has passed through the process it is ready to go to the bottler and filler.

There is a plan of bottler and filler manufactured by Bishop & Babcock, St. Paul, Minn., and the Liquid Carbonic Co., Chicago, that can be adjusted to deliver the milk directly into the bottle at as low temperature as desired, without being exposed to air contamination or gross carelessness on the part of the attendant. Then by passing the filled bottles to the capper (and the best one on the market is the Tridac Machine, made by the Crown Cork & Seal Co., Baltimore, which will hermetically seal a bottle) there is then little danger from contamination.

Milk or cream handled after this process and properly iced can be shipped in refrigerator cars and delivered in the city in first-class condition, and when taken from the cars in galvanized iron containers that have been iced, before being placed in the cars, there can be very little danger of an inferior article that has been passed on by the inspector at the central bottling plant, but the irregular insufficient city delivery and an uneducated ignorant maid in the kitchen can be held responsible for spoiling an article of food delivered into their hands in good condition. Imagine the grocery boy getting a bottle of milk or cream into his hands. He will put it in a box with other groceries.
for the same place, no ice, temperature, summer heat; he is from one-half to
one hour in finally making the delivery; the maid in the kitchen leaves it on
the kitchen table fifteen or thirty minutes longer and places it in the icebox,
which is not below 60 degrees (about the average). What will be the condi-
tion of it for baby feeding or table use?

I think you will agree with me that in spite of all that has been done so
far we have not reached the A. B. C. of milk production.

THE SANITARY BARN AND CLEAN MILK PRODUCTION.

By Cassius Way, Harvard, Ill.

During the past few years the careful housing of dairy cows has received
more scientific consideration than ever before. Investigations have been made
by men who are thoroughly conversant with the subject from a practical as
well as a scientific standpoint. Thorough, conscientious and capable scientific
men have planned out various campaigns of dairy inspection in order to obtain
a cleaner milk supply, each in accordance with certain definite personal ideas
and certain definite local conditions. The result has been that all over this
country, yes, all over the world, there has been started a campaign of educa-
tion for a cleaner, safer, better milk supply. In every instance the work has
started at the fountain head, the dairy, and proceeded along the various lines
of production, transportation and distribution, until the product has reached
the consumer's door. Today the milk supply of the majority of large cities
is well supervised. To my mind there are many points of interest in this
particular line of sanitary work and my only excuse for presenting this
elementary paper is to point out some of the important fundamentals of san-
titary construction and present some of the phases in which the veterinarian
may play such an important part in watching over the health of the consumer
and guiding the destinies of the producer.

In our northern climate warmer stables have for years occupied the atten-
tion of our best farmers and stockmen. Bank barns were the outgrowth of
the desire to provide comfortable stables that were both warmer and sup-
posedly better. The convenience of having all stock under one roof tucked
carefully away from the cold was very alluring to ambitious farmers. But
animals housed in these expensive dungeons were not happy and showed their
discomfiture in watery eyes, lusterless hair, hot noses and hot, feverish breath,
with fitful, quarrelsome actions together with their inability to grow and
fatten. Frequently animals thus housed were subject to various bovine
diseases which were materially assisted in their work of destruction by condi-
tions so expensively though unintentionally provided. However, experience has
told the observing dairyman that under such conditions his animals are not at
their best and the gradual evolution of the sanitary barn took place, until now
it is the exception rather than the rule, in the large dairy districts, for a
dairyman to build other than an up-to-date sanitary stable.

The proper location of a dairy stable is the first important consideration.
Good air, good drainage, plenty of sunlight and an abundant water supply are
all essential features. The stable should be situated among surroundings that
afford a good natural drainage and should be equipped with a good cement
floor, tight walls and ceiling, ample light (four square feet per cow), plenty
of air space (500 cubic feet per animal), and finally, and most essential of all,
it should be equipped with an efficient ventilating system. I have studied this
matter from a great, many viewpoints and have made many observations con-
cerning the proper ventilation of dairy barns, and I am of the opinion that if
a sanitary stable can have but one sanitary equipment, that one should be ven-
tilation; all others are secondary. Essential as pure wholesome food is to both
man and animals, just as essential, and I dare say more so, is pure wholesome
air. This great natural agent stands first in the treatment of tuberculosis,
and it is equally important in the prevention of disease and in assisting the
body in the various physiological processes of metabolism, assimilation and
nutrition. Hippocrates taught twenty-three centuries ago the importance of
recognizing natural laws in medicine. He said, "It it to the efforts of nature
that the attentive and able physician looks for guidance."

In ventilating a cow stable, we should provide for fresh air to enter the
stable in front of the cows and disseminate without creating drafts through-
out the stable, passing out through an outlet of ample size behind the cows,
thus giving the animals the best air in the stable to breathe, and taking out
the odor from the feces and urine without carrying it by their heads. One
large outlet shaft of sufficient size to ventilate a stable, being constructed on
the ratio of 5 or 6 cows to the square foot is far more practicable, much
cheaper and easier to build, and from results obtained is infinitely better,
than enough small chutes a foot or a foot and a half square to make up the
required amount of ventilation area. There should be intakes enough not ex-
ceeding individually one-half a square foot in area, to nearly equal the area of
the out-take chute. For example: A stable to accommodate 54 cows would
require an outlet shaft 3 feet square, containing 9 square feet ventilation area
and 16 or 18 one-half square foot intakes distributed evenly around the outer
walls would be required to secure enough fresh air in the stable; these can be
regulated to suit the atmospheric conditions, but we must have almost as much
inlet area as we have outlet.

The top or cap on the outlet chute should be at least 18 inches above the
chute. This is to allow for ample capacity of the large outlet shaft. Many
make the mistake in putting the cap on the ventilator of putting it 6 or 8 inches
above the body of the chute, thus cutting down the capacity, and when the
warm air laden with moisture gets into the chute it cannot get out fast enough,
and therefore condenses on the upper portion of the shaft. The large chute is
not necessary if the capacity is to be reduced at the top or outlet, the result
of which is inefficient and inadequate ventilation. The stable should be tight
and the hay chutes closed except when in use. Under these conditions this
ventilation will work admirably and save the dairyman many dollars by
keeping his animals in better health and protecting the roof and timbers from
frosting and rotting out.

I cannot too strongly urge the importance of liberal sunlight in stables,
not only for its warmth, but for its cheer and assistance in carrying on the
daily work during the winter months. When new buildings are to be erected,
I would suggest, where possible, that the barn run east and west, thus pro-
viding for a south exposure, which is so very desirable during the winter
months. The hovel as a dairy stable is a relic of bygone days. No dairyman
can afford to house his cows in an underground, dark, damp or forbidding
stable, if he is in the business for profit and satisfactory results. The cow,
above all other domesticated animals, responds quickly to the kind of treat-
ment she receives. The limit of her profit is measured by the care and sur-
roundings given her.

A properly constructed floor is of vital importance in a sanitary barn. It
should be constructed of non-absorbent material, preferably cement, and the
cow bed may be covered with cork brick if desired. The manger should be
from 30 to 36 inches wide and 10 to 12 inches deep. The platform should be
just wide enough to accommodate the animals, (a platform 4 ft. 6 in. wide will
accommodate Jerseys, 4 ft. 7 or 8 in. for Guernseys, Ayrshires and average sized
animals, with 4 ft. 8 in. to 5 ft. for Holsteins, depending entirely upon their
size) and the gutter should be 8 to 10 inches deep and 18 to 20 inches wide and 3 to 4 inches deep on the walk, driveway or side. This will keep the cows clean, which is the first essential in clean milk production.

A cement floor where animals walk should never be troweled with steel or creased in any way, but should be finished with a wooden float as the masons say or brushed lightly with a broom. A floor that is finished with a steel trowel is smooth and very slippery and creases fill up with manure and stable filth and become almost as slippery as the very smooth floor.

A sanitary stable to be clean and up-to-date these days must be whitewashed at least two or three times a year, oftener if necessary. The contrast between the old-time stable, where the spider has hung his drapery of cobwebs from every projection and in every nook and corner, and the modern, clean, whitewashed, convenient stable is very marked. Whitewash is an abomination to the spider and is of inestimable value in dairy sanitation.

Milk is a suitable medium for conveying many forms of infectious diseases of animals and man. The pathology of milk, therefore, would naturally involve a study into those conditions which are regarded as primary to the propagation or dissemination of disease, both on the ground that milk is a fertile culture medium, as well as a convenient vehicle. The maintenance of a healthy herd is the most potent factor in a sanitary milk supply. The herd should be under the surveillance of a skilled veterinarian and any animals suffering from diseased udders or general constitutional diseases of any kind, especially those involving the genito-urinary tract and the lymphatics that will in any way harm the milk, should be segregated from the milking herd and treated, killed or disposed of as the case demands. The veterinarian, by virtue of his training and varied experience in sanitation, is the proper individual to watch over the health of the herd.

To maintain a healthy herd requires careful supervision and regulation. A careful, thorough, physical examination of all animals should be made as often as possible. I am pleased to learn that certain veterinary colleges are taking up the subject of physical examinations in a systematic course of instruction, and I am of the opinion that in the future the careful systematic physical examination of dairy animals will be far more popular than it has been in the past. The great question of bovine tuberculosis will, I believe, be largely controlled by this method of examination. While I am as strong an advocate of and just as staunch a believer in the tuberculin test as ever lived, I am informed that statistics show that less than 5 per cent of the dairy cattle are tuberculin tested.

Now then, if we wanted to test all the remaining cows, there are not enough veterinarians in the United States to do it fairly, accurately and honestly for years and years to come. Now, gentlemen, what are we going to do with the remaining 95 per cent that are not tested? It is generally believed by those in authority on this subject that in a large majority of cases the spreaders of bovine tuberculosis baccilli are physical or clinical cases. Accept this to whatever extent you please, for we must accept it to a certain degree, isn't the elimination of these spreaders from the herd the first step toward a sane, practical solution of this great problem?

While I would not for a moment pose as an authority on this subject, permit me to quote from Dr. Faville of Chicago: "The fear of tuberculous milk that is generally entertained by the public is based on what seems now a misconception. To the general public tuberculosis means consumption, that unspeakably dreadful scourge of the world. The idea that prevailed some years ago among scientists that milk is a large factor in producing consumption of the lungs prevails today among the people. Naturally the preju-
dice upon this basis is very deep. Legislation and regulation started under this belief. Promoters of health legislation have urged the human susceptibility to bovine tuberculosis to the fullest extent as a pressure to secure protection. The result is that the public, believing something way beyond the proven truth, has one point of view.

"The people majestically wave the wand and say 'eradicate tuberculosis.' The farmer whether he knows enough to be free from it or not, knows by dire experience that rough shod and inefficient ways of going at it bring ruin and no results. Naturally, even if stupidly, he shows a sullen resistance."

And now let me say, with full knowledge of how easy it is to say and what difficulties it involves, that the essence of the whole question is education. This demand is being met first by high standard veterinary colleges that are turning out research work that is especially valuable together with well educated, well trained men who will carry to the stock owner and the public the results of these investigations, together with a practical solution of the problems; second, by agricultural institutions and the agricultural press that are sending out valuable and interesting bulletins and literature; third, by breeders' associations; and, fourth, traveling exhibits, institutes, and comprehensive field work offer untold opportunities for the dissemination of accurate knowledge and the creation of a healthy public opinion.

There have been no hard and fast rules laid down to govern a thorough physical examination, but suffice it to say that all external appearances of disease should be carefully taken into consideration: the udder and all superficial lymph glands should be critically examined; a careful rectal examination should be made; the lungs should be thoroughly auscultated, and the general appearance of the coat, the eyes, the ears, and the countenance are essential points in this very important work.

The attendants should be free from disease of all kinds. Owing to its susceptibility to contamination and being an ideal culture medium, milk is often rendered a disease-carrying medium while the venders of such milk are innocent of any contamination with human disease-producing organisms. To this end, a thorough and systematic medical inspection of dairymen, their families and employes should be maintained by all milk distributors in order that they may protect their customers and themselves as much as possible.

Milk should be drawn from the cow at regular intervals into clean pails, preferably of the narrow top design. From a bacteriological standpoint this is the most important stage in the production of clean milk. Excessive numbers of bacteria indicate the presence of foreign matter—filth and dirt. Milk that is drawn into an open pail from cows whose udders, flanks and hips are loaded with manure and stable filth, must from the very nature of the process of milking be heavily laden with organisms of an undesirable nature. Therefore, clean cows and narrow top milk pails are prerequisites to clean milk. Many experiments have been conducted to ascertain the value of covered pails in reducing the bacterial count, with the uniform result that this form of pail reduces the numbers of bacteria from 40 per cent to 70 per cent. Progressive dairymen are anxious to reduce the undesirable bacterial contest of their milk, especially where such an easy and practical solution is at hand, and at the present time the reign of the open milk pail seems doomed.

Next in importance to clean milking is proper cooling; this should be done immediately after the milk is drawn from the cow, inside a clean milk house situated within clean surroundings. The time is past when the dairymen can satisfactorily cool milk without the use of ice. However, in certain sections where there are few lakes and where ice is very hard to obtain, cold well or
spring water at a temperature of from 48 degrees to 52 degrees F. is essential. Milk can be cooled in a few minutes to within a few degrees of the temperature of this water, and if the temperature is not allowed to rise above 55 degrees F. the milk can be delivered in good condition.

Clean, sanitary milk, therefore, can be obtained if the cows are clean and kept in clean surroundings and if persons caring for them and doing the milking are cleanly in their habits and personal appearance. This requires careful daily routine. The stables should be well lighted and ventilated; white-washed at least twice a year; have tight, sound floors with gutters of non-absorbent material; they should be cleaned and swept daily. During the winter months when the cows are stabled, they should be brushed every day, this not only assists in producing clean milk, but is especially profitable by increasing the flow. The udders, flanks and hips may be clipped and the tails trimmed up and the bush carded out; this will aid materially in keeping the cows clean, and when these parts are wiped off with a damp cloth just before milking, many fine particles of dirt and large numbers of bacteria are prevented from falling into the pail. The milkers should milk with clean, dry hands, and wear a clean suit used for milking only. The fact that milk is such a delicate article of food, so susceptible to change and an ideal culture medium should control all methods of production.

The importance of safeguarding milk from the cow to the consumer is self-evident. It is to maintain the natural flavor of the milk. It is to deliver to the consumer a food that contains nothing except that which it has a right to possess by nature, a definite per cent of butter fat, a uniform quantity of other solids, a certain fixed percentage of water and a few bacteria. Milk is a balanced ration, containing enough food to sustain life for an indefinite period. The consumer should be educated in the value and care of this very sensitive food, and then he should be willing to pay for the extra demands he makes on the producer. A high price does not necessarily mean clean milk, but clean milk means an extra cost of production.

Unfortunately the general public has for a long time known only one milk and that governed mainly by the price. Indifference on the part of the consumer in regard to quality and sanitary conditions in dairying has done much to retard progress such as has been seen in other lines of food production.

As the careful thorough veterinarian is the chief advisor in regard to matters pertaining to the health of the herd, it seems to me he should be the first person whose advice is sought in connection with the building of a sanitary stable. For too many years old fashioned carpenters, contractors and masons with antiquated and out of date ideas have supervised the planning and building of supposedly up-to-date stables. City architects thoroughly capable to plan and construct elaborate dwellings and apartment houses, skyscraper office buildings and huge department stores have occasionally planned stables, in the majority of cases for rich clients, that should have been models; however, they often fall far short in the fundamental principles of sanitary construction. Here is a field in which we as veterinarians can do much good, both financially to our clients and to the great animal industry of this country, by way of assistance and advice in this fundamental work leading up to healthier, better living conditions for healthier, better producing herds.

The various branches of an agricultural training pertaining to soil fertility, cultivation and rotation of crops, feeds and feeding and a balanced ration, selection, breeding and judging animals, are important adjuncts to the particular line of sanitary work. Statistics show the average increase in the yield per acre of our common grains, wheat, oats and corn, to be less than
1 per cent in 23 years, while the United States Census shows an increase of 47 per cent in our population in 20 years.

One of the ablest agricultural educators in this country says: "When we became unable to properly feed our increasing population by increasing our acreage of farm land, we began decreasing our exportation of foodstuffs and the average of the last five years as compared with the five years preceding 1900, shows that during the ten-year period our exportation decreased from 198 million to 116 million bushels of wheat and from 193 million to only 57 million bushels of corn. That the limit of our relief in this direction is near must be plain to all. Now we must increase our acre-yields or the cry from our 32 million population with its ever increasing numbers against the high cost of plain living will just as surely bring distress and disgrace upon this great nation as it has upon 400 million people in India and Russia where famine is now looked upon as a permanent feature in the life of our own Aryan race."

"Public prosperity is like a tree; agriculture is its roots, industry and commerce are its branches and leaves. If the root suffers, the leaves fall, the branches break and the tree dies." (This is the philosophy of the Mongolian people who have maintained some of their soils for more than 4,000 years).

Soil fertility is the foundation of dairy husbandry and permanent agriculture. We must work for a better system of agriculture and a more scientific application of fertilizer. Manifestly we should save every particle of the fertilizer from the dairy barn, and make large use of legume crops for the production of farm manure, or green manure, and America should stop selling for five million dollars enough raw phosphate for the production of one billion dollars worth of corn valued at the consumer's price. How long can we afford to give away a thousand million for five million? Do you know that at the second conservation Congress called by the President of the United States, that Dr. Van Hise of the University of Wisconsin was the only man to raise his voice in the interest of the common soils of America? For three days the statesmen and the experts discussed forests, the waters, the coal and the iron, and for fifteen minutes President Van Hise pleaded for the conservation of phosphate, the master key of all our material prosperity, and he was called a crank with a hobby.

In presenting this subject I realize I can only touch on the main points of interest to the veterinarian doing sanitary work. To ask your attention to the many minor details would be to presume on your good nature and your patience. The veterinarian who aspires to such work is to my mind the proper individual, best fitted by training and mental endowments, to do a wonderful work for his profession and mankind. With the invention of the automobile, eliminating from service many of man's most faithful and trusty equine friends, other avenues have opened toward the sanitary handling and production of thousands of food producing animals and their various products. To my mind the field of the veterinarian has just begun to widen, the beginning was simple, the development has been wonderful, but the future is marvelous.

Dr. Mayo: There is one, to me, very important point in the sanitary protection of milk and in the control of disease in dairy herds that the writer did not touch upon as extensively as I think it warrants. You will go into many dairies where they have stables constructed up to our modern knowledge on the subject and they have the most horrible yard in to which they turn their cows every day, where they have to run through mud and manure, and it is
thought, "Well, that is outside of the barn, that is not a very important subject." And I will tell you that in my experience in eradicating tuberculosis from a herd that was stabled in a sanitary barn, as good as could be constructed at that time, we really did not make much of any headway until we went after the yard and went after it hard, and don't you forget that in dealing with sanitary stables and attempting to eradicate tuberculosis that you can't get very far unless you clean up the yard.

Dr. Griffiths: I have been in this work for fifteen years and have had considerable experience, and I want to say that the most effective way, in my judgment, to get at this is to score the dairy and have the score published in the newspapers. You will find that many will be dissatisfied with their scores and will soon be coming around and asking you to re-score them, and in that way you will get them to clean up. That, to my mind, is the most effective way—to get the newspapers to publish the scores.

Dr. Kinsley: Just one word in relation to the suggestion in the paper concerning tuberculin testing. The statement was made, I believe, by the essayist that about five per cent of the dairy cattle were tuberculin tested. I think that is right according to statistics and he further made the statement that there were not enough veterinarians to make those tests. That is a fact, if the old subcutaneous test is used. But in Missouri we have been finding that a man, a very ordinary man, depending upon the distribution of the herds, can test from ten to twenty-five thousand head of dairy cows every year, and putting other states on the same basis, if they do it in this way, I think they should do as much as Missouri, and for that reason it seems to me that this statement is not correct. And from the efficient tests, competent tests that have been made, I believe we are warranted in using the intradermal test. I believe the intradermal test has proved as efficient in demonstrating tuberculosis as the other test.

Dr. Eliason: I don't believe we have come to the limit of education, and I think the time is coming when we will have a little more light on the tuberculosis question. It seems to me that there must yet be some means whereby we can get definitely some information as to the condition of a cow. And along with the sanitation this must come, and as was mentioned in the paper, there are not men enough to do the work, but I think that wherever the work is done by subcutaneous or intradermal method, the subject should be pushed along. We have too much light thrown on some methods of doing business instead of doing business. I would like to see the men do something rather than decrying some work that is being done, so let
the good work be done and pushed along from all quarters, and I believe yet that we will get some quicker method in testing tuberculous cows.

Dr. Way: Mr. President, I don’t know as I have anything more to say except with regard to the intradermal test; I must confess that I am not in a position to discuss that. However, I do believe that the intradermal test is more or less in an experimental stage, and we should go carefully in regard to that. I think that the one great point in this whole matter is that we have gone after the question of cleaning up these herds from the wrong end of the horn. We have tested and eliminated tubercular animals, diseased animals, and then disinfected the stables and put in an efficient ventilating system. Now I could cite a number of instances where dairymen have spoken to men who have done this class of work and have said: “You have done more good than anybody that ever came out on to our farm.” It seems to me that the living conditions for the present herd that we have got is one of the most important things to consider, and then I think that education will bring about the methods and means of doing the other.

AFTERNOON SESSION.

The meeting was called to order by Dr. J. G. Wills, acting chairman, at 2 o’clock P. M.

THE CONTROL OF HOG CHOLERA WITH IMMUNE SERUM.

By Paul Fischer, Columbus, Ohio.

This paper is not presented with a feeling of elation over success in discovering a practical method for using Dorset immune serum in the successful control of hog cholera. In using the term “successful control” I have in mind nothing less than a plan that will serve us as a foundation for the complete eradication of the disease from a given area within a reasonable time.

My desire is, not so much to offer a solution for this problem, as to bring before this association, for thought and discussion, the neglected problem which is the topic of my paper.

Since the early summer of 1908, consequently for more than five years, hog cholera immune serum has been prepared under official direction of most of the large corn growing and hog productive states. The value of this serum was, in fact, known for some time before that period. That is, Dr. Dorset and Dr. Niles demonstrated, long before, that effective and comparatively lasting immunity to hog cholera could be produced with an anti-serum. The work of our agricultural experiment stations, agricultural colleges and live stock sanitary boards have, as we know, fully confirmed these results.

It will probably be admitted by everyone who has made a study of the matter that Dr. Salmon’s estimate of the losses from hog cholera, in some years, as approximating $50,000,000 for the United States was not extravagant. Those of us who have given some attention to hog cholera during
the last five years know that during this period the disease was generally prevalent and as destructive as ever.

The losses that have resulted from hog cholera since the value of antiserum for its prevention has been generally known in an official way must therefore have approached five times fifty million dollars, or a quarter of a billion, in five years. During that time all of the important pork producing states have made some effort to do something to stop this loss. Upon inquiry, however, it is found that the total money expended for this purpose by all states put together has been but a trifling sum. Ohio provided, in 1908, an appropriation of $1,000 for special hog cholera work; in 1909, $3,000, in 1910, $5,000 for immediate use and $25,000 for the purchase and equipment of a "serum farm;" in 1911, $60,000 for laboratory buildings and other equipment, and $5,840 for salaries and labor. Thus, during the five year period a total of $99,840 was appropriated for hog cholera serum production. Of this sum, however, $85,000 was for the new serum farm and laboratory which is only now being completed, thus leaving only $14,840 actually available for serum work for a period of five years. We had, of course, the use of our regular field veterinarians for serum treatment (all serum produced in the Ohio laboratories being applied by official veterinarians). This amounted to salaries for from two to eight men at from $1,200 to $1,500 each. We have had, also, the receipts from serum sold to the owners of herds that received treatment, this amounted to about $60,000 for the year ending November 1, 1912, or for the past five years to about $100,000.

Adding these all together we have, in Ohio, expended less than $200,000 for hog cholera control work during the five year period, while we were suffering losses from disease aggregating fifteen million dollars.

While I am unable to quote the exact figures for other states, I believe I am safe in stating that in no other has even this amount been set aside for the prevention of these enormous losses.

Nevertheless, I believe we are making encouraging progress. The people realize that losses from hog cholera are unnecessary because they can be prevented. They feel that the problem is one for the state as a whole to solve; they are making their demands upon their representatives in the legislature and their demands are being heard and acted upon. From what I have been able to learn, liberal appropriations for hog cholera work are expected from the legislatures of many of the states this winter. After we get these appropriations, the question arises, how shall we use them most effectively?

In Ohio, last year, we spent about $25,000 of the state's money for serum production and serum application. Our receipts were over $49,000. We treated 100,000 head of swine with an average value of $10 each, or a total value of $1,000,000. These swine were all in infected, or more or less exposed, herds. We solicit reports from owners on the results of treatment and while our files are crowded with letters expressing the satisfaction of owners over results, we have had few complaints, and have not had a single verified report of deaths in healthy herds following the application of the double treatment (which we use exclusively).

We feel that the work we are doing, as far as individual owners of herds are concerned, is the most profitable from a financial point of view that the state of Ohio has ever undertaken. But while we can report a noticeable decrease in the number of deaths from cholera in those sections of the state in which we were most active, we have succeeded in covering only a small proportion of the state, and hog cholera is practically as prevalent as it ever was.
As a livestock sanitarian I shall not feel that we are making real progress until we can show that we are making some headway in the direction of the total eradication of hog cholera.

The suggestion of plans for this purpose which will bring the problem before this association for consideration is the object of my paper.

I have had in mind three possible plans of action—some more practical than others, all offering obstacles to overcome, though not necessarily insurmountable.

PLAN 1. THE RADICAL METHOD. In our experience badly infected premises have been permanently freed from disease by the use for one year or for two years of the double serum treatment. In brief our plan was to keep adults immune by annual vaccination, treating all young pigs within four to six weeks after birth and repeating at four months of age which would carry them through to market. In a few instances where immunity ran out before the expected time, prompt re-vaccination was resorted to. By this method the disease has been stamped out on isolated premises. Permanent and effective progress by this method, however, is prevented by the constant danger of re-introduction of the disease from a thousand and one sources.

To overcome this with one blow—all swine in the state could be treated for a period of one or two days. Thereafter it would be necessary only to police the borders of the free territory.

Proper disinfection of premises, strict quarantine and rigidly enforced transportation regulations of course constitute a necessary part of the plan. If all states followed this plan simultaneously or in short succession and with necessary co-operation, the early eradication of hog cholera would seem to be within our grasp.

Taking Ohio for an illustration, this would cost, on the basis of past experience, and estimating the cost of serum and virus at more than double what it has thus far been, viz., 2 cents per cc. as follows: (This excessive cost of the serum is given because of the increased difficulties that are apt to present themselves in securing sufficient virulent blood for hyperimmunization when the most economical sources, natural outbreaks, no longer exist as a result of general immunization of all swine.

100 c. c. of serum for each 150,000 brood sows 15,000,000 c. c.
3 c. c. of serum each for 1,350,000 suckling pigs 4,050,000 c. c.
20 c. c. of serum each for 1,350,000 shoats of 50 lbs 27,000,000 c. c.

Total 46,050,000 c. c.

In round numbers 50,000,000 c. c. costing $1,000,000

This estimate includes the necessary virus.

The cost of application in Ohio's 88 counties, allowing two veterinarians for each county with over 10,000 swine and not exceeding 35,000—two veterinarians for each three remaining counties: 100 veterinarians in 50 counties, 26 veterinarians in 38 counties, total, 126 veterinarians at an expense of $2,000 each, $246,000; executive work $54,000, total $300,000; plus the cost of serum, $1,000,000, or a grand total of $1,300,000.

This is only from one-third to one-half of the actual annual loss from disease, and the latter would practically stop at once. Continued for two or three years the disease would be under complete control and could thereafter be held in check, if not eradicated, at a very nominal expense. This would bring the estimated cost of the operation of the plan to its completion to a sum equal, practically, to the regular annual loss for one year which has been going on for decades and will probably continue until systematic measures are taken to prevent it.
While the suggestion to spend one or two million dollars for live stock sanitary work might stagger some of our legislators—the investment of one dollar in order to prevent an annual loss of two dollars for an indefinite time thereafter, is after all not an extravagant idea.

The funds for carrying on this work could be furnished by direct appropriation or by a special tax on all swine produced in the state.

But the objection to this plan in spite of all is its great first cost. I believe however, that it would be the cheapest in the end.

PLAN 2. MODIFICATION OF PLAN 1. (Modified Radical Plan). This would consist of the treatment as just outlined, not of all swine in the state but of all swine in infected herds, or on infected premises or on premises immediately adjoining the same. This would reduce the cost to probably one-third of the first estimate (accurate estimates are of course impossible at this time) and might be equally effective. Making cost of this method about $500,000 per year (equal to a tax of 33 cents per head of swine).

PLAN 3. The experimental adoption of either Plan 1, or Plan 2, for a certain district, one or more counties for instance, enforcing the same under a special act of legislature, or of congress, and in the meantime following the plan now in general operation (which is no plan at all) of doing what we call "the best we can" for the rest of the state. This "doing the best we can" plan may be made much more effective, however, by the enforcement of proper quarantine and transportation regulations, including compulsory notification of outbreaks of disease.

If plan 3 worked out successfully for one county and if in connection with the same a suitable campaign of education was conducted all over the state it would encourage action of a more general character, and thus all counties in the state and all states in the Union would finally be included. In this plan the cost of the work in the counties in which the first or radical plan, or plan 2, its modification, was adopted should be borne by the state while the work in other sections could be paid for by the owners as heretofore.

The cost of Plan 3, which for convenience we will call the County Unit Plan, would, according to my estimates, not much exceed $26,000 for any one of the four largest hog producing counties in Ohio, each of which contain about 2 per cent of the entire number of swine in the state. This, as we understand, would provide for the entire expense of repairing and applying the serum to every hog in a county. It provides one veterinarian for each 12,000 swine and would thus allow ample time for inspection work. Operations for each worker would be confined to a single county and little time would be lost in covering territory.

While I believe that Plan 1 or its modification. Plan 2, would be feasible and in the end most economical for the commonwealth, I do not believe that a legislature could be found in the United States that would appropriate one and a quarter million dollars annually for several years to carry out this plan. It would probably also be impossible to raise the necessary funds through a special tax.

Plan three, however, the County Unit Plan, looks less formidable to the taxpayer, it would be much easier to put into operation, be more certain of success, and if carried out for a single county would at once be demanded by adjoining territory. It would then be only a question of time when the whole state would be brought under the system, after which, or in conjunction with this plan, centralized federal control would finish the work.

We expect to propose the introduction of this plan in Ohio. Our new serum plant will be ready for business sometime this winter or early spring.
and we anticipate no insurmountable difficulties in producing and applying
the needed potent serum and procuring the necessary funds.

What we must yet provide, however, and what may give us many dis-
appointments before we get through, is an adequate law under which this
plan, or for that matter any other effective live stock sanitary work, may
be carried out.

We need stringent quarantine laws and means for enforcing them. We
need equally stringent regulations of live stock transportation and a law
under which they can be made effective and lastly and above all we need
regulation of the production and sale of hog cholera immune serum. prohi-
bition of the sale or use of poor serum, prohibition of the use of virus in
the serum simultaneous method by any but specifically authorized veteri-
arians, and prohibition of the use of quack sure cures for hog cholera, at
least in those counties in which Plan three is put into operation. Immediate
notification of the Board of Live Stock Commissioners of all outbreaks of in-
fecitious disease in swine, the quarantine of all infected premises, the pla-
carding of the entrances to all infected farms to warn of the existence of
cholera, and the absolute prohibition of the transportation of infected or ex-
posed animals must also be enforced. Other questions not mentioned here
would naturally arise and require attention. In this paper my purpose has
been simply to suggest a general plan of operation.

In regard to serum production, state or private, there should be fed-
eral regulation or supervision. This should include direct supervision of
preparation and official testing of brands bought in the open market. (Similar
to the practice followed in some states in the enforcement of fertilizer laws.)

Since a number of states are contemplating the enactment, this winter,
of a suitable law under which hog cholera control work can be carried on, it
seems to me that this association which represents the United States in live
stock sanitary matters could do nothing more important, at least for the
great swine industry of the country, than to take some official action in regard
to proposed legislation on hog cholera control.

I suggest, therefore, that the president of this association be authorized
to appoint a committee composed of representatives of some of the larger
pork producing states who have been actively interested in this work and a
representative of the United States Bureau of Animal Industry, and that this
committee be instructed to draft a general law under which effective hog
cholera control work would be possible and propose and recommend a plan
for the effective use of hog cholera immune serum for the eradication of hog
cholera and present the same for the approval or endorsement of this asso-
ciation.

FIXED HOG CHOLERA VIRUS.
John Reichel, Glenolden, Pennsylvania.

Hog cholera is at present correctly classed as one of the invisible-virus
diseases. Little has been added to the work of Dorset, Bolton and McBryde
(1) in which they proved the specificity of the virus. Aside from knowing
that it is invisible, filterable, demonstrable only by injecting suspected
material into susceptible hogs, easily destroyed by heat and unusually resis-
ant to some of the well known disinfectants, we have no clue to its real
nature. The work of Dinwiddie (2) presented at the 49th annual meeting of
the American Veterinary Medical Association encourages the hope that a
tissue-element, the red blood corpuscles, of the hog may perhaps be demon-
strated as the host of the specific cause.

Judging from the natural outbreaks of the disease the variation in the
virulence of virus is a very important characteristic, upon which preventive measures, including the success in the immunizing and curative treatment with hog cholera serum, largely depends. In preparing virus, or virulent blood, for 1181 hyperimmune hogs, 1964 supposedly susceptible hogs were injected subcutaneously with from 2 to 5 c. c. doses of virus, and only 144, or 7.3 per cent, resisted infection. The 1720, or 93.7 per cent, all developed the disease in less than 40 days.

The virus hogs were kept in regulation virus-pens—8 by 10 feet, elevated 18 inches from the ground on 4 legs, waterproof metal lined floor, slant roof, both sides solid, small narrow drop-door for ventilation in back, with door and two windows in front. Each pen is equipped with a wooden feeding trough and card holder to accommodate a card for each hog. The pens are placed in two rows of five each, from 4 to 5 feet apart. The two rows are separated by a fenced alley approximately 10 feet wide. The group of pens in turn is surrounded by a fence which prevents all communication from pen to pen except by the door-way of each pen.

TABLE NO. 1.

Passage of Hog Cholera Virus Through Susceptible Hogs.

<table>
<thead>
<tr>
<th>Virus Source</th>
<th>1st Mo.</th>
<th>2d Mo.</th>
<th>3d Mo.</th>
<th>4th Mo.</th>
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</table>

* First line of figures gives number of susceptible hogs injected; second line of figures average number of days in which hog cholera was developed before killed for virus or died.
<table>
<thead>
<tr>
<th>State</th>
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<th>No. 3</th>
<th>No. 4</th>
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Although 19 strains are listed in Table No. 1 not all of the strains were continually passed through susceptible hogs. In fact no more than 6 were passed through hogs in the virus-pens at any one time. The table records 13 separate, but not consecutive months. In fact a number of the strains listed were acquired several years ago, and when not passed through hogs during any one month, the "seed" of the strain was kept in sealed bulbs at a low temperature, the month was not counted in the tabulation. A strain passed through hogs during a number of separate but not consecutive months, was injected into not less than one lot of hogs each month and during that month the strain may have been passed through two or more hogs. Although the hogs were injected for the chief object of producing virus or virulent blood for the injection of hyperimmune hogs, every effort was made to increase the virulence of the strains and to keep them pure, so that the stronger would not supplant the weaker. All the hogs for the production of virus were purchased by one who was thoroughly familiar with our needs. That they should be corn-fed and from hog-cholera-free sections of the country were chief requisites; that susceptible hogs were supplied is proved by the fact that 93.7 per cent succumbed. If as happened several times, there was reason to believe that the hogs were infected upon arrival, no "seed" was saved to carry the strain from the suspected lot.

Upon the arrival of a lot of hogs for the virus-pens, each hog was injected with from 2 to 5 c. c. of the seed-virus, and placed in the virus-pen assigned to the strain. The pens were not cleaned during the time each lot of hogs was kept in them. Grain was fed twice daily and water placed in the feed troughs without entering the pens. Temperatures, however, were taken daily and recorded. This was usually entrusted to one man who went from one pen to the next. Therein lies the possibility that infection was carried from one pen to the other, but a careful study of the table shows that any increase in virulence was gradual. Moreover the care exercised in selecting the strain for "seed" reduced to a minimum the possibility that a weak strain was supplanted by a stronger.

According to the table the 19 strains had their origin in natural outbreaks in 8 States. The top figure in each square opposite the number of each strain includes the number of hogs injected during each month; the lower figure gives the average number of days from the time the hog was injected until the disease had sufficiently developed for us to kill the hog for virus or virulent blood. Sudden deaths before the hog was bled, are included as hogs killed.

With the exception of virus No. 1 the strains show a gradual increase in virulence, and we believe that we have had some of the strains under observation sufficiently long for us to regard them as having attained the maximum virulence possible—in other words, that these strains have or are rapidly approaching what Pasteur, working with rabies virus, called a "fixed
virus." These strains are capable of producing the first symptoms, loss of appetite, occasionally reddening of the skin, and temperature-rise on the fifth or sixth day, with death on the seventh or eighth day as a direct result of the injection subcutaneously in 2 to 5 c. c. doses. The hogs killed in less than 5 days, included in the table, were probably of the small class infected before arrival.

It is interesting to note at this time that fixed rabies virus will bring about symptoms of the disease in rabbits following subdural injection on the sixth or seventh day, and death on the eighth or ninth day. The period of incubation of fixed strains of the so-called invisible viruses may be quite similar in length.

The virus or virulent blood collected from 1720 hogs was entirely used up in hyperimmunizing 1181 hogs, of which only 6.7 per cent received one or more intraperitoneal injections and 2.7 per cent one or more subcutaneous. All the injections were made intravenously except in the percentage referred to, when intraperitoneal or subcutaneous injections were alone possible.

Virus propagated in the manner outlined above and injected intravenously will yield a uniformly potent serum, as has been proved by the accepted standard test of injecting 6 susceptible pigs, each weighing not less than 50 pounds, with 2 c. c. doses of virus, fixed virus being invariably used; 2 are then injected with 15 c. c. and 2 with 20 c. c. doses of the serum under test, and 2 are left untreated with serum, to serve as controls or checks on the virulence of the virus used and the susceptibility of the pigs. The virus used should kill the controls in at least 21 days, while the serum should save pigs treated.

Dr. Dorset: I should not like to see this subject passed by without discussion. I feel sure that it must greatly interest most if not all of those present. I was particularly interested in Dr. Fischer's paper and his statement regarding the control of the disease. I quite agree with what he says, that although we have in this serum a means by which hogs may be immunized against hog cholera, we are making very little progress, if any, toward controlling the disease. Dr. Fischer has suggested plans which might be pursued in eradicating hog cholera. He has not, however, touched particularly upon the means by which such plans might be carried out. Some years ago Dr. Melvin in a paper before the American Veterinary Association outlined a plan for the control of hog cholera through the employment of serum, and I still feel that that plan is practicable, and I would like, indeed, to see some states adopt it even if only for a small section of the state. The plan outlined by Dr. Melvin was that there should be a central agency in each state; that this central agency, either the state veterinarian or the Live Stock Sanitary Board, should have a certain number of field assistants in the shape of trained veterinarians; that those men should be assigned to certain tests; that there should be in each county, possibly in each township, a voluntary agent to report either to the state veterinarian or to the district field veterinarian any sickness that might occur among hogs in his particular township or county, in
order that the disease might be quickly investigated. There would, of course, be connected with the central agency a hog cholera serum plant. I feel that while the serum would protect hogs, that it alone will not eradicate hog cholera; that the first thing that we need and must have is in each state an efficient organization to apply this serum, and also to enforce other sanitary requirements, such as quarantine, disinfection, and the regulation through the Federal government of the interstate movement of the diseased animal. I wish, furthermore, Mr. Chairman, to suggest to Dr. Fischer that he put the suggestion at the end of his paper concerning the appointment of a committee to consider uniform regulations in the form of a motion so that it may come before the Association.

Dr. Kinsley: Mr. President, I have been particularly interested in the three papers and the discussion concerning hog cholera. I was especially interested in Dr. Peters' discussion of the simultaneous method, but I fail some way to see good sanitation in the application of virus in field work. It seems to me that we are now in part reaping the reward of the use of virus heretofore. I may be in error in that, but we have some evidence that at least causes some of us to think that the present extensive outbreak of cholera or epizootic of cholera has in part been brought about by the previous use of virus. So it seems to me that if we are going to practice sanitation, sanitary practices, we must control cholera in other ways than the continual sowing of virus. I doubt if there are many in this room that are sufficiently careful in their manipulations and operations not to infect premises with virus while giving the simultaneous method. I agree heartily that if all hogs in the entire country could be simultaneously immunized and a permanent and continuous immunity produced for successive generations that perhaps in three or four generations of hogs, or better—three or four years—the virus natural of the soil or of the few outbreaks would gradually become attenuated, and hog cholera would lose the virulence that we recognize at the present time, but until all hogs in large sections of the country can be practically simultaneously immunized it seems to me the universal or the general use of virus should be condemned in the simultaneous treatment.

One other statement made by the last essayist is correct, but there seems to be a difference of opinion on it, and that is the fact that the various diseases exhibited in hogs are practically universally all hog cholera. Now I have seen some diseases in hogs—I have not had the experience of many of you that have given these essays and will discuss these papers—but from what I have seen it appears to me that we have a disease in hogs at the present time which is
more or less prevalent in Iowa, Nebraska and Missouri and some parts of Kansas to my knowledge, that is materially different from the disease we ordinarily recognize as hog cholera. This disease is characterized more by the disturbances of the lung, which consists primarily apparently of catarrhal pneumonia, gradually extending and involving new centers, there being various areas of the lung under different stages of pneumonia, the later stages being usually a necrosis, and simultaneously with those lesions in the lungs there is also an accompanying disturbance of the pleura which is usually a fibrinous pleurisy, this same lesion frequently and usually involving the pericardium. Now perhaps that is a variation of hog cholera, but I have seen instances within the last three months where a variety of serum from different serum institutions, state and private, have absolutely failed to produce any impression in the way of an immunity against said disease.

Now, possibly it happened that the serum from all of these different institutions, of which I think there were some six or seven represented, and as I say in which there were two or three state institutions represented—I say that possibly it happened that in this particular section there was sent some impotent serum. It is unfortunate if such was the case, but I think I recall similar instances in previous years, and I am asking for information concerning that particular disease, if anyone has found that universally serum, or that serum or the simultaneous method has immunized hogs against that particular disease or variety, if you wish to so state it, of hog cholera.

Mr. Good: I think the suggestions that are given by Dr. Kinsley are good. We find in Kentucky the greatest source of the spread of hog cholera is the inability to get the people to either bury or burn the carcasses, and I dare say that the spread of the cholera there is ninety per cent greater from that cause than it is from the causes spreading it by the simultaneous treatment. We have a law in Kentucky compelling the burning or burying of carcasses, but you know a Kentuckian is a very peculiar person. He cannot be driven very far, and when you try to compel him to bury his hogs or burn them you have got a mighty stiff proposition on your hands. Furthermore than that the neighbors will seldom complain of such a person, and that being the state of affairs, it is a difficult proposition, as I say, to get them to burn or bury their hogs. We have known whole herds of hogs to lie on the top of the ground until putrefaction had started in to a considerable extent and bacilli had been flying around on those dead hogs and traveling all around the country. Those cases might be taken up by the grand jury and the people
compelled to bury them, but I think that not until we pass laws that rigidly compel people not only to burn but to bury their hogs will we ever eradicate the disease of hog cholera. In sections of the state where we have vaccinated a large number of hogs by the serum simultaneous treatment I may say that the disease has been gradually reduced, if it has not been eradicated in some sections, and in some sections of the country where we have not been at all they have a good deal larger percentage of the disease among the hogs than where we have been. I doubt very much if the simultaneous method is correctly done, carefully done, and the man told how to disinfect his premises, how to destroy any animal that might happen to become sick in a herd that is not already infected, that there will be very much spread of hog cholera. I believe if those precautions are carefully carried out that there will be very little spread from the serum simultaneous treatment.

Dr. Fischer: Mr. Chairman, referring to the suggestion of Dr. Dorset, which suggestion is in harmony with my line of thought, I make a motion that the President be authorized to appoint a committee to take up the matter, drawing up a form for a general law for the control of hog cholera in the various states by the means of anti-serum, and such regulations that could be made under that law. (Motion seconded and carried.)

Dr. Peters: Mr. Chairman, replying to Dr. Kinsley, I will say that the lesions that he described are possibly found in very rare instances, at least I have found them very rarely, but in every case they had plenty of hog cholera lesions combined with them, and hog cholera was confirmed by blood and laboratory tests. Now, where most of the veterinarians make their mistake in these cases, is that they are chronic cases most of the time and the animals have been ailing for some time, lingering along for some time, and I call it a complication of affairs, but the primary cause was really the cholera infection, and I say this, that if I take that herd and post two or three more animals I would not find these lesions. Now that has been my experience. It might differ from that of Dr. Kinsley.

Regarding the question of control work, I will say that Illinois has been trying to do the control work according to Dr. Melvin’s and Dr. Dorset’s ideas, and possibly fifteen counties in this state have been freed from cholera just through the simultaneous method, absolutely eradicated. We had plenty of serum and the men were competent and did this work fine, and as I stated to you, these one hundred men have treated from one thousand to five thousand, and some as high as twenty-five thousand head in the best herds of the state, and because we are a little bit differently situated in this
case, in that we get the serum free, we can pounce right down on an outbreak and get at it and clean it up, and that is what we have been doing, and we have done very nobly in this state. Just think about this one point that I made in my paper. No one receives the serum who is not competent to administer it. I would not give it to my own brother to administer by this double method unless he would come down and stay in the laboratory. Now, there are some of them that would not get it at all that have come to our laboratory, because they are not competent to apply the double method. And, gentlemen, the longer you work with this business the sooner you come to the conclusion that it is the operator and not so much the serum, and I don’t wonder that the private concerns are doing so well, selling this serum. We do not allow anyone to have it who is unable to administer it properly. And there is the great trouble; we have got to keep a card index of the men that are doing the work, and the men that come to our place see our work, and when they see our work it is up to them to apply it rightly; and when they have bad luck this stuff is tested so and so, and when they leave it they know that if they have bad luck they are the men that are responsible, and not the serum. Because here is a batch of serum, we never have a batch of less than 8,000 or 10,000 doses; it is sent out to forty or fifty men. We protect ourselves by keeping the minutest kind of record of this stuff, and when forty men receive this serum, and thirty-nine have had good results, and one of the forty has had only bad results he has got to come to the laboratory and explain it, and with that kind of control work we are getting somewhere. You never will in any other way.

Dr. Kinsley: May I ask Dr. Peters a question?

Dr. Peters: Yes.

Dr. Kinsley: I would like to ask Dr. Peters if he ever had one man come along and successfully use the simultaneous method for fifteen or twenty times, and then suddenly something went wrong?

Dr. Peters: Yes, and then when he came back I showed him just where his carelessness comes in.

Dr. Reynolds: What was it, usually?

Dr. Peters: Usually too much hurry, Dr. Reynolds, trying to catch a train; forgot the dose. A man has got to take time and get his doses right and see to it carefully that he gets them injected right, Dr. Reynolds, and if he don’t he is going to get in bad. Too much virus, not enough serum, and the trouble is all on, and I will tell you every serum plant, whether it is a state or a private concern, is in hot water, and until we educate the men who are going to do
this work that it is an economic proposition, that they are ruining this man if they are not careful, this method will never work, and we may just as well face this issue squarely, and we have these men in our laboratories for days and don't do anything else but drill that into them. (Applause.)

Dr. Connaway: Mr. President, in our little conferences that we held the past two days on serum production and serum application, I expressed some notions which differ from those of Dr. Peters and Dr. Fischer have put before you. And I think it would be wrong in me to let the pleasing personality of an orator like Dr. Peters carry you away from sound principles of sanitation and lead you and your state into serious and lasting trouble. The doctrine that we can control contagious diseases by the spread of disease, by the spread of virus, is not true. It is true that we can give a lasting immunity by giving an animal a disease. If I had had smallpox I would not expect to have it again. If I had had hog cholera—if I were a pig—I would not expect to have it again. And this is what we do when we inject these animals with a virus, we give them the disease in a mild form and fortunately we lose but few, and so far as the individual owner of that herd is concerned that method is pleasing to him. It is better, he thinks, to have this permanent immunity than to lie awake nights thinking about the infection getting back into his herd again from some negligent neighbor. But when as sanitary officers we are carrying out a process of that kind we are acting for the individual and not for the good of the state. We are not eradicating cholera, and that is the purpose of the sanitary organization, and not to please Mr. Jones or Mr. Smith or anybody else who happens to have a fine herd of hogs which he would like to have permanently immunized by having them infected with a virus and have permanent infection. I dare say, Doctor, that in those fifteen counties next year you will have as much cholera as you have today if the disease is as general as it is today in other parts. I dare say that you have spread the cholera and you have, by this method, put this disease into herds where it never has been before. You will remember at the Missouri Valley meeting at Kansas City our friend from Minnesota presented a chart in which something like thirty-two herds were injected by this method and twenty of those herds had cholera introduced into them. Sixty-two and a half per cent of the herds where this disease did not exist before had the disease brought on to the farm.

One gentleman has spoken here of the negligence of farmers in not burning up these dead hogs. Now in these herds that you inject some of those hogs get sick and some of them die. Every hog
that gets sick spreads infection on that farm; every hog that dies
spreads infection on that farm. Every hog that lies open for the
birds to feast upon, the dogs to feast upon and carry that infection
from place to place is spreading the disease, and wherever this
method is used we are planting new foci of infection, and you
cannot help it; and that is one of the troubles, as my friend, Dr.
Kinsley, has shown to you, and we Missourians have to be shown
in this matter. Our experience and our operation in our own state
have shown us that this method spreads disease, and you have
admitted, you men from Ohio and from Illinois have admitted that
you have made no progress in eradicating this disease. You are not
suppressing it, you are simply helping the individual farmer to save
his hogs. I think I have vaccinated in the past five years as many
hogs as any other state, something like 300,000 head of hogs, and
we have saved our herds, we have saved our individual farmers as
much as $1,000,000, but that is not eradicating cholera. We must
get to the control side of this. We can never control cholera by
the use of serum alone or by the use of the serum simultaneous
method.

Dr. Haslam: I would like to ask Dr. Fischer what the total
value of the hogs in Ohio is, according to the schedule that he fixed
up, and about what percentage of the total value would his scheme
No. 1, for the entire state amount to?

Dr. Fischer: We have 1,500,000 hogs.

Dr. Haslam: And what is their average value?

Dr. Fischer: Average value $10, from $10 to $20, depending on
the price of pork.

Dr. Haslam: Approximately ten per cent of the value of the
hogs?

Dr. Fischer: Yes.

Dr. Schoenleber: I would like to ask Dr. Connaway what are
you going to do when you use the serum alone method and in about
a month or more get another outbreak in that same herd?

Dr. Connaway: I am going to get more serum and I am going
to give that fellow a good jacking up for not cleaning up his farm.

Dr. Schoenleber: That is the point I want to get at. I don't be-
lieve that Dr. Connaway mentioned all that he wanted to say.

Dr. Connaway: It takes an hour to say all that I want to.

Dr. Schoenleber: We don't insist enough upon actual cleaning
up of the farm. We don't insist enough upon the destroying of this
infection, and that is a hard thing to do, but I believe that we can
do just as much in the line of sanitation in that way as we can
with the vaccination, that is, if we combine the two. We must keep
that in mind. I want to mention here that I know Dr. Peters and Dr. Kinsley well enough to know that they are both right in their contentions; they are both right. Dr. Peters has not had the opportunity, evidently, to run across these conditions that we have down in the southwest. Dr. Kinsley is correct. We have found case after case in which we have found these troubles, and absolutely serum will not touch them.

Dr. Connaway: As my friend from Kansas has said, we have not been laying stress enough upon the control side of this thing, the sanitary side. We have got to get the serum, and we have got to get the farmers to clean up their farms, but I am unalterably opposed until I can be shown better or differently, I am unalterably opposed to the use of the simultaneous treatment in my own state, and I shall certainly fight it. I am willing to fight virus and we are going to fight contagion and do all we can to get rid of that by every means we can, but the extension of time I wanted for the purpose of discussing what hog cholera is.

What is hog cholera? There seems to be in the minds of veterinarians, those that are well informed, and I think even in the minds of two pretty good writers of books, eminent pathologists like Dr. Moore and Dr. Kinsley, some little confusion, and I hope they will let one who may have had a little more experience in hog cholera than they have had differ with them as to what the nature of hog cholera is. My definition of hog cholera would be this, that it is a septicemia pure and simple. That is, we may have in some of these cases the death of animals from this filterable virus, from the action of that, without seeing any symptoms whatever by which any man on earth could tell that we have hog cholera or any other disease. The hog is simply dead. Any man who has made many post-mortems has run up against conditions of that kind. But if you would take the blood of that animal and inject it into a susceptible animal you might reproduce what is generally known as the typical signs of cholera.

Now let us take another stage. This, remember, is a septicemia, it is a blood disease, and there is a tendency in these blood diseases to hemorrhages. Those may be very slight or they may go on to extensive extravasation, and of cholera. Anything beyond this I should regard as a complication. If we have in a certain herd the development of pneumonia there are local conditions there, certain germs that are likely to cause complications. If we have either the old swine plague bacillus or the bacillus suisepcticus or micrococci or other bacteria which infect the upper air passages, and we have these lesions—the old hemorrhages in the lung, those primary lesions—
the infection of those lesions will produce these complications which have been diagnosed as swine plague and as contagious pneumonia. I regard swine plague and pneumonia as simply superimposed complications upon the disease of septicemia, which is produced by the filterable virus. And the same thing is true of these signs that we find in the intestine. They are evidenced by ulcers, and sometimes we find membranes covered over with a diffused diphtheritic coat. That I regard as a complication which is superimposed on the primary lesions of a congestion and minute hemorrhages, but usually minute hemorrhages when these chronic conditions come, because if we had extensive extravasation there the animal would die in the acute stage of the disease. But if those lesions are slight then we have the secondary invaders to come in and produce those signs that we have always regarded as hog cholera, and those secondary lesions are valuable to us as signs of cholera because they are so frequently associated with it and will still serve for practical purposes, for I believe that we don't have those conditions arise except in very rare instances without we have associated with it the filterable virus all through contagious hog cholera.

I saw in one instance the formation of these button ulcers in a bunch of pigs where they were fed on a highly nitrogenous vat tankage, where the pigs were let run into a self feeder and fill themselves up until they could hardly waddle along. In that case a number of those pigs died, nearly the whole bunch of pigs died, and I suspected that they might have got cholera through that tankage, but the fact that they did not spread the disease to the feeding herd hogs that were susceptible to the disease, did not carry it into the herd with which they ran freely, convinced me that they did not have contagious disease, but they did have through the action of the disposition of that great surplus of tankage, a condition of lowered vitality that set up inflammation that gave the old hog cholera bacillus, but did not set up the button ulcers which they would do with the filterable virus.

Dr. Kinsky: Mr. President, perhaps I and a few others are exceptionally slow in seeing things, but it seems peculiar to me that we should autopsy three, four, six or even a dozen hogs dying as a result primarily of a filterable virus, secondarily of a pleural pneumonia, and not find in any one of those any of the characteristic lesions of cholera, if those other diseases are entirely a secondary cholera. That is a peculiar thing to me. I am very anxious to be corrected on that, and I would like to ask any one other than Dr. Connaway, not eliminating him for any personal reason, for Dr. Connaway and I have never agreed on this yet, but I would
like to hear from someone else whether or not they have found that this type of disease, as Dr. Schoenleber has mentioned, does exist in his section of the country, or whether or not Dr. Schoenleber and I have been seeing out of our eyes crooked.

Dr. Dorset: With regard to this question raised by Dr. Kinsley concerning the existence of a new disease, at least new to me and new to those of us who have been doing work in Iowa with this disease for some time, I wish to relate briefly a little work done this fall at the Iowa State Veterinary Association. The suggestion that there existed an infectious pneumonia was made, and several of the veterinarians present reported that that disease existed in the southwest of Iowa. I think their ideas in this respect resulted from work done and opinions probably expressed by Dr. Kinsley, at least I was ready to believe that at the time of the meeting. I am not sure of that, however. At any rate Dr. Shore of our force was sent down into this section of Iowa to look into this matter, and he went to the veterinarians who had reported the existence of this disease, if I remember rightly in two herds that were infected, supposed to be with infectious pneumonia, one of which the serum treatment had been refused by the veterinarian because the disease was infectious pneumonia and not hog cholera. Dr. Shore found as the result of his examination there and the post-mortem examination of some animals that there was pneumonia in some cases, but the history of the disease lesions found in the carcasses of the animals upon autopsy were quite typical of hog cholera, including hemorrhagic splotches on the skin, and other hemorrhagic lesions. Blood was collected from these herds and carried back to our station in Ames. There a certain number of pigs were injected, I believe three were injected with each lot of blood. Two of the three pigs in each case were given the doses of the serum prepared at our station at the same time, in other words we made a simultaneous inoculation. The experiment was not entirely complete at the time Dr. Niles and Dr. Shore came to this meeting, but in both instances the untreated pigs were beginning to get sick with the ordinary symptoms of hog cholera, and the serum treated hogs remained perfectly well. This tended to confirm in our minds our previously formed ideas that the so-called infectious pneumonia is merely a complication of the disease. That is, if the hog is protected from the filterable virus in the first place he would probably never have those serious lung complications.

Dr. Staley: Early last winter or late in the fall we had an outbreak of contagious disease of hogs reported to us from Crawford County, and we sent a local veterinarian to investigate, because
I suspected that it was cholera, and sent him a supply of serum and told him to administer it if he arrived at the conclusion that it was cholera. He returned the serum to us and told us, or reported that the hogs were dying not of hog cholera but of contagious pneumonia with pericardial complications. He was a man that had had an English College education, and he added to his report that this same condition had been noticed in England quite extensively, and for that reason he did not think it advisable to administer the serum. The losses continued and the people demanded some protection. We sent another veterinarian, a man that we had every confidence in, who had had an opportunity to know cholera, and he was of the opinion that it might possibly be cholera, but he was not at all sure, but he vaccinated the exposed animals. The losses continued for the next four or five days, and I went out from Harrisburg and found conditions somewhat improved, the losses were not as heavy, and I had an opportunity to hold a couple of post-mortems and found none of the typical lesions of hog cholera except those that we used to recognize as swine plague. But there was a shoat weighing about 75 to 100 pounds, and I had that shoat wrapped in canvas and sent in to the laboratory. Now, that animal was bled, blood was drawn from it at the laboratory and a post-mortem held, and it happened that that one showed the same lesions that we had found in the field, but did show the characteristic ulcers in the intestines, and we therefore made the diagnosis of hog cholera, but to be sure of our diagnosis we injected some of this blood into animals that we naturally supposed were susceptible, and they developed hog cholera and died, and I think that these are just about the same conditions that have been brought up here as a disease supposed to be some thing new, but we satisfied ourselves in that instance that it was undoubtedly hog cholera, and that the lung lesions were secondary matters.

Dr. Schoenleber: In support of our theory I want to mention two specific instances, one probably a month ago. A man had in the first place about 130 to 135 shoats, weighing from 135 to 140 pounds, and these, by the way, were vaccinated some time previously, I would judge a month or two months before by the simultaneous method, and he had lost about fifty per cent up to that time. I went out and held nine post-mortems. He had about, I would judge, ten or twelve animals running around which were looking bad. I investigated the conditions and came to the conclusion that it looked more like infectious pneumonia than anything else. We had that man change conditions, entirely clean up there and he lost just about the number that were sick at the time that we held those post-mortems, and he lost none of the others.
At a different time, not a great while ago I was at another outbreak where I had to hold six post-mortems under almost the same conditions and then I found hog cholera and I did vaccinate them. Now, there are two conditions.

Dr. Sihler: Speaking of those infectious pneumonia cases, I will say I ran across some of those so-called cases during the last year, and I have held a good many post-mortems upon similar cases, and I have taken the blood back to the laboratory, injected it into the hogs, susceptible pigs, and in no case have I ever produced a case of infectious pneumonia. I have always produced typical cholera, and I have now a strain of blood on hand that is one of the most virulent strains that I have had for many a day that I got from a case of that kind. Now, Dr. Schoenleber has just mentioned a case that had been simultaneously treated and later on developed cholera. I had an experience of that kind also a short time ago. There was a herd of 465 shoats weighing from fifty to eighty pounds. It was presumed that they had received the simultaneous treatment. Just seven weeks after they received that treatment they began to die. I was called upon to make an investigation. I did and I found cholera. I took the temperatures of those hogs at that time and 82 per cent of them had temperatures ranging from 105 on up to 108 and above. They were re-vaccinated, all of those of a high temperature received the serum alone, and those with normal temperatures, or those with temperatures up to 103.1-2, received the simultaneous treatment, and six head were lost afterwards. That was one of the cases reported to me as swine plague, and that the serum would not cure it, but it checked it immediately.

Now, Dr. Peters has mentioned in his article some things that have never been brought out before, and I wish to impress upon you that there is no man that can go into a herd or into a territory if cholera exists within two or three miles and say that he is in a non-infected herd. In every herd of hogs that we are vaccinating at the present time we take the temperatures, and if there is cholera within a mile or two and there are apparently no sick hogs in the herd we find temperatures ranging from 105 on up to 108, and some of them, as much as fifty per cent of those herds, have high temperatures. Now, that is one reason why we have had so many deaths result in some herds; we give the simultaneous treatment in that herd and there will follow a great number of deaths. In vaccinating those hogs it is well to take the temperature and with those that have an abnormal temperature to simply give the serum treatment alone, and to those with the normal temperature, give the simultaneous treatment. And since we have adopted that method our losses have been very, very small indeed.
Dr. Connaway: Mr. President, Iowa is a great hog raising state, and as we have not yet heard from Iowa I suggest that some representative of that state give us his views on the subject.

Dr. Gibson: I wish to say just a word on this subject. I won't take the allotted time. We are hearing a good deal about education, the education necessary to know cholera and treat cholera. This especially comes from Dr. Peters to-day in very strong terms. A year ago today Dr. Peters read a paper to us in this Association and he was neither a serum nor a serum simultaneous man. Now he has had a change of heart, and makes this profession, that he is not only able to do the work but teach it so others can do it. We had better all go to Dr. Peters for our instruction. I know of some men who have been working very carefully for years and still make mistakes. I agree with what Dr. Connaway says about virus. I am one sanitarian that does not carry virus, and will have to experience a change of heart before I do. We are suffering from the greatest known outbreak of hog cholera, due to the dissemination of hog cholera in our state, carried there not in hogs but in bottles, dropped from syringes and squirted out of syringes and everything else, and some of the most enthusiastic simultaneous men in Iowa we don't trust with anything. Now, they may be better educated than any of us, but we have our doubts about it. I think every man is entitled to his opinion, and I think that a man may learn by experience as well as any other way, but I am telling you that Iowa is having some experience, and we are learning some things, we believe, and we are opposed to the simultaneous method, so far as I am concerned, and I believe the other veterinarians on the Animal Health Commission in Iowa are of the same opinion, and we are going to be very careful. The loudest enthusiasts here for simultaneous treatment all emphasize the danger. If what they say about the danger is true then I am not competent under all circumstances to use it safely, nor are the gentlemen whom we have heard from to-day nor any other man for that matter. Now, you talk about controlling cholera; we may control the present outbreak with simultaneous treatment, but I believe we are preparing the way for a greater outbreak.

Dr. Reichel: I want to say in closing that the strains that have attained their highest potency that we have been working with naturally would kill hogs in seven or eight days. Now if those hogs are killed at the end of the fifth day and some at the end of the seventh day and others allowed to go and die on the eighth day it is rather unusual to find what we speak of as lesions of hog cholera in those hogs that are killed on the fifth, sixth or possibly on
the seventh day. It seems that the lesion producing organisms get in there after the vitality of the hog has been lowered by the virus. The virus in itself is not responsible for the lesions. Even those hemorrhages that we speak of in the kidney, they are nothing more than simply infarcts produced by the crowding in of those so-called secondary invaders, hog cholera bacillus. I wanted to make that point clear.

Dr. Fischer: In regard to the danger attending the serum simultaneous method and the consequent impracticability of using that method in exterminating or controlling effectively hog cholera, I want to ask just one question and then state a few facts and let you draw your own conclusions. The question is this. If a cubic centimeter or two cubic centimeters of virus injected subcutaneously or intramuscularly into a pig is dangerous, if it contributes to the spread of disease to the neighboring farmers, what will the carcass of a pig that died of cholera in a herd that was treated with serum alone do? Which is the greatest danger? That is all for that.

Now I want to suggest just a few facts and let you draw your own conclusions. Our serum laboratory in Ohio is located in Franklin County at Reynoldsburg on an eight acre farm surrounded by a wire fence. Reynoldsburg is ten miles from Columbus, the middle of the county, and lies just about between the middle of the county and the eastern border. It is in the middle or in the center of the eastern half of the county. Now Franklin County is not the largest corn raising or pork producing county in the state, but it averages up pretty well. I think we have from 15,000 to 20,000 hogs in Franklin County. Now Reynoldsburg is a little town, a little village of four or five hundred inhabitants. Our eight acre farm adjoins the corporation line. The next town east is Wagram, four miles east, connected with an electric car line and a good pike. The next town south is Brice, three miles away. The next town north is Black Lake, two and a half miles away. The next town west is Hibernia, which is hardly a town, just a little bit of a settlement containing five or six houses, which is about three miles away. Now every farm in that neighborhood, and I don’t know of a single exception, though I suppose there are some, on which there are none, every farm has pigs on it, from one or a dozen or a few dozen to several hundred. On this eight acre farm where we have our serum plant all of our buildings are frame; they are well constructed; we have perhaps twenty buildings on that place. Among those buildings we have three large pig pens, one in which we house our hyper-immunes, about 80 at a time. In another we house our virus pigs
when we have any. In a third we keep discarded test pigs that have become immune in the tests and serum pigs that are not in use. In addition to that we have fourteen small pens, five by six feet in area, in which we run our serum test. We have from six to eight little pigs in those pens. We have all together from 200 to 400 pigs on that place all the time, immune, hyperimmune, infected animals and susceptible animals. There is cholera there all the time. Now all of our susceptible pigs that we use in testing our serum are bought in Franklin county within a radius of ten miles from the serum plant, or a driving distance with a horse and buggy. We get all of our little pigs there. We have one man that looks after that work. He is careful when he gets out, he wears different clothes when he goes out than those he wears when he is in the serum plant. He disinfects his shoes before he leaves the serum plant. The feed for our hogs is all bought at Brice, three miles south. It is hauled up with a horse and wagon. The horse and wagon are disinfected when they leave the place with creolin solution, five per cent. During the four years time that this serum plant has been in operation there has never been an outbreak of cholera at Brice until this year. It occurred on the premises and in the neighboring premises of the man that hauls our feed. Whether it was carried from our place or not I don’t know, but cholera occurred there. And by the way, that herd was treated with serum alone, and cholera is still there. The only other outbreaks that we have had near that serum plant have been at Wagram, four miles east. We have had a half a dozen outbreaks in that locality. We have treated them promptly, and that was the end of hog cholera in the neighborhood of our serum plant, while on our serum plant the only precautions we take to prevent the spread of the disease is to be careful in the transfer of pigs from disinfected to the infected pens, and in admonishing the employees to disinfect themselves after being in our infected pens. In addition to that, however, we have got one field where we are raising hyperimmune and discarded test pigs, a good many of them little pigs that have chronic cholera that we did not discover until three or four weeks later, that are constantly running about, nothing to separate them from the neighbors’ place except the wire fence.

Dr. Peters: Mr. Chairman, I will say in conclusion that at our serum plant we have the same conditions. We haven’t had any outbreak. We have a lot of cholera there. Almost all the herds within a radius of three miles or possibly more are all treated, and no outbreaks of cholera. In fact we seem to be secure enough since the farms around there have had their herds treated. And I would say,
Dr. Gibson, that we should be pleased to have him or his state men come down to our plant and we will show them not only the simultaneous method but a number of the other serums with the various filterable viruses, and the other experiments that are being carried on to lessen the danger of this great work. We have not been saying very much about it, but while I reported as I did last year, not by any means have we discarded that, and the good work of experimenting along that line is being carried on with great vigor. We would be glad to have you come down. And I will say further that all of our friends, Dr. Connaway, Dr. Gibson and all the others that are not in the simultaneous fold this time, if they are going to stay in the hog cholera serum business, they will have to be in this fold before long or go out of business.

Dr. Connaway: That is just what we want to do. We want to go out of the hog cholera serum business. That is the purpose of our work.

LIVE STOCK SANITARY CONTROL WORK IN CANADA.

By Fred Torrance, Canada.

Live stock sanitary control work in Canada is of comparatively recent origin. Previous to the appointment of my predecessor, Dr. Rutherford, the Veterinary Sanitary Service of Canada was somewhat rudimentary, consisting of a quarantine station at Point Levis, opposite Quebec, and a few veterinarians who were allowed to practice and gave only part of their time to the governmental work. The Service was under control of the Deputy Minister of Agriculture, who consulted the chief veterinary advisor whenever he deemed it necessary.

Imperfect as this system was, it had proved its usefulness on several occasions, preventing the introduction of contagious diseases from Europe, and calling attention to those we already might call indigenous.

Under the new system that was inaugurated with the appointment of Dr. Rutherford, a veterinarian was, for the first time in the history of the country, given full charge of the Health of Animals Branch of the Department of Agriculture and required to devote his whole time to it. It was high time that a change should take place. The old system had done its part while Canada was largely undeveloped and unknown except as the Provinces of Ontario, Quebec and those others to the east known as the Maritime Provinces. But now a new era had commenced. The great west was developing, hundreds of thousands of immigrants were pouring into the country, some of them bringing their domestic animals with them, and it was very necessary, if the health of the live stock was to be protected, to have a veterinary service commensurate to the task. New quarantine stations must be established along a lengthy boundary line to prevent the introduction of disease from without, and a veterinary staff must be organized to undertake the control of those already within her bounds.

The organization of this service was the task allotted to Dr. Rutherford some ten years ago, and how well he has performed this duty it is my privilege to tell you today.

Before proceeding to describe the control work of Canada and the staff by which it is performed, it will be well to glance for a moment at conditions
existing in Canada as compared with the United States. In your country, veterinary control of diseases is largely in the hands of State authorities, and consequently you have a number of State Live Stock Sanitary Boards, while the Federal Government takes charge of such matters as quarantine against foreign countries, inspection of meats for export, investigation of diseases and so on.

In Canada the conditions are quite different. Our provinces, which correspond to your states, have no control over contagious diseases of animals. There are, therefore, no bodies similar to your Live Stock Sanitary Boards. All authority, both as to quarantine and control of contagious diseases, is centered in the Federal Government, which also provides for inspection of all abattoirs engaged in the export meat trade, this latter expression including export from one province to another, or what you would call “Inter-state Commerce.”

We have, then, three departments under one head—quarantines, field control work, and meat inspection. I propose now to give you a brief account of our field control work.

First, as to organization: The field inspectors, numbering between 80 and 90, are divided among the different provinces, as the exigencies of the services require, a larger number being stationed in those provinces when they are required for the suppression of disease, a smaller number when the absence of contagious disease makes them suffice. Any of them can be moved from one province to another as occasion requires. In each of the western provinces a chief inspector has charge, directing the field inspectors and receiving their reports before these are transmitted to the head office in Ottawa. These inspectors are all on salary and give their whole time to the service. In the head office a sufficient clerical force is employed to keep records of the work, do the book-keeping, attend to the correspondence, etc.

Early in the history of the service it was found necessary to provide a laboratory for the preparation of mallein, tuberculin and other biological products and this has been in successful operation for some years. It is situated at Ottawa where Dr. Higgins, with three qualified assistants, prepares all biological products used in the Department, examines and reports on pathological specimens, and does as much research work as his other duties permit.

A branch laboratory is established at Lethbridge, in Alberta, where Dr. Watson is engaged in special work on dourine and diseases peculiar to the western prairies, while at Agassiz, in British Columbia, we have a temporary laboratory for the convenience of Dr. Hadwen in the investigation of red-water in cattle, a disease indigenous to a certain part of the mountain province. The work of these pathologists has been and is of great value to us, and many of you may have listened to papers presented to the American Veterinary Medical Association by each of these gentlemen.

Now a word as to the diseases we are attempting to control and how we are dealing with them. The first and worst of these is bovine tuberculosis. This is widespread, and so far as we know exists in every part of Canada. It is decidedly worse in the dairy districts than elsewhere, as indicated by the slaughterhouse statistics, but we have no reason to think that we are any worse off than any of our neighbors in this respect. Hitherto, no steps have been taken to eradicate the disease, as it was felt that until public opinion demanded it, any drastic remedy would only defeat its own object. Measures have been taken, however, to educate the public as to the importance of getting rid of the disease both for sanitary and economic reasons, and we think
the time is near when control work can be attempted with the co-operation of the farmer. At the present we insist on the tuberculin test for all cattle imported into Canada, with the exception of settlers’ cattle, and we give assistance to the individual farmer, who desires to clean up his herd, by furnishing tuberculin free of charge to the veterinarian he employs to make the test. The test charts are sent in to the head office, and any reactors are permanently marked by punching out the letter “T” from the right ear.

In this connection I may say that the Province of British Columbia has undertaken, with the consent of the Dominion Government, a campaign against bovine tuberculosis. Some three years ago they undertook to test all the cattle in the province, killing the reactors and paying compensation to the owners. The statistics of this campaign are interesting as showing what may be accomplished by this method. The percentage of reactors the first year was a little over 8 per cent, the second year 5½ per cent, the third and last year 3 per cent. It must be remembered that British Columbia is not a dairying country and has a small number of cattle compared to other provinces of Canada.

Glanders.—In dealing with glanders the policy, adopted in the year 1904, has been the slaughter of both clinical cases and reactors, with liberal compensation to owners. Contact horses are held in quarantine for thirty days for retest, and premises are carefully disinfected before released from quarantine.

The results of this policy have been quite satisfactory. In every part of Canada except those two western provinces, Saskatchewan and Alberta, where the vast influx of immigration has created conditions that are peculiar to that part of the Dominion, the disease has steadily diminished. The prairie provinces are making progress, although not so rapidly as the rest of Canada, and we have no reason to doubt that the steady work of our inspectors will eventually reduce the disease to very small proportions.

In adopting the policy of slaughtering reactors, Dr. Rutherford took a step in advance of other veterinarians in charge of control work, and it is gratifying to note that the experience of the eight years it has been in operation, proves the wisdom of his action. It may be noted here that this policy has since been adopted by the British Board of Agriculture, the South African authorities and others.

<table>
<thead>
<tr>
<th>Year</th>
<th>Horses killed</th>
<th>Compensation paid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1904-05</td>
<td>2,113</td>
<td>$147,851.43</td>
</tr>
<tr>
<td>1905-06</td>
<td>1,387</td>
<td>108,045.76</td>
</tr>
<tr>
<td>1906-07</td>
<td>1,881</td>
<td>142,057.07</td>
</tr>
<tr>
<td>1907-08</td>
<td>1,324</td>
<td>102,868.65</td>
</tr>
<tr>
<td>1908-09</td>
<td>981</td>
<td>73,386.88</td>
</tr>
<tr>
<td>1909-10</td>
<td>627</td>
<td>48,686.01</td>
</tr>
<tr>
<td>1910-11</td>
<td>666</td>
<td>57,122.11</td>
</tr>
<tr>
<td>1911-12</td>
<td>853</td>
<td>77,439.95</td>
</tr>
<tr>
<td>1912-13</td>
<td>478</td>
<td>45,494.89</td>
</tr>
</tbody>
</table>

Hog Cholera.—Canada has fortunately never suffered as severely from this disease as the United States. This is no doubt owing in part to our cold winters, which have the effect of checking the extension of the disease for some months of the year. We have also maintained a very strict quarantine of thirty days, and in the case of hogs from the United States require in addition a certificate that the hogs entered for quarantine have come from a locality where hog cholera has not existed, during the preceding six months, within five miles of the premises from which the hogs are coming.

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In spite of all precautions, however, we have had many outbreaks of the disease which have been dealt with by immediate slaughter of all hogs on the infected premises with compensation to the owner. We have not tried the system of immunizing hogs against the disease, as the present method of dealing with the disease is considered more suitable to the conditions existing in Canada.

**Mange in Cattle.**—This disease is largely confined to two definite areas, where it has existed for some time, but is gradually being controlled, and, we hope, will soon be extinguished. Both these districts are ranching districts, that is to say, the cattle are allowed to roam freely over large tracts of land and are not confined in stables at any time. The disease is dealt with by compelling the owners to dip their cattle in a lime and sulphur dip under the supervision of a veterinary inspector. The chief difficulty in controlling the disease has been in the opposition of some owners, who cannot see that it is to their interest to dip their cattle when merely suspected of infection. Other owners, whose cattle plainly show the effects of the disease, are easily induced to dip, but unless the contacts, or incipient cases, are also dipped, little progress can be made. The division of the large ranches into small holdings is now taking place to a large extent in the mange area, and this is materially assisting in the extinction of the disease.

**Mange in Horses** is found to only a limited extent in Canada. The few isolated cases that occur are treated by quarantine and the application of remedies at the owner's expense, under the supervision of an officer of the Department.

**Dourine.**—This disease, first discovered to exist in Canada in the year 1904, has given us a good deal of trouble. Affected animals are promptly slaughtered and the owner compensated, but the difficulty of reaching a diagnosis with a disease as insidious and slow to develop as dourine has necessitated the holding in quarantine for long periods of animals suspected of infection. Through the work of Dr. Watson and others we are now in a position to reach a rapid diagnosis in these cases by modern laboratory methods. We are now building a new laboratory at Lethbridge to provide facilities for this work, and hope to be able to stamp out the disease, which fortunately is confined to two small areas in Alberta and Saskatchewan.

**Other Diseases.**—There are several other contagious diseases which visit us at times but have never attained formidable dimensions, such as sheep scab, anthrax, rabies and black-quarter. These are dealt with as they arise, using the methods that have been proven effectual and are approved by the majority of veterinary sanitarians. There is no need to weary you with any detailed account of our methods of control. They are the same as those generally adopted and varied to suit any special conditions.

Before concluding, I would like to add a word or two as to our system of yard and car inspection. The railways are required by law to clean and disinfect all stock cars after they have been used. We have a number of car inspectors, not veterinarians, whose duty it is to see that the railway companies do not neglect this work. The railway stock yards are also inspected regularly and kept in a clean sanitary condition. Any yard which is not cleaned by the railroad company, when ordered to do so, is placed in quarantine until the necessary work is done.

This system has a good effect in more than one direction. It helps materially in preventing the spread of contagious diseases and also renders the treatment of animals in transit by rail more humane than it otherwise would be.
Dr. Marshall: Mr. President, I would like to make a motion that we give Dr. Torrance a vote of thanks for attending our meeting and giving us such a good account of the way the work is carried on in the Dominion of Canada.

Dr. Nighbert: Seconded.

The President: It has been moved and seconded that a vote of thanks be extended Dr. Torrance for attending our meeting and giving us this excellent paper. All in favor of that motion will please rise.

(A rising vote of thanks was extended to Dr. Torrance.)

CONTAGIOUS ABORTION BACILLUS VACCINE.

John Reichel, Glenolden, Pennsylvania.

The bacillus of contagious abortion was proved the cause of contagious abortion of cattle in Denmark by B. Bang and V. Stribolt in 1896; in England by the McFadyéans and Stockman in 1909; by Swick in Europe in 1910, and by MacNeal and Kerr in the United States in 1910. The strains subsequently isolated by Good and Glütner in 1911, and the work of Larsen, Hadley and Beach, and Surface with the complement fixation test further demonstrates the prevalence of the disease among cattle in this country. The discovery by Schroeder and Cotton of the bacillus in the milk of cows in infected herds not only added another chapter to the prevalence of the infection but the pathogenicity as well. The lesions such as the organism is capable of producing in guinea-pigs, described in detail by Smith and Fabyan, may well be accepted as cause for apprehension until more facts are known concerning the bacillus.

That the bacillus is the cause of a serious subacute or chronic infection of cows in which abortion may or may not be observed, is a fact more appreciated at this time than heretofore. Aside from the loss of the calf the general condition of the aborting cow is below the average. More data are needed as to how much of a menace she is, and the outcome of the disease.

Treatment thus far has been directed to preventing the abortion, but as the root of the evil is the infection, prevention and eradication should be planned.

In 1902 and 1903, B. Bang injected heifers and sheep intravenously from 1 to 3 times with 10 c.c. doses of living serum bouillon cultures of the bacillus of contagious abortion, to test whether or not an increase in the resistance of the animal to an experimental infection would result. The experiment included the subsequent breeding of the heifers and sheep and feeding of infectious material to the heifers and intravenous injection of living cultures of the bacillus to the supposedly then pregnant sheep. A due number of control animals were allowed in each set. Unfortunately but one control heifer conceived and only 3 of the 8 sheep, rendering the experiment therefore worthless. Experiments on sheep and goats were begun in 1904 and 1905 in which they were treated subcutaneously with either living or killed cultures; the animals were infected by feeding infectious material from animals that had aborted. Cattle were subsequently treated with the following results:

Of animals treated with subcutaneous injections of living cultures one cow resisted infection or at least she did not abort; and three aborted. In six, possibly nine sheep, and in 18, possibly 21, goats, abortions were pre-
vented. Of animals treated with subcutaneous injections of dead cultures two cows carried their calves full term, while the treatment failed in three; five, possibly eight, sheep and five goats came through successfully, while one sheep and seven goats aborted. In summarizing these experiments it is well to bear in mind that the infective dose, fed or intravenously administered, was many times the amount of infection naturally contracted at any one time.

The English commission having satisfied itself that an intravenous injection of infectious material is nearly always followed by infection of the pregnant cow and subsequent abortion, used this method exclusively in experiments in which animals were injected subcutaneously with large doses of living cultures; the results were practically similar to those of Bang.

Concerning the practice of immunizing animals with subcutaneous injections of living bacilli the English Commission states: "It is evident that since the inoculation of living cultures of the abortion bacillus into pregnant animals causes them to become infected, one must administer the immunizing dose of such cultures some time before the animals become pregnant in order to allow time for the living bacilli to be destroyed in the body." As this, however, is difficult to control, the dangers of this procedure are at once appreciated, and detract from its practical application. The question also naturally arises that if it is necessary to have all the living bacilli injected subcutaneously as an immunizing dose destroyed in the body before the animal conceives, why inject living organisms in the first place? Will not dead bacilli injected subcutaneously increase the resistance of the animal and may the injection not be made sufficiently strong to protect the animal against infection, and possibly assist the infected animal to recover? In this connection the experiments of the English Commission with dead bacilli may be referred to with advantage. Heifer 187 was injected intravenously with 8 c. c. virulent material 45 days after conception, and during the following 78 days injected with 4 doses, a total of 700 c. c., killed bacilli subcutaneously. The heifer was killed 112 days after receiving the infective dose and herself and her fetus were found free of the infection. Heifer 190, 52 days after conception, received 10 ounces of infectious material. Beginning 51 days after the administration of the infective material the heifer received 1,200 c. c. of killed culture within the following 52 days, in three subcutaneous injections. One hundred and thirteen days after injection the heifer was killed and found free of the disease.

Bang, realizing that subcutaneous injections of serum bouillon cultures, in which the dead bacilli were killed by the addition of tulouol, would not produce a real appreciable degree of immunity against experimental or artificial infection, arranged to furnish contagious abortion bacillus vaccine to a number of Danish veterinarians in 1908, for trial under ordinary conditions; the results were as follows:

In 1908, 34 heifers on a farm on which the rule for several years prevailed for heifers to lose their first calf, were injected from four to six times with 10 c. c. of Bang's contagious abortion bacillus vaccine at four-day intervals, beginning a month before pregnancy; only three aborted, whereas of eight heifers untreated and left as controls, under identical conditions, all aborted. In 1909, 31 heifers on the same farm were treated, with only four abortions resulting, whereas of four heifers untreated or controls, all aborted. On another farm 15 heifers were treated, of which three calved six weeks ahead of time, while the rest went full term. On a farm where the cows invariably aborted the second time, 20 that had calved once were
treated, although all were with calf when the treatment was started and five aborted.

Jorgensen administered the treatment to 11 heifers in 1909 on a farm where abortions were prevalent for 30 years, and where in 1908 only 25 per cent of the heifers went full term. Of 11 heifers treated, two calved eight days ahead of time, the others went full term, while 22 young cows which aborted before, aborted again. On another farm where cows began to abort in the first year and where 15 out of 16 pregnant cows aborted in the second, in 1909, 19 were treated, of which 16 carried their calves full term. One cow aborted a dead fetus two months ahead of time and two calved three weeks ahead of time. The results were similar on other farms following treatment with dead cultures of contagious abortion bacillus vaccine.

From the trials quoted, the injections of dead bacilli into heifers in infected herds increased their resistance to the infection, preventing abortions altogether, or resulting in fewer abortions in the treated animals, whereas the control animals aborted regularly.

Author’s Method of Preparation of Contagious Abortion Bacillus Vaccine.

As it is generally accepted that a number of strains of the same organism are to advantage included in the preparation of a vaccine, six cultures of the bacilli are used including Cultures * A, B, C, L, M and W, transplanted repeatedly on 1.5 glycerine peptone agar plus horse serum, and incubated at 37 degree C., abundant growth being obtained in well paraffined cotton stoppered cultures. The growth takes place on the agar medium in the serum and is readily removed with the serum, or on the addition of a small amount of sterile normal salt solution. The suspension is then collected in Miquel bulbs and the number of bacilli in each c. c. determined by Wright's method.

The sealed bulbs are then immersed in a water bath at 60 degrees C. for three hours. The heavy suspension is then diluted with sterile carbolized (0.5 per cent) salt solution as follows:

- Vaccine for injection A (4 c. c.) 40,000,000,000, killed bacilli.
- Vaccine for injection B (4 c. c.) 60,000,000,000 killed bacilli.
- Vaccine for injection C (4 c. c.) 80,000,000,000 killed bacilli.
- Vaccine for injection D (4 c. c.) 100,000,000,000 killed bacilli.

Cultural tests are made to insure the sterility of the diluted emulsions or vaccine.

Four dilutions of the vaccine are administered in 4 c. c. doses, subcutaneously, at intervals of from 7 to 14 days, with the usual precautions in making such injections. As the bacilli are grown on serum peptone agar, heavier growths are obtained than in the serum bouillon cultures, as used by Bang in 10 c. c. doses. The heavier growths or emulsions from the serum peptone agar cultures are diluted so that the same number of bacilli administered in 10 c. c. doses of serum bouillon cultures are included in 4 c. c. of the diluted vaccine; 10 c. c. of serum bouillon as used by Bang contains approximately 50,000,000,000 killed bacilli. In injecting vaccine for injection A and followed by B the same number of bacilli in 20 c. c. of serum bouillon cultures are administered. The four c. c. of vaccine for injection C includes 1 3-5 the number and injection D twice the number.

* Strain A isolated from infected cow in Pennsylvania.
Strain B isolated by Bang, Copenhagen, Denmark.
Strain C isolated by E. S. Good, Kentucky Agricultural Exp. Sta.
Strain L obtained from W. P. Larsen, Wisconsin Agricultural Exp. Sta.
Strain M isolated by John R. Mohler, B. A. I., Dept. of Agriculture.
Strain W isolated by John R. Mohler, B. A. I., Dept. of Agriculture.
The strains used even though they grow readily as stated above, are ineffective for pregnant guinea pigs and rabbits, through which they are passed at regular intervals to keep up their virulence, even though it may not be necessary. In fact, five c.c. of a culture of living bacilli of Culture W recently injected intravenously into a normal young pregnant heifer, accidently killed on the fifth day after the injection, proved sufficiently infective in that short time to infect the cotyledons of the uterus, but not the fetus. Immediately after death by bleeding from the carotids the pregnant uterus of the heifer was removed with its fetus of about three months and ligated near the vulva. Typical uterine changes as seen in naturally infected cows, apparently entirely confined to the cotyledons, were demonstrated, from which the bacilli were isolated in pure culture. Cultures from material elsewhere in the uterus and fetus remained sterile. The heifer was proved free of the infection by the complement-fixation and agglutination tests before she was injected with living bacilli.

The thermal death-point of the bacillus is conceded as 59 degrees to 61 degrees C. for 10 minutes. Three hours at 60 degrees C., however, insures certain death without causing undesirable changes in the cultures, which would tend to alter or weaken the specific proteids alone of value. In fact, the English Commission in its Report (Pt. 1, page 11) says:

"Moreover it would appear that the toxins (specific proteids) are not completely destroyed by a high temperature (100 degrees C.)," etc.

It is interesting to refer to experiments underway at this time in which we have succeeded by the catalytic action of absolute alcohol on the supernatant liquid of well centrifugalized cultures of the bacillus in obtaining a precipitated proteid, soluble in water, which probably is identical with Piorkowski's Lymple. We have demonstrated that the proteid obtained in this way contains some of the specific proteid or proteids of the dead bacilli, because rabbits injected with contagious abortion bacillus vaccine and others with the precipitated proteid in proportionate doses all develop antibodies, i.e., agglutinins for the bacilli equally as well. The results obtained in the field by Hesse with Piorkowski's Lymple may therefore be taken as additional evidence of the value of injections of the specific proteid in the form of vaccine or precipitated proteid.

The manner in which the animal body responds following an injection or natural infection of a specific proteid in the form of a living or dead organism is well known. Antibodies such as precipitins, agglutinins, oposins, and amoceptors, soon appear or are increased. They remain as long as the infection remains active, and generally disappear when the body is free of the effects of the specific proteid which serves as an antigen. When an animal is afflicted the body response against the infection takes place, but the infection may develop for the reason that the response is not strong enough to overcome the infection. With the animal body constantly exerting itself to accomplish this, a rational treatment is therefore one which will assist the animal body in its efforts. The value of all bacterial therapy as well as serum therapy rests upon this principle. The response of the animal body to a single injection of the specific proteid of the bacillus of contagious abortion is appreciable, not only by the so-called reaction, i.e., rise in temperature in from 12 to 24 hours, loss of appetite, depression with a decrease in milk production, for a short time, but also by the development of antibodies measurable to some extent by the increase in agglutinins as shown in table No. 1.
TABLE No. 1.

Production of Agglutinins in Cattle Following a Single Subcutaneous Injection of Contagious Abortion Bacillus Vaccine.

<table>
<thead>
<tr>
<th>No.</th>
<th>Animal</th>
<th>1st day</th>
<th>2d day</th>
<th>3d day</th>
<th>4th day</th>
<th>5th day</th>
<th>6th day</th>
<th>8th day</th>
<th>9th day</th>
<th>10th day</th>
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<tbody>
<tr>
<td>2164</td>
<td>Steer</td>
<td>1-25</td>
<td>1-25</td>
<td>1-50</td>
<td>1-50</td>
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<tr>
<td>2165</td>
<td>Heifer</td>
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<td>1-25</td>
<td>1-50</td>
<td>1-100</td>
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<td>1-200</td>
<td>1-400</td>
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</tr>
<tr>
<td>2166</td>
<td>Bull</td>
<td>1-50</td>
<td>1-50</td>
<td>1-100</td>
<td>1-200</td>
<td>1-200</td>
<td>1-400</td>
<td>1-400</td>
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</tr>
<tr>
<td>2180</td>
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<td>1-100</td>
<td>1-200</td>
<td>1-200</td>
<td>1-200</td>
<td>1-200</td>
<td>1-400</td>
<td>1-400</td>
<td>1-400</td>
</tr>
<tr>
<td>2439</td>
<td>Bull calf</td>
<td>1-50</td>
<td>1-50</td>
<td>1-50</td>
<td>1-100</td>
<td>1-200</td>
<td>1-200</td>
<td>1-400</td>
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</tr>
<tr>
<td>2440</td>
<td>Bull calf</td>
<td>1-50</td>
<td>1-50</td>
<td>1-100</td>
<td>1-200</td>
<td>1-200</td>
<td>1-200</td>
<td>1-400</td>
<td>1-400</td>
<td>1-400</td>
</tr>
</tbody>
</table>

Without going into the history of the animals included in Table No. 1 it may be said that these animals were not selected for the treatment, but utilized for this purpose only because available.

The antibodies increase steadily following each injection of vaccine. The blood serum of treated animals may be made to agglutinate in dilutions as high as 1-1000 and higher, which when injected into an untreated animal in a dose of 80 to 100 c. c. will impart a passive immunity lasting from two to three weeks.

It is apparent that the second injection of vaccine need not be administered to normal animals on the tenth day following the first and it is likely that the injections may be administered to advantage at intervals longer than fourteen days, as suggested by Bang, when the treatment is started at least one month before the animal conceives.

Treatment With Contagious Abortion Bacillus Vaccine.

1. Treatment of Non-infected Cattle: The first injection of vaccine should be administered as near to the last month before breeding as possible and subsequent injections made at intervals preferably not less than 14 days and upwards, to a month. The danger of infection seems to be greatest during the early months of pregnancy. The English Commission failed entirely to infect a heifer 17 days before calving. In addition an effort should be made to reduce exposure to a minimum. Non-infected pregnant cows may be injected at intervals from 14 days up to the time of calving without danger. A morning and evening temperature should be taken on the day following each injection of vaccine.

As infected animals are very likely to react not only to the first injection, but as well to those succeeding, the heavy pregnant cow, due to calve within two months, may not be able to stand the reaction without losing the calf, and it is therefore advisable to hold cows of this class over until they have aborted or calved and begin injections of vaccine as near to a month before they are bred as possible.
Infected cows too far advanced in the period of gestation may be treated with an immunizing serum at short intervals if the value of the calf warrants the expenditure.

3. Treatment of an Infected Herd: (1) Number and describe each animal in the herd, including bulls and bull calves. (2) Note age, general condition, date and number of times each cow has calved or aborted, whether after-births were retained or not, date each heifer or cow was bred and when expected due. Record date and number of heifers or cows each bull serves. (3) Collect from 5 to 10 c. c. of blood from each animal into a sterile rubber stoppered bottle with a sterile needle for the agglutination and complement fixation tests. If a separate needle for each animal is not available, keep a few needles in constantly boiling water. Before placing a used needle in the boiling water force a volume of water from a syringe through the needle to free it of coagulated blood. (4) After blood samples are collected, take temperatures of each animal as for the subcutaneous tuberculin test. Inject 4 c. c. abortin solution (1 c. c. concentrated abortin) instead of tuberculin, after recording at least four pre-injection temperatures. From approximately the ninth hour after the injection, take at least six post-injection temperatures at two-hour intervals. (5) Compare the results of abortion, agglutination, and complement fixation tests, with the history of each animal, and note the possibly infected. (6) Treat each animal with contagious abortion bacillus vaccine in accordance with the outline of the treatment for non-infected or infected cattle. To determine the practical value of the treatment allow a sufficient number of the non-infected and infected heifers to go untreated as controls. (7) As soon as any cow shows premonitory symptoms of abortion, isolate at once. (8) As soon as the cow has aborted, remove the fetus, fetal membrane, discharges, etc., and burn rather than bury them. (9) Thoroughly cleanse and disinfect the external genital organs, hind quarters, hips, thighs, and tail with a reliable disinfectant. (10) Douche the uterus with a solution of non-poisonous and non-irritating antiseptic, at first twice a day and later daily until all discharges cease. A pump forcing the solution from a bucket into the uterus is most likely to cleanse the organ thoroughly. Always place the pump and hose in a strong solution of a disinfectant before using it again. (11) Disinfect the premises thoroughly with formaldehyde if possible, or use a solution of a strong germicide freely. Spray the stable with whitewash containing one pound of fresh chloride of lime to each three gallons of water. Spread the manure from the stable and barnyard in some field in which cattle are not pastured. After removal of all manure spread lime thickly. Repeat the stable disinfection and yard disinfection at intervals. (12) The aborting cow should not be bred for at least 10 weeks. If properly doused all discharges cease much sooner, but the genital organs take all of that time to regain their normal condition. (13) In order to reduce to a minimum the possibility of the bull transmitting the disease where a separate bull is not kept for the infected cows, thoroughly cleanse and disinfect the sheath of the bull before and after service. Clip the long hairs of the prepuce and sheath and thoroughly wash sheath with a weak solution of a non-irritating disinfectant. (14) The herd record should be kept complete so that results may readily be summarized at any time.

In a number of herds under treatment, in accordance with the above outline, for considerably less than a year, all that can be said at this time is that the results are fully as good as can be expected.

In administering the treatment it is interesting to note that the supposedly infected cow apparently improves in general condition.

The agglutination and complement-fixation tests will be strongly positive.
in tests of blood serum of normal animals treated with vaccine, and the length of time this is true after the treatment is finished may be accepted as the length of time the treatment is probably of value; this is not known, but it is likely to be a year or more.

CONTAGIOUS ABORTION.
By W. L. Williams.

With the collaboration of C. P. Fitch, J. N. Frost and R. R. Bolton, New York State Veterinary College, Cornell University.*

There exists in the genital organs of cattle a wide-spread, highly destructive, chronic infection which expresses itself by a variety of symptoms, four of which stand out prominently.

1. The expulsion from the uterus of an immature dead fetus, which we designate abortion. Owing to the striking character and economic importance of this phenomenon, it plays the title role and gives to the disease its name of contagious, or infectious abortion.

2. The expulsion from the uterus of an immature living fetus, premature birth.

3. Metritis with retained placenta.

4. Sterility. This phenomenon causes economic losses little short of those from abortion itself. Usually involving single scattered individuals, like the phenomenon of abortion, it may involve simultaneously 20, 30, 50 per cent or more of the animals in a herd.

Cattle abortion is world wide and causes probably the most severe economic losses of any cattle disease. It can be considered second to tuberculosis only in the basis of its lesser danger to the human family.

The general source of abortion cannot be determined. We have estimated that in New York, abortion exacts an annual toll of $5 per cow or a total of $10,000,000 and that the losses to the nation exceed $50,000,000 a year.

Contagious abortion as expressed by the phenomenon of abortion, occurs in a variety of types. Ordinarily the abortions occur singly, one case here, another there, ranging from 2 to 10 per cent annually in smaller herds.

The insidious cases of abortion, the phenomenon being absent or unrecognized for one to several years, and ranging over a long period from 5 to 8 per cent per annum, the individual cases being widely separated, cause on the whole the chief economic losses. Many breeders do not know nor are they ready to believe, that no case of accidental, mechanical, fright or ergotinal abortion in the cow has ever been verified by an autopsy.

Abortion occasionally breaks upon a herd in the aspect of a storm and 25, 50, 80 per cent or more of the pregnant females in the herd abort in such rapid succession as to cause consternation and, followed or accompanied by severe and fatal metritis, retained afterbirth, obstinate or insurmountable sterility, etc., may prove ruinous to the herd and convince the owner and veterinarian that a contagion is at work. In extensive herds these abortion storms occur and recur at irregular intervals without the cause or causes becoming clearly known.

* The complement-deviation and the agglutination tests are the special work of Dr. Fitch, Department of Pathology and Bacteriology; the bacteriologic work is by Dr. R. R. Bolton, while the clinical and experimental operations have been carried out jointly by Drs. Frost, Bolton and the writer, the entire work being under the general supervision of Dr. V. A. Moore. The writer assumes entire responsibility for the conclusions.
In yet other herds, while the abortion rate is high, the vacillations in intensity are comparatively slight.

In the first group, those herds where the abortion rate is low and intervals of one to several years pass without a recognizable abortion, the phenomenon is seen largely in heifers during their first or second pregnancies, with a lesser number in adult cows. When a storm breaks in such a herd, the barriers of age are cast aside and adults may suffer as much as heifers. In those herds having a high and constant abortion rate, the phenomenon is usually seen mostly in first pregnancy and next in the second, with comparatively rare abortions in third or later pregnancies.

We may best illustrate the behavior of the disease by actual records.

Abortion Data in Herd A.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of cows</td>
<td>217</td>
</tr>
<tr>
<td>Total number of pregnancies</td>
<td>645</td>
</tr>
<tr>
<td>Average number of pregnancies per cow</td>
<td>3</td>
</tr>
<tr>
<td>Total number of abortions</td>
<td>78</td>
</tr>
<tr>
<td>Average abortions per annum</td>
<td>3.5</td>
</tr>
<tr>
<td>Average per cent of abortions per annum</td>
<td>12</td>
</tr>
<tr>
<td>Number of individual cows aborted</td>
<td>71</td>
</tr>
<tr>
<td>Percentage of cows which have aborted</td>
<td>33</td>
</tr>
<tr>
<td>Number of cows aborting twice</td>
<td>9</td>
</tr>
<tr>
<td>Number of cows aborting twice in succession</td>
<td>6</td>
</tr>
<tr>
<td>Number of cows died or killed after first abortion</td>
<td>10</td>
</tr>
<tr>
<td>Number of years covered</td>
<td>22</td>
</tr>
<tr>
<td>Number of years in which no abortion occurred</td>
<td>6</td>
</tr>
</tbody>
</table>

**FIGURE 1.**

Chart showing annual abortion rate in Herd A, 1890-1911.
Longest duration without abortion ......................... 4 years
Number of consecutive pregnancies without abortion ......... 89

The herd has gradually grown from 22 females in 1890 to 52 in 1911 and has shifted from grade cows, freely bought and sold, and with one or two herd bulls, and many heifer calves discarded, to a herd of pedigreed animals of six different breeds in which it is aimed to raise and breed all heifer calves. The abortion rate has constantly increased so that since 1904 it has dropped below the mean annual rate of 12 per cent but once, largely because the storm of 1905 had prevented the growing of heifers. See Fig. 1.

Pursuing the herd further the prevalence of abortion according to age is illustrated in Fig. 2, and it is shown that with the growth of the herd and increase in heifers, the disease is more and more limited to these until in 1911 the herd was free from observed abortion except in heifers in first pregnancy, where amongst 18 animals, 8 or 44 per cent aborted. Thus far in 1912 the abortion has again been chiefly in heifers pregnant for the first time.

As previously stated, in 22 years but 9 animals have aborted or calved prematurely twice each, and none three times. It has been claimed that one or two abortions confer immunity. This would suggest that if temporary immunity occurs, it would be greatest immediately following the first abortion, but we observe that the second abortion or premature birth followed the first immediately in 6 animals and after an interval of one or two calvings in but 3. Pursuing the question of immunity after two abortions further, our records show that 3 of the 9 cows bred afterwards and each produced one calf, offering scant opportunity for testing the immunity producing power of two abortions. This probably explains largely the statement that cows rarely abort thrice—they rarely have an opportunity. They die from the abortion, become sterile or are discarded for other reasons.

---

**FIGURE 2.**
Chart showing abortion rate in Herd A as influenced by age of animals.

113
Abortion Record In Herd B. (May 1909 to December 1911.)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pregnancies</td>
<td>1206</td>
</tr>
<tr>
<td>Total abortions</td>
<td>213</td>
</tr>
<tr>
<td>Percentage of abortions</td>
<td>17</td>
</tr>
<tr>
<td>Number aborting but once</td>
<td>167</td>
</tr>
<tr>
<td>Number aborting twice</td>
<td>80</td>
</tr>
<tr>
<td>Number aborting thrice</td>
<td>2</td>
</tr>
<tr>
<td>Total number of cows aborting</td>
<td>189</td>
</tr>
</tbody>
</table>

Abortions in first pregnancy, 99–50% of first pregnancy and 46.5% of all abortions.

Abortions in second pregnancy, 70–34% of second pregnancy and 33% of all abortions.

Abortions in third pregnancy, 26–12% of all abortions.

Abortions in fourth or later pregnancy, 18–8.5% of all abortions.

Repeated abortions included in above table.

<table>
<thead>
<tr>
<th>Pregnancy Combination</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st and 2nd pregnancy</td>
<td>15</td>
</tr>
<tr>
<td>1st, 2nd and 3rd</td>
<td>2</td>
</tr>
<tr>
<td>2nd and 3rd</td>
<td>2</td>
</tr>
<tr>
<td>3rd and 4th</td>
<td>1</td>
</tr>
<tr>
<td>4th and 5th</td>
<td>1</td>
</tr>
<tr>
<td>5th and 6th</td>
<td></td>
</tr>
</tbody>
</table>

Vital Statistics, Herd C.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years covered</td>
<td>10</td>
</tr>
<tr>
<td>Females of breeding age</td>
<td>67</td>
</tr>
<tr>
<td>Total pregnancies in herd</td>
<td>202</td>
</tr>
<tr>
<td>Average pregnancies in herd</td>
<td>3</td>
</tr>
<tr>
<td>Average live calves per cow</td>
<td>2.6</td>
</tr>
<tr>
<td>Females bought after first calving</td>
<td>6</td>
</tr>
<tr>
<td>Bred in herd or bought before calving</td>
<td>61</td>
</tr>
<tr>
<td>Heifers failing to breed and sold</td>
<td>3–5%</td>
</tr>
<tr>
<td>Heifers aborting in first pregnancy</td>
<td>22–38%</td>
</tr>
<tr>
<td>Heifers not calving first year</td>
<td>25–43%</td>
</tr>
<tr>
<td>Of the 22 aborting heifers, there were sold for sterility</td>
<td>2–10%</td>
</tr>
<tr>
<td>And for other causes</td>
<td>6–27%</td>
</tr>
<tr>
<td>Total heifers in herd producing no living calves</td>
<td>11–18%</td>
</tr>
<tr>
<td>Heifers calving from 1st pregnancy and sold as sterile</td>
<td>3–5%</td>
</tr>
<tr>
<td>Heifers discarded after 1st calf for various reasons</td>
<td>5–8%</td>
</tr>
<tr>
<td>Heifers conceiving a second time</td>
<td>42–69%</td>
</tr>
<tr>
<td>Heifers aborting in 2d pregnancy</td>
<td>5–12%</td>
</tr>
<tr>
<td>Amongst 99 3d or later pregnancies there aborted</td>
<td>3–3%</td>
</tr>
<tr>
<td>Average rate of abortion for 10 years</td>
<td>15%</td>
</tr>
<tr>
<td>Total abortions</td>
<td>30</td>
</tr>
<tr>
<td>Aborted in 1st pregnancy and not yet bred</td>
<td>1</td>
</tr>
<tr>
<td>Aborting in 1st pregnancy and again conceived</td>
<td>12</td>
</tr>
<tr>
<td>Of which pregnancy has terminated in</td>
<td>10</td>
</tr>
<tr>
<td>With abortion in</td>
<td>2–20%</td>
</tr>
<tr>
<td>Remaining pregnant</td>
<td>2</td>
</tr>
<tr>
<td>Aborting twice</td>
<td>3</td>
</tr>
<tr>
<td>Aborting in 1st and 2d pregnancies</td>
<td>2</td>
</tr>
<tr>
<td>Aborting in 1st and 4th pregnancies</td>
<td>1</td>
</tr>
</tbody>
</table>
Record of Cow No. 5, Born 1900.

1902 Abortion and retained afterbirth.
1903 Abortion and retained afterbirth.
1904 Sterile.
1905 Premature birth and retained afterbirth.
1906 Weak calf which died. Retained afterbirth. Fatal metritis.

The mean abortion rate for all pregnancies in Herd B is 17 per cent while the rate in 1st pregnancy reaches 50 per cent. This appears extraordinarily high but is in reality about the same as has recently prevailed in first pregnancy in Herd A where the rate has been ascending for 22 years.

Herd C is an exceptionally well kept, clean, healthy herd of pedigreed Jerseys with an annual average of a trifle over 20 females of breeding age for the period of ten years.

It will be observed by tables that the abortion is largely confined to the first pregnancy, is not rare in second pregnancy but is practically negligible in third or later pregnancies.

The percentage of heifers which failed to breed at all appears high though we believe it is really low, but we have no such accurate data for other herds. It is noteworthy that 81 per cent did not breed a second time and that of the 22 heifers aborting in first pregnancy only 12 again conceived, in 10 of which the pregnancy had terminated, with 2—20 per cent of abortion, while amongst 30 heifers in second pregnancy which had calved normally in first pregnancy but 3—10 per cent aborted which so far as it goes indicates that one abortion predisposes to reabortion instead of tending toward the production of immunity. Of the 3 cows aborting a second time, 2 were consecutive abortions, against one with 2 calves intervening, again suggesting a predisposing rather than immunizing influence. One of the animals aborting a second time gave birth to 6 healthy calves thereafter, which is the best breeding record after 2 abortions in our data, the second animal did not conceive afterward and the tragic history of the third cow, No. 5, is shown in the above table. During her five breeding years there was perennial disaster, every year one of the four most prominent symptoms of contagious abortion being present, finally culminating in her fifth breeding year in a mortal infection without having given birth to a normal calf. Her case is exceptional. Few cows are given the opportunity for such a series of disasters; fewer still have the vitality to survive so much.

The theory that one, two or more abortions immunizes an animal against the infection is contrary to all reason. Abortion which fundamentally includes fetal death, can not logically immunize the mother. No vital statistics of herds exist, so far as we know, which give the least warrant to the theory that one or several abortions confer immunity upon the mother.

Our data indicate with great emphasis that contagious abortion is pre-eminently a disease of heifers and that an age immunity of value occurs. The statement that after a heifer aborts once or twice she is less liable to abort later is true. She is far less liable to conceive again, in which instance she can not re-abort. If she breeds she has advanced a year and is that much removed from the most critical period, her first pregnancy, and so is less liable to abort. But the fact that she has once aborted renders her, if she conceives, more, not less, liable to abort again.

A heifer which has passed safely through her first and second pregnancies is a far safer breeder in later years than the heifer which has aborted. There is absolutely no consolation, no gain for the future value of a cow, through her having aborted.

115
1. Fetal sac from the non-gravid horn of uterus thrown over the neck of the fetus (for convenience).
2. AC—Allantois-chorion (afterbirth) in dorsal region where cotyledons are scarce.
4. F—Head of fetus.
5. UM—Intercotyledonal uterine mucosa.
7. U U—Uterus.
8. Va—Vagina.
10. 1-1—Fetal cotyledons; 2-2—Maternal cotyledons; 3-3—Cotyledonal stalks; 4-4—Utero-chorionic space in which the abortion exudate form beginning just anteriorly to US.

FIGURE 3.
Photograph of the gravid uterus, the uterus laid open, the fetus showing enclosed within its membranes.
The basic lesions of contagious abortion consist of the appearance within the utero-chorionic space (See 4, Fig. 3) of a sticky tough grayish-yellow, yellow or chocolate-colored mass, the abortion exudate. In many cases this exudate, 1-8 inch or more in diameter, invades the entire utero-chorionic space, massed particularly about the stalks of the cotyledons. (See 3, Fig. 3.)

When the abortion exudate is localized, it occurs quite uniformly at the internal mouth of the uterus, (just in front of U. S., Fig. 3). In 22 cases examined on the killing floors of abattoirs 11 were localized, in 10 of which the exudate radiated out from the internal os, and in one it was a few inches therefrom under special conditions which apparently furnished an explanation. In this exudate, bacteriologists generally, but not always, recognize the abortion bacillus of Bang.

The avenue of invasion by the organism is unsettled. Bang holds that the chief avenue of infection is the open cervical canal at the time of estrum, the chief carrier the bull, and the date of copulation the most common era of invasion, except the infection may already reside in the genital canal at the time of copulation, perhaps from a prior abortion, in support of which he quotes Poulsen's observations on 7 cows.

M'Fadyean and Stockman believe that the chief avenue of infection is through the digestive tract, from which it is carried to the uterine cavity through the lymph and the blood.

If carried through the body fluids from the digestive tract the organism must presumably gain the utero-chorionic space either through the placental filter (1 and 2, Fig. 3) or through the intercotyledonal uterine mucosa (U. M. Fig. 3).

Against the first hypothesis stand two formidable objections. 1. The Bang organism is almost as large as the bacterium of tuberculosis and other organisms which fail to pass through the undamaged placental filter, and no destructive placental lesions have yet been noted. So far as we are aware, microscopically visible bacteria do not pass the intact placental filter. 2. In bacteriological searches in the uterus and contents, the organism is uniformly found in precisely the reverse order to what would be expected did the organism pass the placental filter.

FIGURE 4.
Cross section of non-gravid cervix of cow.
CC—Cervical canal in middle of cervix, in cross section.
OE—Os uteri externum.
V—Vaginal wall surrounding the vaginal portion of uterus.
FIGURE 5.
Longitudinal section of the cervix of a non-pregnant cow, through the cervical canal.

A—Os uteri externum.
CC—Cervical canal.

FIGURE 6.
Sealed uterus of heifer in early pregnancy.
F—Fetus ¼ inch long, enclosed in its branched, greatly elongated embryonic sac.
O—Ovary with corpus luteum of pregnancy.
S—Uterine seal as shown in cross section of the cervix at various points.
U—Uterus.
X—Uterine seal projecting into vagina.
FIGURE 7.
Sealed Uterus of pregnant cow.

CC—Cotyledons.
S—Uterine seal as seen on cross section of cervix at various points.
X—Uterine seal protruding into the uterine cavity.

We believe with Prof. Bang that the chief avenue of infection is the cervical canal, that the most favorable time for invasion is during estrum while the cervical canal is open, and that the bull is an important conveyer of the infection.

We would emphasize the importance of this avenue, and minimize the invasion through the digestive tract. We further hold that the invasion may and frequently does occur long before copulation has taken place and that the infection frequently lies in wait in the genital tube of virgin heifers prior to the first copulation.

We further believe that the formation of the uterine seal (See Figures 4-7) within 30 days after conception seals definitely the fate of the fetus. If the infection of contagious abortion exists in the sealed utero-chorionic space, the animal may abort, suffer from premature birth, or calving at full term, have metritis with or without retained placenta.

On the other hand, no adequate controls, so far as we have found recorded, we believe the contained fetus immune to contagious abortion. At this point we come into conflict with the conclusions, but not with the data, of various experimenters.

Experimenter after experimenter has asserted that he had induced abortion by the vaginal introduction of the organism after the uterine seal had been formed, by injecting the organism beneath the skin or into the jugular vein or by feeding the infection by the mouth. No question is raised regarding the facts. They have thus inoculated the animals with the Bang organism the animals have largely aborted, the Bang organism has been recovered from the uterus, etc.

On the other hand, no adequate controls, so far as we have found recorded, were kept to check the experiments. It has not been shown that a like number
and kind of pregnant cattle would not have aborted had sterile salt solution been substituted for the Bang organism. The recognition of the Bang organism in the uterus after abortion following experimental inoculation, does not show that the one in the uterus is the lineal descendant of the other, nor does it at all prove that the Bang organism was not already in the uterus when the animal was inoculated.

The recognition by autopsy, as already related, of the abortion exudate radiating always from the internal uterine mouth speaks strongly for the cervical canal as the chief if not the sole avenue of infection.

**The Handling of Contagious Abortion.**

At the present time we have no sure and reliable method for preventing an animal from becoming infected with contagious abortion, no means for curing a pregnant animal having the infection in her utero-chorionic space and no means for definitely eradicating the disease from a herd.

Many have held to the belief that the disinfection of the stables and the posterior parts and vagina of the pregnant animals would check the progress of the disease and rescue the fetus from its peril. We held this view for some years and at times felt encouraged with the results, but a careful study of the genital organs of over 3,000 cows and heifers, including over 30 cases of abortion infection in the uterus, along with an extensive clinical study and some experiments, has forced us to retreat from our former position. The disinfectant introduced into the vagina may wash the vaginal end of the uterine seal from whence it must turn back, having approached within 4 to 6 inches of the seat of infection. We can not disinfect the hermetically sealed utero-chorionic space without first destroying the seal and emptying it of its fetus and fetal membranes.

These futile efforts to disinfect an infected, hermetically sealed, great neutral cavity and the immense losses to cattle breeders because of these failures, has opened the floodgates to all kinds of quack remedies from which some charlatans have reaped a rich harvest, while the cattle owners have paid a high price therefor and kept their abortion.

Recently the market has been flooded with a new sure cure for abortion in the form of bacterins or vaccines prepared by growing the Bang organism artificially, sometimes adding thereto pyogenic streptococci, killing the bacteria and injecting subcutaneously an emulsion of the dead bacilli.

Before plunging too madly into bacterin or vaccine therapy for contagious abortion it would be well to pause and inquire whether we may logically expect favorable results. In acute maladies vaccines and bacterins have in many cases well nigh revolutionized therapeutics and produced many astonishing results. In chronic diseases, in diseases which do not themselves give to the patient a definite immunity, like syphilis, gonorrhoea, glanders, tuberculosis, etc., investigators have thus far failed to win any signal victories. Contagious abortion has generally been considered a chronic malady and we know of no weighty argument against this view. Hence any marked success along these lines with contagious abortion would mean the successful invasion of a heretofore baffling field.

In this country, so far as we are aware, but one prominent manufacturer is advertising this product and we have been able to procure information of its workings in but two herds. In one of these the alleged remedy was applied to 57 pregnant females in June and July of this year. Six pregnancies, two cows and four heifers, have terminated all in abortion, or 15 per cent of the lot handled. Naturally, the 51 animals remaining are not likely to suffer so severely.
In a second herd 11 animals had aborted. The product was then used upon 135 pregnant females in July. During the treatment four aborted and an equal number had aborted within 30 days after injection. Between 30 and 60 days, nine aborted and after 60 days 11 more, or a total of 21 per cent of the animals handled.

Since commencing the treatment 38 pregnancies have terminated with 28 abortions (74 per cent) and 10 living calves or 26 per cent.

These observations are neither complete nor reassuring. So far as they go they harmonize with our above conclusions that we should not logically expect success from this plan of handling a chronic malady.

Recently an opportunity offered us to test the value of this plan of treatment on a lot of 18 heifers in their first pregnancy, belonging to Herd A, in which the rate of abortion had been high in first pregnancies for some years, with a rate of 44 per cent in 1911, and we had every reason to anticipate similar losses in 1912. We accordingly procured from a widely known establishment engaged in the manufacture of biologic products, but having on sale no vaccines against abortion, a quantity of material for use in our investigations. The product was supplied in four doses for each animal, stated to contain $\frac{1}{2}$, 1, 2 and 4 billion killed abortion bacilli in the first, second, third and fourth doses respectively, and these were administered on July 3, 11, 18 and 24. On July 24, the pregnancy of each animal was verified by rectal palpation. The results have been very striking as will be seen by the following table.

**Experiment With Abortion Vaccine in Herd A.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Date Bred</th>
<th>Date Died</th>
<th>Cause of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>837.</td>
<td>X, 1911</td>
<td>10-9-12</td>
<td>Killed 10-9-12—271 days.</td>
</tr>
<tr>
<td>105.</td>
<td>2-20-12</td>
<td>9-7-12</td>
<td>Aborted 9-7-12—190 days.</td>
</tr>
<tr>
<td>25.</td>
<td>2-21-12</td>
<td>9-23-12</td>
<td>Aborted 9-23-12—199 days.</td>
</tr>
<tr>
<td>143.</td>
<td>2-12-12</td>
<td>11-7-12</td>
<td>Dead calf 11-7-12—278 days.</td>
</tr>
<tr>
<td>110.</td>
<td>3-3-12</td>
<td>10-3-12</td>
<td>Aborted 10-3-12—241 days.</td>
</tr>
<tr>
<td>111.</td>
<td>3-8-12</td>
<td>9-23-12</td>
<td>Aborted 9-23-12—199 days.</td>
</tr>
<tr>
<td>112.</td>
<td>3-8-12</td>
<td>8-1-12</td>
<td>Aborted 8-1-12—146 days.</td>
</tr>
<tr>
<td>107.</td>
<td>3-24-12</td>
<td>11-4-12</td>
<td>Aborted 11-4-12—225 days.</td>
</tr>
<tr>
<td>94.</td>
<td>3-28-12</td>
<td>11-9-12</td>
<td>Aborted in pasture.</td>
</tr>
<tr>
<td>108.</td>
<td>2-25-12</td>
<td>11-25-12</td>
<td>Calved 11-25-12—275 days.</td>
</tr>
<tr>
<td>103.</td>
<td>2-13-12</td>
<td>286 days</td>
<td>Pregnant—286 days.</td>
</tr>
<tr>
<td>24.</td>
<td>3-3-12</td>
<td>272 days</td>
<td>Pregnant—272 days.</td>
</tr>
<tr>
<td>102.</td>
<td>3-4-12</td>
<td>271 days</td>
<td>Pregnant—271 days.</td>
</tr>
<tr>
<td>113.</td>
<td>3-16-12</td>
<td>259 days</td>
<td>Pregnant—259 days.</td>
</tr>
<tr>
<td>142.</td>
<td>4-14-12</td>
<td>210 days</td>
<td>Pregnant—210 days.</td>
</tr>
<tr>
<td>23.</td>
<td>4-15-12</td>
<td>229 days</td>
<td>Pregnant—229 days.</td>
</tr>
<tr>
<td>104.</td>
<td>3-12-12</td>
<td>255 days</td>
<td>Pregnant—255 days.</td>
</tr>
</tbody>
</table>
Summary.

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancies terminated</td>
<td>11</td>
<td>61</td>
</tr>
<tr>
<td>Of which there calved normally</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Premature birth</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Abortions or dead calves</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Total abortions, dead calves and premature births</td>
<td>10</td>
<td>91</td>
</tr>
<tr>
<td>Heifers died or killed because of septic metritis</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Heifers suffered from metritis and recovered</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Heifers remaining pregnant October 30</td>
<td>7</td>
<td>31</td>
</tr>
<tr>
<td>Proportion of entire lot already aborted or calves dead</td>
<td>9</td>
<td>50</td>
</tr>
</tbody>
</table>

In Herd A there were at time of the experiment other pregnant adult animals not treated.

<table>
<thead>
<tr>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>46</td>
</tr>
<tr>
<td>19</td>
<td>54</td>
</tr>
<tr>
<td>16</td>
<td>84</td>
</tr>
</tbody>
</table>

Of the 18 heifers in the experiment, 14 conceived at the first service and 5, Nos. 95, 837, 105, 25 and 142, required 2 or more services before they conceived. Of the 14 heifers served but once, 1 has calved normally, 6 (43 per cent) have aborted, and 6 (43 per cent) remain pregnant.

Of the five heifers requiring 2 or more services, 4 (80 per cent) have aborted or calved prematurely, and 1 (20 per cent) remains pregnant 210 days, with opportunity yet for disaster.

We stated at the outset that abortion and sterility were two of the four most prominent phenomena caused by the infection of contagious abortion and here we find striking data in support of that assertion as related in sterility. Other vital statistics have not been arranged upon this point, but from our studies we do not hesitate to assert that the few data here submitted are typical of the actual relation between these two phenomena.

Abortion predisposes to sterility. Temporary sterility, especially in heifers, predisposes to abortion, each being a separate symptom of an identical cause. While our evidence is not yet arranged for convincing presentation we are fully confident that sterility in heifers should be assigned in general to the presence in the genitals of the abortion organism, tending constantly to prevent conception, and failing to prevent is on the ground with the foundation laid for ultimate abortion.

With good vital statistics of the herd for the previous 22 years, the experiment with the lot of 18 heifers in first pregnancy stands out as one of the most appalling catastrophies in the history of the herd.

While we hold that this line of investigation should by no means be abandoned, we certainly think it too early to accept vaccines as a sure cure or as anything more than an interesting and costly experiment which might well be conducted by the Federal or State government.

The control of abortion in a herd is a problem of great complexity. Various veterinarians, breeders, herdsmen and others think they know how, but one after another they encounter humiliating defeat.

It is no easy task. Numerous very worthy authorities say the disease may be controlled and the losses rendered negligible by segregation of the aborters. This plan has been carried out for 23 years or more in Herd A with a mean rate of 12 per cent which is constantly on the ascendant. Herd C has also applied this method and keeps its annual losses from the phenomenon of abortion alone down to 15 per cent. We can discover no recorded proof that segregation has ever eradicated abortion from a herd or has
notably lessened its ravages. We see no logical reason for assuming that it could influence the course of the malady in the least. The first, and at present insurmountable, barrier to efficient segregation is our inability to make a timely and reliable diagnosis of the presence of the infection.

Clinically, diagnosis is impossible. During the first three months of pregnancy abortion almost always passes unseen and the aborter continues in the herd. Even in later stages, especially in heifers at pasture, the abortion passes unnoticed and the infecting discharges drop anywhere. While many cases of abortion may be anticipated by days or even weeks, a large proportion of them come stealthily in the night and when discovered in the morning the infection has been disseminated beyond recall.

More recently new diagnostic agents have been devised, such as abortin, the complement-deviation and agglutination tests, and with these some enthusiasts claim the malady may be controlled by segregation. But these investigations, all very interesting, have not yet been tried in actual practice sufficiently to warrant a final conclusion. Each of these tests have their champions and critics. Holth and Wall have played a conspicuous part in the

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| BULL #23 | MAY 20 | + | + | + |
| HEIFER #20, BRED APR | OCT. 25 | + | + | + |

**FIGURE 8.**
Chart showing experiments with pregnant heifers after inoculating with abortion bacilli followed by complement-fixation and agglutination tests.
development of the complement-deviation and agglutination tests, but their recorded results are not wholly assuring.

We have conducted some very limited but interesting experiments along these lines. We procured 1 bull and 3 heifer calves at less than one day old and grew them in the college hospital where chiefly horses are kept and where they were never in contact with other cattle. When approximately 16 months old, daily disinfection of the vagina and sheath was instituted, later reduced to twice weekly. After continuing this disinfection for some two months the heifers were bred, each conceiving at the first service by the bull which had not previously copulated. The disinfection was continued after copulation until one estrual period had passed. Pregnancy was then verified by rectal palpation and after a lapse of 28, 31 and 24 days, respectively, the 3 heifers each received in the jugular 10 c.c. of an active culture of the Bacillus abortus, the stock having been obtained from Herd B. We then tested the animals as shown in the accompanying chart.*

It will be observed that all four animals tested sound on the date of inoculation and that in No. 36 and 31 we waited too long for the next tests, to catch the beginning of the development in the reaction, which placed us on guard in No. 34 and the complete picture of both ascent and descent is preserved.

The test of October 25 with absolute negation in No. 36 and 34 and practical negation in No. 31 led us to believe that we had observed the elimination of the infection and quite disarmed us for abortion in No. 31 six days later. We immediately drew blood for agglutination test, which resulted absolutely negative. The heifer was killed immediately after taking the blood sample, the afterbirth was found retained, the utero-chorionic space was filled with typical abortion exudate, the uterus and cotyledons revealed the typical metritis of contagious abortion and the exudate gave abundant and typical cultures of the Bang organism. The experiment has been checked and counterchecked at every possible point. Heifer No. 31 aborting from natural infection at 216 days and tested 52 days later gave a typical reaction to the same test material.

While this study is very brief it vies with all data thus far published in the patience and care used and the apparent clearness of results, until sud-

(* ) The test fluid for the agglutination tests was first prepared from a culture obtained from M'Fadyean and Stockman. It will be noted that this is a different strain of Bact. abortiosis than was injected into heifers Nos. 31, 34 and 36. The test fluid was first tried with known abortion sera and found to agglutinate satisfactorily before the tests here recorded were performed. The test fluid prepared from this culture was used until October tests. During this month test fluid was used which was prepared from the mixture of three strains: the M'Fadyean and Stockman, the strain injected into heifers designated B. 391 and another strain isolated from a case of abortion designated B. 288. This latter fluid was tested with the sera of heifer No. 29 as given in the table and found to agglutinate satisfactorily. Test fluid has been prepared from the strain of Bact. abortiosis isolated from heifer No. 31 and found to give positive results when testing the serum of heifer No. 29 and negative results with sera from No. 34 and 36.

The antigen used in the complement fixation test was prepared from the M'Fadyean and Stockman culture. Antigen has also been used which was prepared from cultures No. 391 and 288.

C. P. F.
denly No. 31 aborted and the entire experimental structure tumbled to the ground in hopeless confusion. The test was positively and tragically misleading. This animal would have been placed in a sound herd, where segregation was being practiced, just at the fatal moment.

We do not know the source of the intra-uterine infection. Most people would say it emanated from the intra-venous inoculation. The fact that the exudate was massed about the internal os, leads us to believe, in harmony with the major hypothesis of Bang, that despite all our precautions the infection lay in wait in the uterus at the time of her first and only copulation or was carried by the bull at his second coition.

Regarding the other two heifers we are now at sea; wholly at sea, without chart, compass or rudder. We have no clearance papers to show from what port we sailed, or into what haven if any we are ultimately to cast anchor. They may abort, give premature birth, suffer a variety of calamities or calve normally. If they abort we shall be unable to tell from what source or when the infection came.

From our point of view regarding the avenue and date of invasion of the uterine cavity until accurate investigations shall have shed new and important light upon the character of the malady, we must content ourselves with an earnest effort to prevent the infection entering the uterine cavity prior to conception and the formation of the uterine seal. To this end we would advise a comprehensive plan of sexual hygiene of cattle to guard alike as far as we may be able the genitalia of all breeding animals of both sexes.

At present we are advising the disinfection, as far as practicable, of the genital organs of both sexes for a few weeks prior to breeding, to be continued after breeding until the animal has conceived, applying the disinfectants chiefly to the vagina and vulva of the female and to the sheath and penis of the bull, placing special emphasis upon virgin heifers in order to guard their first pregnancy. Naturally we include sterility in any program of sexual hygiene, palpate the ovaries, oviducts and uterus per rectum, and apply such therapeutic measures as each individual may demand, including disinfection of the uterine cavity where advisable.

Clinically, in several valuable herds, our results have been highly encouraging wherever our plan has been carried out faithfully, but there is only a minority of owners and herdsmen as yet willing to go back ten months or more prior to expected calving to increase the security of normal parturition. Sexual hygiene is not a sure cure, it has none of the glamour of a panacea, or impudence of quackery. It is not new, some of its fundamental laws having been promulgated by Moses, for the human race. It will not prevent all abortions or sterility. If applied intelligently and conscientiously it does reduce the losses in valuable herds very greatly and at an expense and labor which brings it well within breeding economy. Detailed data upon the efficiency of this plan are not yet available and only a general statement can be made.

We have, in a limited way, conducted some experiments but they have been somewhat clouded as to results in this direction. Thus in Heifers Nos. 36, 34, 31 the sexual hygiene was applied to the best of our ability but we added a complication by injecting the Bang organism into the jugular which many investigators assert will surely cause abortion. In spite of that No. 31 carried her calf 164 days after the inoculation and to the 188th day of pregnancy. Heifer 36 has carried her fetus 222 days and 194 days after inoculation, and No. 34 has carried her calf 211 days and has been inoculated 173 days. Most investigators would have asserted that ere this all 3 heifers would surely have aborted, whereas we have thus far had but one abortion, or 33.1-3 per cent, while in our vaccination experiment with the 18 heifers, where according to
some enthusiasts we were applying a sure cure, the abortions have reached
50 per cent in one-half less time, making it appear that the resort to this
alleged certain plan of inducing abortion is more favorable to the life of the
fetus and the mother than the use of the alleged sure cure.

In another experiment with 6 heifers less carefully conducted but also
disinfected before breeding and having abortion bacilli injected into the jug-
ular when pregnant, one died from tuberculosis and the other 5 were killed
in advanced pregnancy. One heifer showed the lesions of contagious abor-
tion in the uterus and pure cultures of the organism were obtained.

Thus in 9 experiment heifers inoculated in the jugular vein with the Bang
organism one has aborted, one showed upon autopsy a limited infection about
the internal os uteri (probably too limited to have caused abortion) the
autopsy of 5 was negative and 2 remain pregnant and test negative.

If under these trying conditions sexual hygiene can hold abortion to so low
a plane it augurs well for its efficiency Of course the details are not com-
plete and much investigation remains to be done.

If there has been a vein of pessimism in this article it has not been
intended. We have tried to lay bare our imperfect and uncertain knowledge
of the malady and to frankly face the supreme truth that we have no reliable
cure or preventive. Whether a cure shall ever come or not we feel that a
preventive not only may, but must, be found and that this association by
formal action should do its part toward the initiation of far reaching scien-
tific research which shall ultimately solve the problem. It is no minor task
to be assigned to one man or one small group of men. The work can not be
accomplished in one year or in five years. It can not be accomplished probably
at an outlay of $100,000 or of $1,000,000. Problems of its magnitude are
rarely solved so cheaply. With an annual loss to our nation of probably fifty
millions, a liberal outlay for investigation would not be notably wrong. Three
distinct but correlated groups of investigations seem to us desirable.

1. The Federal government, rather than the state, should purchase in
some of our great stock yards several hundred cows and heifers which have
aborted or given premature births in the yards or during transit, should
slaughter them immediately and study the lesions. By this means it could be
determined how many cases of accidental abortion occur and would teach as
in no other way can be done, the truth that an overwhelming majority of even
isolated abortions are contagious and not mechanical. At the same time
there would be afforded the opportunity for exhaustive blood tests and for
bacteriological and other studies.

2. Each state materially interested in cattle breeding should, independ-
ently or in collaboration with the United States Department of Agriculture,
institute careful laboratory and inoculation experiments into the nature of the
malady with ample equipment, plenty of cattle and sufficient working force.
ently or in collaboration with the United States Department of Agriculture,
sufficient number of accurate clinical experiments for the control of the dis-
ease in large breeding herds perhaps in those belonging to private owners.
Vital statistics from such experimental herds covering a number of years
would prove of inestimable value in solving the great and pressing problem of
how we may be enabled to control or eradicate from our herds this greatest
scourge of the cattle breeder.
EVENING SESSION.

Meeting was called to order by President Ravenal at 7 o'clock.

PREVENTIVE MEASURES AGAINST EQUINE INFLUENZA BASED ON ITS BACTERIOLOGY.
By N. S. Ferry, Michigan.

In equine influenza we are dealing with a disease which is considered to have a relatively low mortality rate, and, therefore, not to be especially feared by the general public, although it is known to be extremely infectious and contagious. In the catarrhal form, Hutyra and Marck give the mortality rate, under favorable conditions, as from 0.5 per cent to 4 per cent, while in the pectoral form it ranges from 4 per cent to 16 per cent. Although the death rate is high enough it is not so much the loss due to the dead animals that affects the shippers and owners, as it is to the enormous expense incidental to the sickness of those that recover. I believe this point has never been fully emphasized. A large percentage of the horses and mules passing through the stock yards and sales stables of the country contract the disease. These animals are incapacitated from a few days to several weeks, and many of them are of little account after recovery, due to the results of complications and sequelae. The cost of stabling, treatment and care, to say nothing of the loss of time, amounts to millions of dollars yearly, irrespective of the fact that the loss due to diseases among animals is commonly reckoned, by the average observer, according to the mortality rate only. This method of estimate is not absolutely incorrect for the loss due to diseases among animals intended for slaughter, but for others the estimate should be based upon the number of animals affected, and not alone by those that die. In hog cholera, the loss in dollars and cents to the farmer is figured by the number of dead hogs. If the loss due to influenza is computed on the same basis, it is a disease not so much to be dreaded, but if the number of animals affected are included, it is a disease of the greatest economic importance, and yet very few realize the fact. The question then arises, if this is such a contagious disease, if the majority of horses suffer at one time or another with the infection, if 0.5 per cent to 16 per cent die and if many more are more or less in incapitated for life, ought not something to be done to better the conditions, ought not shippers and owners to take better care of their stock, and ought they not, as well as the federal authorities, to make an attempt to prevent the spread of the contagion, or at least to control it by more exact sanitary precautions and hygienic measures? The prevailing idea is that the disease has always been present, that horses have always contracted shipping fever, that those shipped from one part of the country to another must always suffer with acclimation fever; therefore, the disease has always been reckoned with other unknown quantities as profit and loss.

The diseases or conditions included in this paper are shipping fever, equine distemper, strangles and equine contagious pneumonia, as well as the classical pink eye. These infections are all contagious, are contracted by horses and mules while in transit from one part of the country to another, are practically found existing side by side in the same stable, under the same stabling conditions and in the same epizootics, and as a rule one attack confers immunity. If it can be shown that certain pathogenic microorganisms are present in these conditions constantly, and that the majority of fatal lesions following these diseases or conditions are due to these certain
micro-organisms, and that the spread of these micro-organisms can be controlled, then it behooves those most concerned to use plenty of common sense, as well as to take advantage of all scientific measures available to stop the spread of the disease and check its ravages. The initial cost of prophylaxis may appear large, but the final saving is enormous. "An ounce of preventive is worth a pound of cure" and in this case it is worth a ton, as compared with the loss incurred, if the disease is allowed to continue unchecked.

The primary cause of the disease has never been satisfactorily proved, although we are pretty sure of the organisms that produce the greater number of pathological lesions. Let us turn for a moment to the authorities and see what is said concerning the bacteriology of the conditions recorded in this paper under the head of equine influenza. After summing up the literature to date Hutyra and Marek give us the following conclusions: "The true primary cause of the disease has, up to the present time not been established. Bacteriological examinations prove only the fact that in the pectoral form (contagious pleuro-pneumonia) two bacteria are principally present, the Streptococcus pyogenes equi, and the Bacillus equisepcticus.”. In strangles the Streptococcus equi of Schutz is conceded to be the primary etiological factor. As to the relation between the Streptococcus pyogenes equi of influenza, the Streptococcus equi of Schutz, the Diplococcus of equine contagious pneumonia of Schutz, and the ordinary Streptococcus pyogenes, it is yet a much mooted question. To give some idea as to how the matter stands we will again quote from Hutyra, and Marek. "The relation of streptococci from different derivations to each other has not yet been sufficiently established.

While Schutz considers his streptococcus as an independent species, Roth believed it identical with Schutz’s diplococcus on influenza and also the Streptococcus pyogenes of man. Lignieres considers the identity of streptococcus of strangles and that of influenza proved beyond a doubt, while he believes that Rosenback’s pyogenic streptococcus, which among other disease plays a part in purpura hemorrhagica of horses, is an independent species.” In fact we might go on almost indefinitely giving the arguments pro and con relative to the relation of these streptococci, but to quote again, “The identity of the streptococci of different origin is still an unsettled question, the solution of which is surrounded by great difficulties, inasmuch as in animal experiments one and the same streptococcus may produce various disease processes (erysipelas, suppuration).”

About two years ago the writer (Studies on the Etiology of Equine Influenza, The Vet. Jour. London, April, 1912) became interested in the question of the etiology of influenza, and from cultures taken at the stock yards in Kansas City, Rochester and Pigeon, Mich., by himself and in East St. Louis and New York City by Dr. R. H. Wilson the following results were obtained. If cultures were taken from the lower trachea in the very earliest stages of the disease (by going directly into the trachea through the tissues of the neck), a streptococcus could be found in nearly pure culture in the majority of cases, while cultures from normal horses gave no growths, and by taking large quantities of blood aseptically from the jugular vein, a streptococcus could be found in 36 cases out of 63 (57 per cent) and in pure cultures in 24 cases (38 per cent). The organisms found by the writer could not be distinguished from the streptococci isolated from strangles, and presumable the streptococcus of Schutz, and it was no doubt the same organism that has been found by so many observers in equine contagious pneumonia, the condition termed by Hutyra and Marek and other authorities as the “pectoral form of influenza.” The organisms found by the writer have been known to pass through porcelain filters, thus showing that they must be extremely minute in some of
their life cycle. If this streptococcus has anything to do with the etiology of the disease, the fact that it can pass at times through these filters may account for the findings of those who claim that the etiology is due to a filterable virus. Another interesting fact relative to this organism is that in a certain number of cases the writer was unable to grow it in the ordinary liquid culture media unless a pure culture of *Staphylococcus pyogenes albus* was planted in the media at the same time, showing the symbiotic relationship between this organism and the staphylococcus. This may also account for the inability of some observers to obtain any growth after blood serum had been filtered, or even before. The writer has had sera's that would not give a growth of the organism after repeated trials unless a culture of staphylococcus was planted with it, at which time the streptococcus became very much in evidence. It seems to be a characteristic of the organism to grow much more luxuriantly in the presence of the staphylococcus than alone.

As has been said before, the question as to the primary etiology continues to be an open one, but the fact still remains that in all of these conditions we find, from the very earliest stages to the very latest and in all complications, a streptococcus, and if looked for consistently it can be found in every case. Knowing, therefore, that a certain pathogenic micro-organism is found in all stages of these varying conditions, and in all complications resulting from the infection, let us turn to the control of this micro-organism and see what can be done to stop its spread and to prevent the infection in horses which have never suffered with the disease.

Assume for the sake of argument that the true primary cause of the disease is a filterable virus or some other unknown organism and not this streptococcus. Under these conditions, if we can control this streptococcus and can prevent the complications in a certain number of cases, it must be conceded we have accomplished something, as all authorities are willing to admit that the majority of fatal results in influenza follow complications due to a streptococcus. On the other hand, it is practically agreed by all that the streptococcus of Schutz is the cause of strangles, and as many cannot distinguish between the streptococcus found in influenza, contagious pneumonia, pink eye, etc., and the species found in strangles, it is not entirely out of all reason to designate this streptococcus as the cause of these other conditions. If this shall ultimately prove to be the case, then by preventing the spread of this micro-organism we are controlling the infection to a certain degree, and carrying on a system of prophylaxis that in time is bound to work wonders, and will pave the way to the saving of millions of dollars to shippers and owners yearly.

The methods of prevention are three:

1. Isolation of infected animals followed by well known approved methods of antisepsis.
2. Practical disinfection and fumigation of stables, stock yards and railroad cars.
3. Prophylactic vaccination before shipment and before exposure.

The first and third methods can be carried out with very little trouble or expense. All it necessitates is a determination on the part of the owner and shipper, and a certain degree of intelligence on the part of those detailed to carry on the work. The second method, however, is not so easy to secure favorable action upon, for it at once imposes a condition on those not directly interested and, therefore, if anything from that source is ever brought about it would be years before results could be expected. It is not an absolute impossibility, however, to properly disinfect and fumigate all railroad cars in which horses and animals are shipped, and perhaps some day this will be de-
manded. It is true that influenza may be found on many farms on which the horses are raised and from whence they are shipped, but after all the cars and stock yard stables, reeking with infection, are the most fruitful source of the disease, and yet nothing of a practical nature is being done to protect from infection the animals housed in them. Experience and experiments have shown that the micro-organisms under discussion are found in the secretions, excretions and discharges from the infected animals, and, therefore, isolation of the animal, together with careful handling and antiseptic precautions, are the best means available for preventing the spread of the infection.

The most approved method of prophylaxis against any infection of known etiology, however, is that based on scientific experiments, of producing an active immunity in the animal against these micro-organisms. According to all authorities, an active immunity may be obtained either by an attack of the disease due to natural exposure, known as naturally acquired immunity, or by deliberate inoculation of the micro-organisms into the animal, which is termed artificially acquired immunity. It is the rule that an animal having recovered from influenza and the allied conditions is thereafter immune; therefore, for protective purposes in animals which have never suffered with the disease, we must attempt to produce relatively the same immunity under artificial conditions. An active artificial immunity may be produced by any one of several ways:

(a) By injecting into the animal body living, full virulent bacteria.
(b) By injecting living bacteria of diminished virulence.
(c) By injecting dead bacteria.
(d) By injecting bacterial products secreted or excreted during the life of the bacteria.
(e) By injecting bacterial products arising from the disintegration of the cells after death.

For practical purposes it has been found to be the safest procedure in the majority of diseases, to use suspensions of dead bacteria. These are termed bacterial vaccines or bacterins. Therefore, in order to render horses immune against the streptococci under discussion they should be injected with vaccines prepared from these organisms. Whether these organisms are the primary cause of the disease is not the main issue. Experience has taught that a large majority of horses can be protected, providing they are properly treated a certain length of time before exposure. Experience, however, is not the only basis for the use of these vaccines. Animal experiments have shown that prophylactic injections of suspensions of these dead organisms will protect against injections of the live virulent bacteria, and tests on the blood of the protected animal, according to the opsonic index have shown a large increase in the opsonins. All horses, therefore, should be vaccinated before being shipped, and the owner or receiver, in order to protect those horses already in the stables, should give them a thorough course of prophylactic treatment. One injection of a large dose will do for a short interval, but three injections of properly graduated doses with intervals of a few days will give better results, and ought to suffice to protect the horse at least six months or perhaps a year. As these vaccines have been in general use but a relatively short time, one is not warranted at the present time in laying down a hard and fast rule as to the length of immunity conferred after the prophylactic treatment.

HORSE PLAGUE IN KANSAS, NEBRASKA AND ADJOINING STATES.

By A. T. Kinsley, Kansas City, Mo.

It may seem presumptuous for the writer to present this very important topic to this Association, but the only object of this brief description is to
open the subject for general discussion. The disease in question has been variously named by different investigators, sanitarians and practitioners, as blind staggers, sleepy staggers, epidemic cerebro-spinal meningitis, cerebritis, but up to the present time it appears that there is still considerable confusion.

This epizootic was first reported from west central Kansas the latter part of July, 1912. From here it extended in practically all directions and by the 20th of September it was prevailing in the western two-thirds of Kansas and Nebraska, in the eastern portion of Colorado, in northwestern Oklahoma, in two different localities in Missouri, in some sections of Iowa, and in South Dakota and North Dakota. The disease was quite general throughout the western half of Kansas, although some farms and ranches were exempt. Equines alone were affected, although various press notices indicated that cattle, hogs, chickens, and even human beings were contracting the disease in some locations.

The following description of this disease is the summary of data obtained by clinical observation in Kansas and Nebraska of approximately 400 cases and 40 autopsies.

The exact cause of this widespread epizootic has not been positively identified. It was found that the disease was primarily confined to animals that were in pastures. It did not appear to make any difference as to the kind of soil, whether the pastures were highlands or lowlands, whether they had stagnant water in them, or whether the water was from deep wells. Those who investigated the disease occasionally found instances in which it appeared as though animals contracted the disease that had not had access to pasture lands. But upon closer investigation, in nearly every instance, it was found that the animals had been allowed to graze, or that they had been fed fresh hay or even green grass cut from such pasture lands. The only common factor in the pastures in the various locations was the food stuff, that is, the grass, of which buffalo grass was the most common in the area where the disease was most prevalent, although it occurred in some pastures in which there was only blue stem grass, and in a few instances alfalfa or timothy and clover were used for pasture, and it seems probable that the cause of this disturbance was derived from the forage. Many animals in the affected areas that were fed on old hay, or dry feed in general, were exempt from this disease. Upon reviewing the epizootic, as it sequentially occurred, it is found that the first diagnosis was forage or mycotic poisoning.

Later, other investigators attributed the disturbance to intestinal parasites, of which strongylidae representatives predominated. There can be little doubt but that some of the diseased animals were depressed with the large number of parasites they harbored, but the fact that some horses contracted the disease and died and none of the parasites were found on autopsy, seems to be sufficient proof that the disease was not caused primarily by parasites. Some diagnosed the disease as influenza. This diagnosis was, no doubt, given because of the fact that a considerable percentage of the afflicted animals were also affected with medicamentous pneumonia, a condition resulting from medication of animals, and due to pharyngeal paralysis, a common symptom in afflicted animals. Still others claimed that the disease was infectious, some holding that a Gram positive diplococcus, which could be isolated from many of the cases, was responsible for the trouble, while yet others held that they had found a Gram negative diplococcus and had been able to obtain it in pure culture, and claimed to have produced the disease in healthy susceptible animals by inoculation. Finally, others have claimed that the disease was caused by a filterable virus.
The parasitic theory and the influenza theory have apparently been abandoned. Some are still maintaining that the disease was due to infection. If it was an infectious disease, it certainly was materially different than any other infectious disease with which we are familiar. Scores of instances can be cited where diseased animals were taken into barns and yards where they were associated with healthy horses during the entire course of the disease, or until they died, and there was no evidence of transmission, and further, this association was in the continuous presence of myriads of flies, which were a veritable pest in the section of the country in which this disease abounded. In other instances, diseased horses were watered out of the same tanks and fed out of the same feed boxes that were used in common by healthy horses without transmission of the disease. One instance was very striking. On the Missouri Pacific R. R. right of way, between McCracken and Utica, Kansas, about seventy-eight teams of horses were used in regrading the road bed. These were fed dry feed in wagons on the right of way, and in one instance, twenty-four teams were watered at a tank from which three horses drank that died of the disease, and these three horses that died were kept in a barn within ten rods of the above said camp, but not a single horse of the forty-eight contracted the disease. None of the one-hundred and fifty-six horses on the regrade had the disease, except two that were used for hauling water and were allowed to graze. In another instance eight head of horses were transferred from a pasture in which several horses had died of the disease to another pasture containing over a hundred head of horses and in which the disease had not made its appearance. At the same time six horses were transferred from the pasture in which the disease had not made its appearance to the pasture in which the horses had died. Later, the exact length of time I am unable to give, several of the eight horses that were transferred to the non-infected pasture contracted the disease and died; also some of the horses that were transferred from the pasture in which the disease had not occurred contracted the disease after being placed in the pasture in which the disease prevailed. Thus far none of the animals in the unaffected pasture died with the disease, excepting those transferred from the first pasture. Several blood inoculations and some intracerebral inoculations were made, but without producing the disease in a single instance, excepting as reported by the Colorado Experiment Station. According to the data at hand, it appears that at the substation established at Holly, Colorado, the disease was successfully transmitted by pure cultures of a Gram negative, the diplococcus above referred to. These experiments have not been verified by other investigators and, therefore can not be accepted as final.

**Symptoms.**—The affected animals behaved similarly to those affected with the so-called sleepy staggers. Inappetence and uncertain gait were usually the first symptoms evidenced. However, the initial symptom was a rise of temperature, and occurred in animals prior to the time any outward disturbance was observed. The temperatures varied from 104 degrees F. to 107 degrees F. and continued high for only a short time, usually not longer than 24 hours, after which it ranged about 103 degrees F. Exceptions to this general range of temperature were found in cases complicated with pneumonia, or other inflammatory disturbances. Usually during the first or second day, a considerable percentage of cases showed some difficulty in deglutition, in a few instances, there being an apparent inability to swallow. The uncertain gait was due to lack of co-ordination, becoming more and more marked as the disease progressed, in many instances the animals supporting themselves by leaning against buildings, fences, etc., finally losing their balance and falling, after which they usually remained in the decubital...
position until death which appeared in from 24 hours to as much as six or seven days after the onset. Later in the outbreak the disease assumed a milder form, many of the animals never losing control of locomotion, maintaining their appetite, and regaining health in a period varying from three days to three weeks.

Lesions.—In autopsying animals dead of this disease, the striking thing was the general absence of any constant lesion sufficiently marked to account for the intensity of the symptoms. There was an apparent venous congestion of the pia mater in some cases, which frequently resulted in an edema of the meninges and a dropsical condition of the ventricles of the brain. Many animals were autopsied in which there were complications of pneumonia, gastro-enteritis and nephritis, but upon obtaining the history of such cases, these lesions could invariably be traced to drugs that had been administered. In those cases that died within a few hours after the onset, there was usually an engorgement of the liver. Upon close inspection of the cerebro-spinal fluid, it was found to be clear, but upon microscopical examination it was frequently found to contain a large diplococcus with a tendency to form in chains, and a smaller diplococcus, the former being Gram positive, and the latter being in some instances Gram negative; also some cells indicative of intoxication disturbance of the cerebral tissues. Likewise, examination of the brain tissue microscopically, at least in some instances, evidenced a small round cell infiltration into the perivascular lymph space and degenerative centers, which according to most authorities, further substantiated intoxication disturbance.

Prognosis.—The outcome of the cases was usually fatal in the early part of the epizootic. In the latter part of the epizootic, many animals recovered, though some that recovered will be permanently damaged, because of irreparable lesions of the brain.

The extent of the loss from this disease was exaggerated by the press. In the territory where the disease was most prevalent, not more than 40 per cent of the horse population died. The percentage fatality varied from 40 per cent to practically none. According to J. H. Mercer, Live Stock Commissioner of Kansas, about 27,000 horses died of this disease in Kansas. The losses in Nebraska, according to Dr. Bostrom, State Veterinarian, was about 12,000, of which he claims probably 3,000 were killed by medicine, the injection of black legoids responsible for the death of about 1,700 head of horses and mules. The press did a very great injustice by its startling statements concerning this disease. In many instances reporters for ordinarily conservative papers would seek for erratic individuals, such as quacks, drug advertisers, etc., from whom to obtain startling statements for their publications, rather than take statements of facts from the more conservative veterinarians. Because of the variation in diagnosis and because of the startling newspaper reports, the people, particularly in Kansas, became almost panic stricken, and were then easy prey for all kinds of fakirs. Some drug houses sent out misleading literature. For instance, one drug house suggested the intravenous injection of anti-streptococcic serum, which it certainly could not have recommended upon any other basis than financial gain. This same drug house further suggested the injection of a mixed bacterin, which cannot be interpreted by any, who knew and recognized the condition, except from a financial viewpoint. Another commercial laboratory in Kansas City obtained some cultures of a diplococcus and prepared a bacterin, which they advertised quite extensively, and they sold considerable quantities of it to the unsuspecting public.

The experiment stations of Kansas and Colorado established temporary
field laboratories and also produced a bacterin or vaccine, which was distributed and used quite extensively, but the disease had apparently run its course, and the results apparently obtained by the use of this product must be carefully considered. As a matter of fact, medication with any drug that was not injurious to the animals apparently produced an immunity to the disease, or even effected a cure in the latter part of the outbreak.

In conclusion, it is quite apparent to the conservative observer that this disease belongs properly to that group we ordinarily term forage poisoning.

Dr. Haslam: I think Dr. Kinsley has stated the facts substantially as they were. I was through all of the outbreak from the beginning to the end. I think Dr. Kinsley made no statement but what quite well agreed with our experience. There were times and localities when it was extremely difficult to find any abnormal condition of the grass or feed on which to lay the blame. There were a great many abnormal conditions. For instance, in Hoxey where our field laboratory was established we had the livery barn, getting hay from the pastures miscellaneous, curing it fairly well, cutting it and bringing it in, and feeding it to a dozen horses without trouble, the horses keeping entirely up. We had a team used on a transfer wagon that was fed some hay, apparently just as nice, bright hay as you ever find, which for a very few hours each day we turned out into a vacant lot. The owner claimed that he had cut every bit of vegetation from the lot and the lot was absolutely dry and bare, and you would have thought that on superficial examination. Looking over it we found a few little bits of pig weed and a few similar weeds that the horses could reach from the fence. One horse contracted a typical phase of the disease, one of the most acute that was seen in that whole period. Now the question was, did the horse contract the disease from that hay, apparently good hay, or from the soil in the yard, or from the small amount of vegetation which grew in that yard, or was it carried by flies?

The disease was extremely baffling in every way. Again many farmers after conscientiously carrying out the sanitary instructions, that is, getting them off of the pasture and feeding them the best of feed obtainable and which under ordinary circumstances would have been classed as "A No. 1" fodder, got bad results; and I think if you would go into that district today and talk with ten farmers you would find them pretty equally divided as to whether there was much efficiency about the process of removing them from the pasture.

But this, we believe, as Dr. Kinsley stated, is due to the fact that they were not absolutely kept up, that if the disease was contracted from the pastures it undoubtedly was also contracted from the small feed lot and barn or else from the cured and apparently at least average or better than average fodder.
Dr. Mohler: I think this Association should be congratulated, and I personally wish to congratulate Dr. Kinsley upon the able manner in which he has presented this very important subject, and I further wish to say that I fully concur in every statement Dr. Kinsley has presented in his essay this evening. The question of the proper name for this disease to me is not such an important one as the question of how to prevent future outbreaks of this same condition. It is immaterial whether we call this disease cerebro-spinal meningitis, enzootic cerebritis, encephalo-myalitis, blind staggers or forage poisoning. To me those names are all synonymous and they all indicate the same characteristic symptoms, producing the same pathological lesions and subject to the same methods of prevention. 

As far as the etiology is concerned I doubt if anybody thus far has obtained definite and conclusive proof of the etiological factor of this disease. To many who went to the outbreak it seemed to be an entirely new disease that had never occurred before in the United States, but those who had experience with this disease in other sections of the country realized the similarity, in fact, the sameness of the outbreak in Kansas, Nebraska and the adjoining states to those which occurred almost simultaneously in other sections of the United States. Now I want to inform you that it was not only Kansas, Nebraska and Colorado that suffered from the affection this past season. We heard of this disease first in Louisiana about the month of June, and later a similar outbreak occurred in West Virginia. It appeared in Georgia about August and came along the sea islands. It prevailed in Oregon as well as in Virginia and Maryland; one county in New Jersey lost four hundred animals, while another adjacent county lost a lesser number. So it is not a disease that was confined to these central and western states, but it was rather general. And strange to say, the disease which we call mycotic stomatitis or pseudo-foot-and-mouth disease was occurring simultaneously along the Atlantic coast. It started the fore part of June in Florida, came up the coast to North Carolina and South Carolina, spread into Tennessee and Kentucky, came up to Virginia and Maryland, and one or two isolated cases occurred in Pennsylvania. Now we are pretty well agreed upon the cause of mycotic stomatitis, and there was a great similarity, so far as the climatic conditions are concerned, between the occurrence of this disease in cattle and forage poison or blind staggers in horses.

A number of years ago this latter affection was known in Europe as "head disease" because of the pronounced brain symptoms manifested. It was subsequently described as "fever of the nerves" and still later as "nervous sickness." It became epizootic in char-
acter in Borna during the 90's and because of its prevalence the name "Borna disease" was applied to it. This disease is the same so far as the symptoms and pathology are concerned as the disease that broke out here. In fact the terms cerebro-spinal meningitis and "Borna disease" have been classified as synonymous by Hutyra and Marek. The only text book that I know of to-day that differs from this classification is Friedberger and Frohner's work of 1904. Their separation of the two diseases is the result of some investigations that Ostertag made in 1900. When Ostertag was investigating the Borna disease he came to the conclusion that it was not cerebro-spinal meningitis because on microscopic examination he failed to find any inflammatory changes in the central nervous system. Since the publication of Friedberger and Frohner's work, Oppenheim, Dexler and others have shown that inflammatory lesions do occur in the brain in Borna disease. Ostertag himself has published autopsy notes on one such case in 1907. He sent the nerve tissues and the brain to Professor Oppenheim, a neurologist in Berlin, and after careful examination Oppenheim was able without difficulty to find lesions of leptomeningitis with inflammatory cell infiltrations and proliferation of the connective tissue elements. Now when Ostertag was studying this disease in 1899 or 1900 he came across the organism which he termed the Borna streptococcus and which he considered to be the etiological factor of the disease. Johne, on the other hand, found a diplococcus which was quite similar to the diplococcus of meningitis of man. Wilson and Brimhall, working in the Minnesota State Board of Health laboratory ten or twelve years ago, succeeded in isolating an organism which they classified as the diplococcus pneumoniae of Frankel. Harrison of Canada also incriminated a streptococcus which differed from Ostertag's in several essential characters. All these investigators you will notice have a different organism for the same disease, and some of these writers have inoculated their respective organisms into horses and believe that they reproduced the disease. But, gentlemen, when you inoculate five or ten cc. of a heavy emulsion of any organism subdurally you are liable to produce a headache in a horse or even an elephant, and I am not surprised to find that some of these animals showed symptoms from the irritation set up, with accompanying mechanical pressure, and sometimes died. I have a number of horses at present which have been injected with various forms of microorganisms recovered from horses which died of the disease in August and September. In two of these experiments the animals succumbed. In the first a strangulated intestine was the cause of death, while in the other horse, inoculated with 1 c. c. of the culture subdurally, the post-mortem showed a large cholesteatoma.
in the third ventricle. From the brain of this animal the original organism was recovered, but since that time the culture has been passed through three other horses and they are still alive after 41 or 42 days of incubation.

Dr. Reichel: I would like to continue Dr. Mohler's remarks in citing the work done in the State Board in 1906 and 1907. For two years it was part of my duty to look into these outbreaks in Pennsylvania that we have, and I made a critical microscopic examination of the fluid of the brain and in a good many cases succeeded in isolating the Gram negative diplococci; in fact many of the strains were isolated, and in guinea pigs and rabbits produced fatal septicemia. Fortunately, however, when this outbreak occurred in Kansas it was my good fortune to be able to go there and collect material in the proper way. I also, in Kansas, had the advantage of a serum laboratory at my disposal and made several cultures direct on the field. Growths were obtained direct in the field in the first cases worked with. A careful examination of the cultures was not possible there but material from these first three cases along with material from five other cases was brought to Glenolden from Kansas and there carefully cultured and the results were negative all the way through, nothing found, and I concluded that the growths obtained on the field in Kansas were probably an accidental contamination. So from a bacteriological standpoint we considered the work entirely negative.

Dr. Kaupp: I am sorry that Dr. Glover of Colorado is not here to help take up the discussion of this disease. Dr. Glover perhaps has had more experience than any of us here in the investigation of forage poisoning and investigating poison by various kinds, such as molds, poisonous weeds and so on, for more than twenty-five years. Dr. Glover was with me at Holly in our six weeks' work there and he was frank to say that this disease was one that was new so far as he was concerned. We did not hold autopsies on horses, except on those that showed the typical symptoms of the disease. We held post-mortems on several and saved the brain fluids under proper conditions to prevent contamination, so far as we could. In some of those specimens of fluid we found symptoms of a Gram negative diplococcus and we used them for inoculating purposes and we succeeded in producing the disease in two horses, using two cubic centimeters for each horse, making inoculation not intracerebrally but subdurally. We also succeeded in producing the disease in rabbits and guinea pigs, making the inoculation intraperitoneally or subcutaneously. In those cases we found the Gram negative diplococcus in the animals that died. In one or two of
the animals we included the Gram positive, but the Gram positive was lost and was not found in the brain fluid. Our microscopic examination of the tissues saved showed that there was an acute inflammation of the coverings of the brain and spinal cord as well as the cord itself and the surrounding tissue. Dr. Glover saw one case in a suckling colt earlier in the season and saw three cases in livery stables, horses that had been kept on dry feed. In regard to Powers County, Colorado—that is on a very high elevation, it is four thousand feet high—we looked up the precipitation record, and the precipitation for that county was not as great as it was for the same time of the year in the rain belt. There was a heavy rain about the middle of August in which the Arkansas River was overflowed. After that time there was one shower about the last week in August. The heaviest loss in Powers County occurred from about the 15th of September to the 1st of October. There was no rain during the month of September or October in that part of the county that was stricken with the disease. The horses that came down were not in the belt that was overflowed, but were from the high gravelly soil, mostly to the north of the river, where the grass is native grass, principally gamma grass, blue stem and buffalo grass. As Dr. Kinsley has stated it appears that horses came down under all conditions, under some conditions that are hard to understand.

Dr. Mohler: I would like to ask Dr. Kaupp if I understood him correctly—if he has the cause of this disease isolated?

Dr. Kaupp: Mr. Chairman, as to that I don’t know. We have not finished our work. We reproduced the disease with the material we got, but there is some evidence that it soon loses its power to produce the disease.

Dr. Mohler: Were you working with pure cultures?

Dr. Kaupp: The spinal fluid we used was a pure culture and we could transfer it immediately to the bouillon cultures and they were virile at that time, that is, if you would use them soon. Whether or not the cultures we were working with had power to produce the disease there is some question.

Dr. Mohler: Were you using the spinal fluid?

Dr. Kaupp: We were using the spinal fluid. You can take the spinal fluid, or at least we took the spinal fluid, incubated it for 24 to 48 hours and the diplococci grew very abundantly.

Dr. Mohler: In pure culture?

Dr. Kaupp: In pure culture. I saw very few on autopsy. One animal we killed by bleeding the artery and found the organism in the spinal fluid. Well, we found a few of the organisms after cultivating the spinal fluid from 24 to 48 hours; they were
very abundant. We transferred that to bouillon and an 18 hour culture into rabbits and guinea pigs. There is some question how far you can carry it. There is some evidence that you cannot produce the disease with the organism after it is several weeks old.

Dr. Reichel: I would like to ask Dr. Kaupp if he can say how he managed to collect his spinal fluid and then incubate it and feel that it was not contaminated.

Dr. Kaupp: Mr. Chairman, I will say that we used a metal syringe, metal plunger. We boiled the syringe and cleaned the surface that we expected to operate upon and we had an alcohol lamp with us, and we seared the surface in which we introduced the needle and got our fluid in that manner. We used several bottles, two dram, homeopathic vials, and those were sterilized in a hot air sterilizer. Some of the bottles were contaminated. Once in a while we would get one that was not contaminated and that we used.

Dr. Stange: I would like to say a word or two if I may. I did not hear the paper, but it was our privilege to investigate a few of these cases, and I may say that we only found the diplococcus once. The diplococcus was found in the lateral ventricle of a brain that was carried from Lincoln, Nebraska, to the laboratory at Ames, and for that reason I attach no significance whatever to the finding of that diplococcus. The cultures that were made under more favorable circumstances showed no growth whatever, and smears taken from brain tissue, the mucous membrane of the ethmoidal cells and from the cerebral fluid did not reveal the presence of the organisms in sufficient number so we could recognize them with the microscope. So far as the pathological changes were concerned that we found, they consisted simply of a superficial infiltration. We were able to demonstrate that in most of the sections were found what we would choose to call degenerative areas. They were indicated chiefly by a failure of the nervous tissue to stain properly. We could notice the different stages of this degeneration. We found a slight degeneration in the kidneys and the segmentation of the heart muscles. Those were the principle changes that we found. We did not find an organism or anything else that we thought an etiological factor of the disease.

Dr. Haslam: Following out approximately the same technique as Dr. Kaupp, only collecting in tubes drawn out to a fine point which had been thoroughly sterilized by steam under pressure, we found that the incubation of the cerebro-spinal fluid gave mixed results. Some failed to develop organisms, others developed cocci mixed with B. coli and others developed negative diplococci. We
have taken out cultures from the brains in the last three years of probably a hundred head of horses. The constancy with which I have gotten this has depended very largely upon the technique that I followed, inoculation into single tubes of bouillon giving the lowest results, and the use of plates, agar plates, and the smears directly on those plates giving the highest result. In practically all the cases which I cultured during this epidemic there were organisms present. Sometimes the plates would be thickly studded, other times there would be only a dozen or two colonies appear. Inasmuch as half of the plate was inoculated and the other half was not inoculated and the colonies appeared on the inoculated half of the plate, that gave the supposition that those colonies came directly from the brain tissue. I believe with Dr. Mohler in his stand on the etiology of this disease and also in his statement of subdural inoculation. I have isolated from moldy corn diplococci which, when injected subdurally, would give me an honest case of meningitis, but then I never entertained seriously any notions that that diplococcus was the cause. If there was one point in which any significance could be attached to the microscopic or rather the bacteriological findings I would say that it was upon the greater preponderance of the Gram negative organism in this disease than in the other brain disturbances, in normal and semi-normal brains which I have examined. We at all times refused to consider that we had any specific micro-organism. The vaccine therapy which was tried out by the station was tried out at the urgent request of the local people where we were, and inasmuch as horses slaughtered a few hours after the symptoms occurred showed these cocci present in the brain fluid, it was held that no harm could be done, and possibly considerable good by immunizing to whatever extent we could immunize against the secondary invader, even though subsequent work might show that this organism was the secondary invader, or that there was no great ground for considering it the primary invader.

Dr. Hughes: If I may present this disease from the aspect of the common city practitioner I would state that in Chicago here we have outbreaks of this disease with sure regularity yearly, in some parts of the city or other, sometimes it is on the West Side, sometimes on the North Side and sometimes on the South Side. Last year or the year before we had in the city a disease that we called the potato disease. The potato disease existed among the horses that were used in the South Water Street section. I might say that the South Water Street section is the section where the markets make their headquarters, and the horses are fed upon vegetables, potatoes, etc. Now the headquarters of these horses was in a certain
section of the city, and the hay and the oats that these horses were fed upon usually came from local dealers, so that in all probability the disease instead of being spread by the potatoes was rather spread from the forage which was gotten on the market. Personally I run across this disease about once in every year or two. The most serious outbreak I had was about two years ago in a large stable where I was obliged to turn a floor having a space of a hundred feet square with twenty box stalls into a hospital. I had a horse there that was down showing symptoms similar to those shown in the West, of bracing his head against the wall, half crazy or with a paralyzed look. These animals were fed on a stock of oats that was in the company's possession; they had 20,000 barrels of oats and they were feeding them potatoes of which they had a couple of car loads, and by the way, those were thrown out of the stable. The first five of the diseased horses died from this disease, but one of them I brought to the school and Dr. Herzog made a very thorough examination post-mortem; the other four were also examined post-mortem and we found various post-mortem appearances. Some of the brain coverings were greatly inflamed. In some the meninges and the sub-molecular spaces were filled; the sub-arachnoid spaces were filled with fluid. Even in those cases Dr. Herzog failed on examination to determine the presence of any etiological factor.

Now, the very fact that we have this disease regularly appearing in this city and that it is caused by forage may perhaps cause the Association here to look at it from a little different aspect, considering, I believe, that the animals affected have been grass fed, grain and fruit fed. The symptoms of course, were exactly like what we have regularly here each year.

Dr. Stange: In regard to this forage poison I would like to say that we have what I consider a great deal of that in the state of Iowa, especially in connection with silos. Now it has been very difficult for us to teach our farmers not to feed mouldy silage to horses, and as a result we have a great deal of trouble, and it has been my privilege to investigate it in quite a number of these outbreaks, and as Dr. Hughes has just emphasized, we always find it associated with one particular kind of food, and in my experience this food has been visibly affected in some way, and we have been able to reproduce the disease by shipping the food to the college and feeding to experimental animals. No other material was transferred to the cows except the food, but in my estimation, or so far as I know this disease has not been associated with any particular kind of food nor has anybody been able to determine that the food has been damaged in any particular way or has been any different,
so far as we can tell, from that which has been fed in previous years. Consequently I believe that we have a disease that presents a similarity in symptoms, but in etiological character is different, and one that we know nothing about.

Dr. Hughes: This meeting is being addressed by scientists. I am only an ordinary practitioner, and from a practitioner's standpoint we find that we are fairly successful in handling this disease. I was astonished to find that 95, 96 or 97 per cent of cases died. Now in the outbreaks that we have, if it is the same disease, we have a fair success in treating them. As soon as it appeared in a stable we recognize it, we know it. It is an old time acquaintance, and it does not get beyond one or two cases before we realize that we have got infected forage, and we watch our horses carefully. And as soon as an animal shows the slightest indication of the disease a powerful aloeetic wash is given and this animal, not that day, but concurrently with it receives salol in two dram doses every three or four hours until he is pretty thoroughly saturated, the object being the intestinal antiseptis that is necessarily produced. I think that salol is the best as a practical drug. It is a cheap drug. It is not an aspirin; it does not sell at the price aspirin does, but its effects are marvelous. You find a horse that commences to knuckle, which is one of the early symptoms, the knuckling of the hind fetlocks, and as soon as he begins that you commence with such treatment and ordinarily it either brings the disease to a standstill or if it runs its course it is very markedly modified. Of the twenty horses that I referred to the first five died before we knew what we were up against. All the others recovered and some of them were equally severely affected.

Dr. Gibson: Mr. President, I have listened with a good deal of satisfaction to the remarks of Dr. Hughes.

In the state of Iowa we have had many little outbreaks of conditions similar to what the doctor speaks of, but it seems to me the southwestern disease was something a little different. It was different from anything I have seen. Dr. Stange referred to feeding from silos. Last winter we had a number of instances in Iowa where the silage was fed to cattle and in some instances to sheep with splendid results, when in some instances one feed of that silage to a horse produced fatal results. Some years ago we had at one point in Iowa a whole livery barn of horses attacked in some such way as Dr. Hughes described. We could trace it to nothing else but a load of hay from a timothy meadow, new hay, good hay, a very good quality of hay feed, very luxuriant growth. We had all phases of nervous symptoms given in that barn. We condemned
the hay on general principles and it was thrown out in the alley, and another man in the town who had some dray horses said he didn't believe there was anything wrong with the hay, and he gathered it up and took it home and fed it to his horses, and presently he had the same trouble, so we felt in that case that it was traceable to that hay.

But there is something about this disease this year that is different from anything I have ever seen. Recently I had one typical case almost in the center of Des Moines. There was a family horse that ran in a little fenced lot about twice as large as a good sized box stall or so, yet for a few days he had been allowed to graze around the house on the lawn. So far as I know I am inclined to think that all horses affected this year in my experience, and so far as I have been able to trace it, were either at pasture or were worked and turned out nights, or turned out Sundays or in some cases had newly mown fodder brought right in to them, not what you would call cured fodder hay. And I am very much interested in this disease. I am glad to report that the state of Iowa escaped with but slight losses. I was with Dr. Stange, and those that were not on the ground can scarcely understand the condition people were in because of the losses from this disease. I think it is a very important subject and I am very much interested in this discussion.

Dr. Butler: I did not have the pleasure of having the opportunity of seeing this present outbreak of the disease in Kansas. I believe, however, that I have seen this disease on several occasions in this country. When I was a resident of Kansas I saw a disease there which resembled, as far as I could tell from the written description, the present disease so closely, that I certainly would not wish to designate it as a separate affection. Having Kansas and going to North Carolina, during the Fall of '91 we had a very severe outbreak of the same disease that I had seen in Kansas, and as near as I can tell from the description it was identically the same disease they had in Kansas last year. And when in the outset of the outbreak we had the marked and positive lesions and symptoms which have been presented in these recent cases here, during the latter part of each outbreak we would get the same train of symptoms, less marked, less pronounced than I have been seeing, it seems to me, scattered all over wherever I have been, and I have had an opportunity of observing this in a half a dozen different states. In the outbreak in North Carolina, during the first period of it 42 horses out of a bunch of 82 died, and in those cases I saw identically the same symptoms that I had seen in Kansas, markedly the breaking down of areas in the brain and the pronounced and acute symptoms which they described at the latter part of that out-
break in that county. Then the only symptoms that developed were less pronounced both in the symptoms before death, and the post-mortem appearances were less marked, less pronounced, just as I had seen in isolated cases here and there, and just as Dr. Hughes described. And I want to say that when I first saw this outbreak in Kansas and the first part of that outbreak in North Carolina I thought I had a separate and distinct disease from the one I had seen before, but when I got to tracing it up and saw the latter part of several outbreaks, as I did in North Carolina, I became thoroughly convinced that it was the disease that we have known ever since I knew anything about medicine, and I am satisfied that I have seen it in Kansas, Mississippi, North Carolina, Iowa and Ohio. (Applause.)

Dr. Stouder: I did not see this, but I saw I suppose, as many sick horses as anybody in Kansas, but I can say just as a contribution to what has been said here, further, that this very identical disease is certainly very prevalent in the states of Washington and Oregon. It is there almost invariably in the spring of the year. The horses which are used to being on large wet ranges are, as a general rule, simply turned into pastures, fallow and wet land, and feed on straw stacks the winter through, frequently the rancher not being at home, and the horses have a wet stack and the remnants of where the separator stood, to live on through the winter. Usually there is no trouble until in the spring of the year, and then there will be no trouble unless there happens to be a light snow, which is usually the condition necessary, and then the sunshine and chinook winds blowing in from the ocean and carrying considerable moisture suddenly turn that snow and the ice which will be on the straw into ordinary water and moisten the straw. At this time several horses will be found down in the field, probably some of them standing or going in a circle, something of that character, and trouble is at hand. On going to the straw stack you can invariably on the outer surface of the straw stack, if you grab a handful of the straw and spread it out on a paper, find anywhere from five to sixty per cent of it showing considerable mold, black or blue black in color, and if you look at it under a glass it has a considerable roughened area. This mold is identical to me, looking under an ordinary magnifying glass, to the mold that I saw on much of the grasses of western Washington this summer; I saw it on kaffir corn and on prairie hay. I saw it once only on the growing corn. I have never seen it on alfalfa, but we had mightly little little, if any, trouble with the alfalfa that was fed so far as we could trace it, or at least so far as I could trace it. I am of the opinion that the trouble that we had in Washington some years ago and had every
spring is from this cause. And I may say that I took some of this straw home and fed it to an experimental horse, and feeding a grain sack of it would usually give the symptoms of the disease, and it is nearly always fatal. I think that one reason of our mortality, at least in Kansas, was that very few farmers, even after a large number of horses had contracted the disease, very few of the farmers were able to detect that their horses were sick until they were extremely bad off. Of the horses that contracted this disease I think it is safe to say that more than fourteen per cent were horses out at pasture, and that means oftentimes quite a ways from the house, and they did not often find them until they were in a very bad stage of the disease, and then, of course, after that the ability of the average farmer to apply anything in a careful way to his horses is very limited, and many of those horses received no medication of any kind, and those that did receive medication, usually got a dose of oil in the lungs or a dose of oil in the ear, those were the two favorite places to put the medicine, and that was about all that was used. I don't know now whether that did any good or not, but up in the north part of the state where I found I could get the assistance of a number of physicians to stay there and help the farmers we did get a high percentage of recoveries by giving a heavy cathartic, usually an aloetic and a rectal injection of gelsemium to help. It was not unusual to find a horse skinned from his knees to the back of his neck, where he would rub up against the side of the house or the corral, if they tried to confine the horse, and they could be quieted if they would be given urotropin. We got so many recoveries in the town of Golden, Kansas, that the physicians are firmly convinced it is a specific for this disease, but at this time I will say that the disease had lessened in its severity over the state in general, and it was too late for us to say whether or not they found anything that was of any particular benefit in the nature of a specific.

Dr. Connaway: I was out in Kansas where our good friends were at work, and I saw a few cases, and saw a post-mortem or two and secured some material through their kindness for a little work at home, and compared it with things that looked like it in the northern part of Missouri. In a county or two of our state cases were reported which were suspected to be this same disease. Dr. Sheldon, the State Veterinarian, and I visited that region and made a couple of post-mortems which showed in the findings the lesions, or many times absence of lesions, that we found in the Kansas cases. The symptoms seemed to be the same. Dr. Sheldon had seen more of these clinical cases than I and he pronounced them the same trouble. We saved some of the cerebral fluids, and made some cul-
tures from them and found the same kind of organisms that Dr. Haslam found in his cases. We made cultivations of these and inoculations into four different horses, but had no reproduction of the disease. These injections were made hypodermically into the jugular, and some of the stuff he rubbed up into the nose, and yet with all this we did not succeed in reproducing the disease, either with the Kansas material or with the Missouri material. Whether it is a specific disease that is due to these organisms that we found of course remains to be determined, unless there has been positive evidence adduced from other experiments. I might add that the disease abated as soon as the frost and cold weather came. It seemed to stop in the northwest part of our state, and very soon we had no more calls for help.

THE PATHOLOGY OF PARTURIENT PARESIS (MILK FEVER) AND THE CALCIUM SALTS AS A FACTOR IN THE ONSET OF LABOR.

By Joseph H. Kastle and Daniel J. Healy. Kentucky Agricultural Experiment Station.

Mr. Chairman and Gentlemen:

It was with pleasure that Doctor Kastle and I accepted the invitation of your Secretary, Professor Ferguson, to read before this meeting a joint paper dealing with some of our recent work at the Kentucky Experiment Station. Owing to the fact that Doctor Kastle has been recently elected to succeed the late Doctor M. A. Scovell as Director of the Station and Dean of the Agricultural College, it has proved, much to his regret, impossible for him to be with us today. I trust that you will find my presentation of this joint paper satisfactory.

Parturient paresis (milk fever) "is a nervous disorder which develops suddenly in heavy milking cows after calving. It is characterized by loss of sense, of consciousness, of muscular control, by hypothermia or by hyperthermia, convulsions, coma and mellituria."++ The most important factor in parturient paresis is parturition, and Hess† states that in 170 cases he did not observe it during, nor preceding labor, nor did he observe it later than 96 hours following labor. Next in importance to parturition comes heavy milk production. It is a disease, not only of cows, but preeminently of individual cows that give the most abundant milk, and particularly at that age when they have reached their greatest productiveness. Constitutional predisposition is also an important factor, and a cow which has survived one attack is more liable to another. Parturient paresis is rare or unknown among other anima's, but in this connection we were much impressed, early in our work, by the great similarity between parturient paresis in the dairy cow and eclampsia, or puerperal convulsions in woman. Of this we shall speak later.

Upon taking up the study of the pathology of parturient paresis, we found it necessary to first establish a normal clinical urinalysis of the dairy cow. This was done with the following result:‡

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* Law, Text Book of Veterinary Medicine, 2d Ed., N. Y., 1905.
† Schw., A., 1905, 47, p. 279.
Color, yellow. Specific gravity, 1014. Reaction, alkaline. A slight flocculent precipitate, and occasionally a heavy white precipitate of calcium sulphate.

Urea, 1.06 per cent. Hippuric acid, 1.17 per cent. Ammonia, a trace.
Total nitrogen, 0.58 per cent. Albumen, none. Sugar, none.

Microscopical examination: Squamous epithelial cells, irregular and spiral vegetable cells, starch granules, calcium sulphate crystals and amorphous matter.

During the period of our work four cases of Parturient Paresis have been available for study and the following results were obtained from the urinalyses:

1. Seven-year-old cow, fifth calf, first attack, which occurred 12 hours after labor. Recovery was prompt and complete with oxygen treatment. Her mother died of parturient paresis. Urine deep yellow, clear, white flocculent precipitate, strongly alkaline reaction; specific gravity, 1055; urea, 3.23 per cent; hippuric acid, 0.93 per cent; ammonia, trace; total nitrogen, 1.58 per cent; albumen, abundant; sugar, 6.25 per cent.

Microscopical examination: Hyalin, granular and epithelial casts, quantities of leucocytes, squamous epithelial cells, and irregular vegetable cells.

2. Six-year-old cow, fourth calf, first attack, which occurred six hours after labor. Prompt and complete recovery with oxygen treatment. Urine was yellow, slightly cloudy, flocculent precipitate; reaction, amphoteric; specific gravity, 1023; hippuric acid, 0.34 per cent; urea, 2.2 per cent; ammonia, 0.037 per cent; total nitrogen, 1.05 per cent; albumen, abundant; sugar, 2.2 per cent.

Microscopical examination: Numerous small granular casts, some large granular casts, and a few hyalin casts; quantities of degenerating squamous and cuboidal epithelial cells, leucocytes and irregular vegetable cells.

3. Seven-year-old cow, fifth calf, first attack, which occurred 36 hours after labor. Recovery prompt and complete with oxygen treatment.

Urine yellow, clear, slight flocculent precipitate; reaction, slightly acid; specific gravity, 1018; hippuric acid, 0.83 per cent; urea, 1.20 per cent; ammonia, 0.035 per cent; total nitrogen, 0.65 per cent; albumen, present; sugar, 1.64 per cent.

Microscopical examination: Granular and hyalin casts, squamous epithelium and leucocytes, irregular vegetable cells.


Urine deep yellow, clear, slight flocculent precipitate; reaction, alkaline; specific gravity, 1028; hippuric acid, 1.16 per cent; urea, 2.00 per cent; ammonia, 0.013 per cent; total nitrogen, 1.03 per cent; albumen, present; sugar, 3.14 per cent.

Microscopical examination: A few hyalin, granular and blood casts, numerous red and white blood cells, squamous and renal epithelia, irregular vegetable cells and amorphous matter.

As the result of these observations it was established that parturient paresis is accompanied by an acute inflammation of the kidneys, and, as indicated by the presence of sugar in the urine, a disturbance of the function of the liver.

The finer pathological changes occurring in parturient paresis have not been determined, and all of the four cases which we had made a prompt recovery.

Miss Lane-Claypon and Starling have shown that the stimulus to the hypertrophy of the mammary gland comes from the developing fetus, and Adami, discussing this work states that lactation would seem due primarily to the removal of these secretions on the birth of the fetus, thus arresting the hypertrophy of the breast, the glandular tissue of the breast then breaks down, the degeneration resulting in the formation of milk.

The modern treatment of parturient paresis consists of acutely dilating the cow’s udder with some suitable gas or liquid, preferably oxygen. The mortality under this treatment has been reduced from 60 per cent to less than 1 per cent. Considering these facts, it occurred to one of us, Healy, that the toxin of parturient paresis was probably present in the udder of the sick animal, as a result of an abnormal degeneration of the mammary glandular tissue following the birth of the calf. That this hypothesis may be tested, Kastle suggested that portions of the colostrum be injected into guinea pigs and the results noted.

As a preliminary study one guinea pig was given, intraperitoneally, 5 c. c. of fresh whole milk containing 22,500 bacteria per c. c. This pig suffered with some diarrhoea following the injection, but one month later was alive and well. Another guinea pig received intraperitoneally the dried residue of the filtrate of 300 c. c. of fresh milk which had been precipitated with alcohol, and rubbed up with 10 c. c. of sterile water. This pig had no symptoms whatever following the injection. Two guinea pigs received intraperitoneally 5 c. c. each of fresh first normal colostrum. They both suffered with a marked diarrhoea, but one month later were alive and well. Another guinea pig received intraperitoneally 3 c. c. of fresh first normal colostrum. This was followed by a marked diarrhoea, but one month later the pig was alive and well. Another pig received intraperitoneally the dried residue of the filtrate of 100 c. c. of fresh normal colostrum which had been precipitated with alcohol, and rubbed up with 10 c. c. of sterile water. This pig had no symptoms following the injection. Two guinea pigs received intraperitoneally 2.5 c. c. of colostrum whey, and two days later received an additional 5 c. c. of colostrum whey. This pig had no symptoms.

Following this preliminary study we tested the toxic effect of the colostrum of a cow ill with parturient paresis by injecting intraperitoneally into three guinea pigs, 10 c. c. of the fresh first whole colostrum, 10 c. c. of the fresh first skimmed colostrum, and 10 c. c. of the fresh first colostrum cream respectively. These pigs had no diarrhoea following the injections, and seemed well. They died, however, in six, five and six days respectively. Death was preceded by a very acute and terminal diarrhoea in each case, and the last pig aborted during the first 12 hours following the injection of colostrum cream.

On post-mortem and microscopical examination these pigs presented areas of hemorrhagic necrosis in the liver, an acute parenchymatous inflammation of the kidneys, with interstitial hemorrhages, and an acute degeneration of the adrenals with interstitial hemorrhage, and in one case a left lobar pneumonia.

A fourth guinea pig received intraperitoneally 10 c. c. of the fresh urine of the cow ill with parturient paresis. With the exception of an intense diuresis which continued for 13 days, this pig seemed well. At the end of this period he was chloroformed and upon post-mortem and microscopical examination was found to present parenchymatous inflammation of the kid-

ncys with small interstitial hemorrhages, rather extensive necrosis of the liver cells, but with no interstitial hemorrhages, and small localized areas of necrosis in the adrenals. A control guinea pig which received intraperitoneally 10 c. c. of fresh urine of a normal cow showed no symptoms during a period of seven days, and then chloroformed. Upon post-mortem and microscopical examination its organs and tissues were found normal.

A fifth guinea pig received intraperitoneally 4 c. c. of the fresh first colostrum of a cow, which the following day came down with parturient paresis. This pig presented no symptoms following this injection. Owing to the fact that the calf nursed up to the time that the cow was taken ill, and also to the fact that the cow received immediate treatment, it proved impossible to obtain more colostrum. The first colostrum, however, had been preserved by the addition of 0.5 per cent carbolie acid. Four days following the first injection this pig received a second injection of 6 c. c. of this colostrum. The second injection was followed by a marked diarrhoea. Eleven days after the first injection this pig received a third injection of 8 c. c. of this colostrum, making a total of 18 c. c. of the colostrum received. Seven days later this pig was apparently dying, and as we wished to obtain the blood it was chloroformed.

Upon post-mortem and microscopical examination this pig presented localized areas of necrosis in the liver, especially of the central portions of the lobules but without interstitial hemorrhages; there was also some small celled infiltration of these necrotic areas, and also surrounding the bile radicles. The kidneys showed tubular nephritis, without interstitial hemorrhages, and with practically normal glomeruli. The adrenals showed small areas of localized necrosis in the cortex, but with no interstitial hemorrhages. The lungs showed broncho-pneumonia.

A sixth guinea pig received intraperitoneally 10 c. c. of the colostrum used in the preceding experiment. This was followed by a marked diarrhoea, lasting for four days and then subsiding. The diarrhoea was followed by a paralytic condition of the hind legs which lasted for 15 days and then disappeared. Two months later this pig was alive and well.

William Otto,‡ in an address delivered before the Baltic Veterinary Society, December, 1910, stated that upon post-mortem examination of cows dying from parturient paresis, "the cortex of the kidney is found strongly injected, and exhibits small hemorrhages; the glomeruli are plainly visible as black points; a microscopical examination of the renal tissue shows markedly distended capillaries filled with blood, and ruptured here and there, allowing red and white cells to escape into the neighborhood tissues. Not infrequently the urinary tubules are filled with disintegrating cells."

On the day following that upon which our papers on parturient paresis were mailed to the editor of the Journal of Infectious Diseases. Dr. Surface called our attention to an abstract by Helfer of a paper by Hoyois,§ in which Hoyois states that the colostrum in cases of parturient paresis, on intraperitoneal injection in doses of 10 to 20 grams, causes paralysing symptoms in rabbits and guinea pigs, with subsequent death at the end of seven to twelve days.

As a result of these studies of the pathological changes found in guinea pigs dying under the influence of the toxin of parturient paresis, and owing

to the great similarity of these pathological changes to the known pathological changes found in Eclampsia, we announced the probable identity of parturient paresis and eclampsia, or puerperal convulsions in woman; and recommended, as the most promising treatment in the latter disease, dilation of the breasts with oxygen or sterile air accompanied by vigorous massage, and forcible compression of the breasts by means of a properly applied bandage.* This was in February last, and since that time five cases of Eclampsia have been reported, which were treated by this method with prompt recovery.† Three of these cases were the result of independent work by de Fine Licht of Copenhagen, and were published in July last.

The Calcium Salts As A Factor In The Onset Of Labor.

The importance of the internal secretions is well recognized in modern physiology and certain of these secretions, notably those of the thyroid and suprarenals, have been turned to great practical account in modern therapy. The profound influence of one organ or gland upon another organ or gland, through the stimulus of its peculiar internal secretion, has been brought to light through the masterly researches of Bayliss and Starling.* The rapid secretion of the pancreatic fluid under the influence of secretin is a sight that will never be forgotten when witnessed for the first time, and when one recalls the former difficulty of obtaining even a few cubic centimeters of the pancreatic secretion. It would lead us too far afield from the subject of the present communication even to mention the various hormones which have been discovered since Bayliss and Starling's first epoch-making research upon secretion. Among these may be mentioned the fact, however, that Miss Lane-Claypon and Starling† have shown that the stimulus to the hypertrophy and lacteal activity of the mammary gland in pregnant animals comes not from the ovaries, nor the placenta, nor uterus, but from the fetus itself. At present nothing apparently is known concerning the stimulus which brings on the onset of labor. It is known, of course, that this can be accomplished in certain instances by the action of drugs, such as ergot; or by mechanical injury to the fetus, or by shock or emotional disturbances, or even, perhaps, by pronounced fatigue, but as yet nothing is known concerning the precise causes which bring about normal labor.

In this connection it is of interest to note that W. Blair Bell and Paintland Hick,‡ in their admirable studies on calcium metabolism and the periodic variation of the calcium content of the blood during the menstrual period, foresaw a causal connection between the fall of calcium in the systemic blood and its corresponding increase in the menstrual discharge, and the onset of labor. According to these authors a slow, forcible and rhythmic contraction of the uterus is produced by the action of calcium salts, and although they were unable to show definitely that labor is caused by the action of calcium salts in the blood, their work certainly indicates such a possibility.

C. de Fine Licht, Ugeskrift fur Laeger, Copenhagen, July 18, 1912.
Dr. Waller Bullock, Lexington, Ky., reported personally.
* The Croonian Lectures, Lancet, 1905, 1, 2.
Later Halford,§ from observations on the remedial effect of calcium salts in pre-eclamptic conditions, also arrived at the conclusion that calcium salts may be responsible for the onset of labor.

Leo Adler,II experimenting with a preparation made from the udders of Circassian cows, and known as "Mamminum Poehl," announced, in January last, that "pregnancy was interrupted by the subcutaneous injection of "Mamminum" in each of five animals (squirrels and guinea pigs) used. These animals were at varying periods of pregnancy. Their health was not affected by this treatment, and upon examination no evidence was found of an inflammation or irritation which might have acted upon the uterus. So far as we have been able to ascertain, however, no one has yet succeeded in proving experimentally that calcium salts can bring on the onset of labor. Our attention was first directed to this subject last December, as the result of our studies on the effect of the colostrum of a cow, ill with parturient paresis, on guinea pigs. As will be remembered, in the first part of this paper it was noted that one of the experimental animals, which received 10 c. c. of fresh first colostrum cream of a cow ill with parturient paresis aborted during the first 12 hours following the injection. In another case a guinea pig aborted on the fifth day after receiving intraperitoneally 10 c. c. of the colostrum of a cow ill with parturient paresis. The colostrum had been kept in the refrigerator for 17 days, and was neutralized with sodium hydroxid immediately before injecting.

The unexpected results of these experiments naturally led us to believe that the colostrum of a cow ill with parturient paresis contains a substance, or substances, capable of inducing premature labor; and to the further though that perhaps this substance, or substances, is not confined to cows ill with parturient paresis but may be present also in the colostrum of normal cows. As it seemed possible that these abortions may be due to some imperceptible mechanical injury, or to the large volume of liquid injected, or to the close confinement of the animals in the laboratory, a series of experiments were executed for the purpose of removing these sources of error.

Two healthy guinea pigs were kept in the laboratory under the usual conditions, one for eight days, when she gave birth to two normal living pigs which continued to live and thrive; the other for fifty-eight days, when she gave birth to three normal living pigs, which also continued to live and thrive. A third pregnant guinea pig received intraperitoneally 10 c. c. of normal sterile salt solution (0.85 per cent NaCl), after five days she had not aborted; she now received intraperitoneally 10 c. c. of fresh whole milk, and although her pregnancy was far advanced she did not abort during the following four days; she now received intraperitoneally 8 c. c. of first fresh whole colostrum from a normal cow, and following this injection she aborted in 60 hours, giving premature birth to two fetuses, and 60 hours after this she aborted a second time giving premature birth to one fetus.

The following experiment shows that fresh milk and a marked mechanical injury may not induce abortion. A healthy pregnant guinea pig received intraperitoneally 10 c. c. of fresh certified milk; during the five days following this the pig did not seem well, and lost both appetite and weight; she did not, however, abort. At the end of this period she was chloroformed and a post-mortem examination showed an accumulation of blood in left side of peritoneal cavity, and some unabsorbed particles of cream over the omentum.

This pig was pregnant in the left uterine horn which contained two fetuses; the right horn was not pregnant.

That normal colostrum, not only of the cow, but also human colostrum may cause the premature onset of labor in guinea pigs is evident from the following five experiments: One guinea pig received intraperitoneally 8 c. c. of fresh normal cow colostrum and aborted two fetuses on the eighth day; another guinea pig received intraperitoneally 8 c. c. of skimmed boiled colostrum and aborted two fetuses on the eighth day; a third guinea pig received intraperitoneally 9 c. c. of a solution containing 25 c. c. of fresh normal cow colostrum and 5 c. c. of a sodium oxalate solution, and aborted two fetuses on the fourth day; the sodium oxalate solution had been added in an unsuccessful effort to precipitate the calcium present in the colostrum. In addition to the above, two guinea pigs received intraperitoneally, 2 c. c. and 1 c. c., respectively, of fresh, normal, human colostrum, and they aborted; the first pig three fetuses on the second day, and the second pig two fetuses at the end of 24 hours. A third healthy pregnant guinea pig received intraperitoneally 1 c. c. of normal human colostrum and at the end of 27 hours gave premature birth to two fetuses, both living at birth but dying shortly afterward.

After due consideration of the recent work on calcium metabolism, and also the fact that the colostrum is still active after boiling for a short time, we decided to investigate the effect of chemically pure calcium salts on the onset of labor.

A healthy pregnant guinea pig received intraperitoneally 9 c. c. of a sterile 3.25 per cent calcium lactate solution; within seventeen hours this pig gave premature birth to three fetuses. Another healthy pregnant guinea pig received intraperitoneally 9 c. c. of a sterile 1.56 per cent calcium glycerophosphate solution; within seventeen hours this pig gave premature birth to one fetus, evidently the only one she was carrying. These two experiments were checked in the following manner: A healthy pregnant guinea pig received intraperitoneally 9 c. c. of a sterile 1.72 per cent lactate solution; during the three following days she did not abort, she then received intraperitoneally 2 c. c. of normal human colostrum, and within twenty-four hours gave premature birth to three fetuses.

A second healthy pregnant guinea pig received intraperitoneally 9 c. c. of a sterile 1.97 per cent potassium lactate solution; during the fourth night following the injection this pig gave premature birth to three fetuses.

A third healthy pregnant guinea pig received intraperitoneally 9 c. c. of a sterile 2.30 per cent magnesium lactate solution; during the following seven days she did not abort; she now received 9 c. c. of a mixture containing 25 c. c. of normal cow colostrum and 5 c. c. of distilled water; four days later this pig was well and had not aborted.

On August 3d, while working on another problem, we gave a healthy pregnant guinea pig intraperitoneally 2 c. c. of a 3.25 per cent calcium lactate solution; this pig aborted within twelve hours.

To recapitulate: Four pigs received normal cow colostrum and all aborted; four received normal human colostrum and all aborted; two received calcium lactate and another calcium glycerophosphate and they promptly aborted; one received potassium lactate and aborted, making a total of twelve pigs that aborted. Two pigs kept under the usual laboratory conditions did not abort; two received fresh whole milk and did not abort; one received normal salt solution; another received sodium lactate, and still another magnesium lactate, and none aborted, making a total of seven pigs that did not abort.
It is evident from these results, therefore, that under certain conditions at least, and so far as we have been able to ascertain under normal conditions of pregnancy, calcium salts in the amounts and at the concentrations indicated above are specific in giving rise to the premature onset of labor in guinea pigs, within a very short interval following their administration. In the light of Bell and Hick's observations they do this by causing a rhythmical, expulsive contraction of the uterus. The fact also that potassium lactate, though greatly slower in its action, can accomplish the same thing is also a matter of interest. That sodium chloride nor sodium lactate, in the amount and at the concentration here employed, do not bring on premature labor in guinea pigs, is what one might naturally be led to expect from the general inertness of small amounts of sodium salts in the animal organism. The fact also that magnesium lactate, in the amount and at the concentration here employed, is powerless to bring on premature labor is also what we would be led to anticipate from the work of Meltzer and Auer on the physiological action of magnesium, which, in the form of its soluble salts, greatly inhibits many vital processes and causes complete relaxation, general anaesthesia, and ultimately death.

As a result of these experiments we have evidence of a new and hitherto unrecognized correlation between the mammary glands and the uterus. According to Lane-Claypon and Starling the fetus, through its internal secretions, stimulates the hypertrophy and lacteal activity of the mammary gland, and according to our experiments the mammary gland thus acted upon in turn stimulates the uterus to labor and the birth of the offspring.

Dr. Connaway: There is one thought that comes to me, that out of this there comes some very practical farm management work in the feeding of animals. The suggestion there of the increase of the sodium content of the blood suggests whether it is possible, in feeding or in some way, to lessen the calcium content in these animals that abort. Some of the cases of abortion, possibly not contagious abortion, possibly not due to the bacillus of Bang, might be due to too much calcium in these food stuffs. Possibly experiments along these lines will make a little change in the feeding, a little less alfalfa or something which contains too much calcium. That is just a thought that struck me. Some of you might test out these things.

Dr. Healy: I would like to say, Mr. President and gentlemen, that the suggestion made by Dr. Connaway I believe is a splendid one. The abortion work in our own state is conducted by another department and we have not in any way taken up that work, of course, but we have been working on other problems dealing with the metabolism of the salts, calcium and magnesium and potassium. Dr. Kinsley and I at least have come to the conclusion that there is a very delicate balance maintained in the system, a very delicate balance, and if that balance is upset it certainly leads to a very produced disturbance in the metabolism of the animal. Now of

course you cannot upset the metabolism without getting the calcium in, and this work has been done by some others, notably by Trost and Anderson at Washington, using a very strong solution of calcium chloride, five per cent solution, which is quite caustic, and if you inject that the effect would be that the system would work against it, and I doubt it would be absorbed. Calcium lactate, calcium glycerophosphate, which we have used with pregnant guinea pigs without disturbance to the pig at all, produced abortion. If these two salts were used in the same solution on male guinea pigs they will kill seventy-five per cent of them. So you see that that little disturbance of the calcium in the metabolism of the male that has not got the mechanism to take care of it like the female has, is really a profound poison. (Applause.)

STRANGLES OF HORSES AND ITS CONTROL.

By B. F. Kaupp, Chicago, Ill.

Immunization against strangles is of two kinds, active and passive. Passive immunity is produced by injecting the blood serum of a horse that has recovered from or has been hyperimmunized to the streptococcus equi by first injecting with the dead, then the attenuated and later the virulent organisms in gradual increasing quantities which stimulates the production of antibodies to a high degree producing a potent serum. Rohr noted that a sick horse injected with this serum showed a rapid abatement of symptoms. The nasal discharge was lessened, abscesses aborted, fever subsided and complications were avoided. The usual method is to inject 10 cubic centimeters of the hyperimmune serum three times on the first day and once a day after that for two or three days.

Active immunity is produced by vaccinating with a product made from the germ causing the disease and grown on artificial medium.

The writer has been conducting experiments relative to strangles during the past five years to determine the value of vaccine made from the germ causing the disease and the best method of preparation. This vaccine or bacterin has been used both as a prophylactic and as a curative agent. The method of preparing this bacterin to obtain one of the greatest value requires a delicate technique. Good judgment in administration is also necessary. We have learned that the more virulent the germ the more efficient the vaccine. Vaccine made from germs not virulent or weakly so do not give as good results as those recently isolated from lesions of the disease. It is generally thought that by passing the germs through a rabbit or some other of the experimental animals that they retain their virulence and even become more virulent. This has been found true in the case of rabies. In street rabies a rabbit will come down with the disease in from 14 to 16 days, seldom 18 to 20, while the next rabbits it is passed through will come down a trifle sooner till by the time it has passed through 20 to 25 rabbits they will be dying in 11 days. This so-called fixed virus is said not to be so virulent for man as is the case with the virus from street rabies. The writer has found that a vaccine (bacterin) made from a streptococcus isolated from an abscess of a human raised the opsonic index in the horse but not always as high as a similar vaccine made from a similar organism isolated from a horse.

Bacterin may be of two kinds; autogenous and stock.
The stock bacterin is made from the Streptococcus equi but is not used and used upon that same patient mainly for the purpose of raising its opsonic index. The increased opsonins aid in preparing the germs, that have invaded the body, for phagocytosis, thus aiding materially in overcoming the disease and in recovery. The writer has found outbreaks of strangles among young horses where it had assumed a severe type and which responded better to a vaccine made from the germ isolated from that outbreak. The vaccine should be given to both sick and well animals. We have repeatedly observed a fall in temperature following the injection of the bacterin, in animals sick of the disease, of from 1 to 4 degrees in the course of 18 to 24 hours and an abatement of submaxillary swelling and the avoidance of abscess formation and complications.

The stock bacterin is made from the streptococcus equi but is not used upon the animal from which the germ was isolated. As there are various strains of this organism it is essential to incorporate several of the different strains in order to obtain a fairly valuable bacterin. As pointed out above they must be still virulent for horses at the time of preparing the bacterin and the technique must be properly carried out.

As a summary of our work from the experimental laboratory, I may say that as a prophylactic it is essential to give more than one vaccination. In summing up those cases in which we had a good check, on single vaccination we immunized about 75 per cent to 80 per cent. Those that came down after single vaccination developed the disease in a mild form. With double vaccination 95 per cent to 100 per cent were immunized.

I want to insist that we do not give enough vaccinations to our animals as a prophylactic. In cases of suppurative processes, such as fistulous withers or poll evil and like conditions, we sometimes find it difficult to make the owner realize that it is necessary to inject vaccine, made from the germs causing the disease, every 5 to 7 days over a period of several weeks. It is still more difficult to make an owner of live stock realize that it is necessary or advisable to give more than one or two vaccinations against any contagious or infectious disease. The writer's experience with blackleg or symptomatic anthrax vaccine shows that ranchmen object to two vaccinations, that although the vaccine causes more or less constitutional disturbance, especially in very susceptible animals, they want to vaccinate, castrate and brand all at the same time. Any one of the three operations is severe upon the calf. And it is only where their calves are few in number and pure bred that they will consent to vaccinate twice. In vaccinating against rabies where an animal or person has been bitten 21 injections are made—none too many. Scientists are realizing that more vaccinations are necessary to obtain the best results.

Tests for Glanders Based on Field Work in the State of Wyoming.

By B. F. Davis, Cheyenne, Wyo.

At the request of our Secretary, I have endeavored to prepare this paper in hope that it will show the result of the mallein test for glanders and a check on this test by the different tests made from blood samples for glanders in the laboratories at Washington.

I am reporting 76 horses which have been tested by me or my deputies, that were held for second test and from which samples of blood were taken and forwarded to Washington for diagnosis and analysis. The mallein used in every instance was that prepared by the Bureau of Animal Industry. The directions followed for making the tests and for the shipping of the blood samples for serum diagnosis were those outlined by the Bureau of Animal Industry.
A typical reaction was considered to be a gradual rise in temperature of at least 3 degrees F., and to above 104 degrees. This should be accompanied by a general and local reaction. The presence of local reaction, when associated with a general reaction, should be regarded as evidence of glanders. Animals giving an atypical reaction, should be retested after the expiration of not less than 15 days.

In almost every instance, blood was taken from the jugular vein before the temperatures were taken or the mallein tests made. When it was deemed advisable to send blood for serum diagnosis, the blood was never taken until after 10 days had elapsed after the last mallein test.

Report 1.

The following tests were made by Dr. B. F. Davis and Dr. S. W. Peck, classifying 8 horses diseased, 4 suspicious and one healthy.

Test Made September 16th, 1911.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection.</th>
<th>Maximum temp. after injection.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>101.4</td>
<td>104.6</td>
<td></td>
</tr>
<tr>
<td>No. 2</td>
<td>101.2</td>
<td>104.8</td>
<td></td>
</tr>
<tr>
<td>No. 3</td>
<td>101.0</td>
<td>104.6</td>
<td></td>
</tr>
<tr>
<td>No. 4</td>
<td>100.6</td>
<td>105.0</td>
<td></td>
</tr>
<tr>
<td>No. 5</td>
<td>100.6</td>
<td>104.7</td>
<td></td>
</tr>
<tr>
<td>No. 6</td>
<td>100.1</td>
<td>104.3</td>
<td></td>
</tr>
<tr>
<td>No. 7</td>
<td>100.8</td>
<td>105.0</td>
<td></td>
</tr>
<tr>
<td>No. 8</td>
<td>100.6</td>
<td>104.8</td>
<td></td>
</tr>
<tr>
<td>No. 9</td>
<td>100.8</td>
<td>103.4</td>
<td></td>
</tr>
<tr>
<td>No. 10</td>
<td>101.6</td>
<td>103.8</td>
<td></td>
</tr>
<tr>
<td>No. 11</td>
<td>101.2</td>
<td>103.6</td>
<td></td>
</tr>
<tr>
<td>No. 12</td>
<td>100.8</td>
<td>103.3</td>
<td></td>
</tr>
<tr>
<td>No. 13</td>
<td>100.0</td>
<td>101.6</td>
<td></td>
</tr>
</tbody>
</table>

Second Test, October 9th and 10th, 1911.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection.</th>
<th>Maximum temp. after injection.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>100.3</td>
<td>104.2</td>
<td>5 x 6 x 13 Diseased</td>
</tr>
<tr>
<td>No. 2</td>
<td>101.0</td>
<td>105.2</td>
<td>5 x 8 x 10 &quot;</td>
</tr>
<tr>
<td>No. 3</td>
<td>101.1</td>
<td>104.4</td>
<td>5 x 7 x 15 &quot;</td>
</tr>
<tr>
<td>No. 4</td>
<td>101.1</td>
<td>105.0</td>
<td>7 x 8 x 13 &quot;</td>
</tr>
<tr>
<td>No. 5</td>
<td>101.0</td>
<td>104.4</td>
<td>8 x 9 thick &quot;</td>
</tr>
<tr>
<td>No. 6</td>
<td>100.6</td>
<td>104.1</td>
<td>5 x 15 x 8 &quot;</td>
</tr>
<tr>
<td>No. 7</td>
<td>100.8</td>
<td>104.5</td>
<td>5 x 6 x 12 &quot;</td>
</tr>
<tr>
<td>No. 8</td>
<td>100.3</td>
<td>105.2</td>
<td>5 x 12 x 16 &quot;</td>
</tr>
</tbody>
</table>

Swelling

<table>
<thead>
<tr>
<th>Horse</th>
<th>100.3</th>
<th>104.2</th>
<th>5 x 6 x 13 Diseased</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 2</td>
<td>101.0</td>
<td>105.2</td>
<td>5 x 8 x 10 &quot;</td>
</tr>
<tr>
<td>No. 3</td>
<td>101.1</td>
<td>104.4</td>
<td>5 x 7 x 15 &quot;</td>
</tr>
<tr>
<td>No. 4</td>
<td>101.1</td>
<td>105.0</td>
<td>7 x 8 x 13 &quot;</td>
</tr>
<tr>
<td>No. 5</td>
<td>101.0</td>
<td>104.4</td>
<td>8 x 9 thick &quot;</td>
</tr>
<tr>
<td>No. 6</td>
<td>100.6</td>
<td>104.1</td>
<td>5 x 15 x 8 &quot;</td>
</tr>
<tr>
<td>No. 7</td>
<td>100.8</td>
<td>104.5</td>
<td>5 x 6 x 12 &quot;</td>
</tr>
<tr>
<td>No. 8</td>
<td>100.3</td>
<td>105.2</td>
<td>5 x 12 x 16 &quot;</td>
</tr>
</tbody>
</table>

On October 14th, blood samples were taken from the 13 head which were tested on September 15 and 16th, and forwarded to Washington for serum diagnosis. Of the eight classified as diseased, after first test, each gave a positive reaction to the complement-fixation agglutination test for glanders. Horses Nos. 9 and 12 gave positive reactions; Nos. 10, 11 and 13, negative. The second mallein test and the selecting of the blood samples was made in the presence of 5 veterinarians, 2 State and 3 Government. On November 1st 9 of the diseased horses were destroyed and autopsies held in the presence of 4 veterinarians, 2 State and 2 Government.

Lesions were found in the liver and lungs of all the horses, in the bronchial glands of four, in the spleen of five, the posterior mediastinal glands of one and on the pleura of one. No. 4 showed farcy buttons on inside of right hind leg.
No. 7, ulcers on nasal septum, No. 8 two healed scars on nasal septum, No. 9 submaxillary glands infected and No. 5 showed discharge from nostrils.

In all ten head of horses were destroyed which twice reacted to the mallein test and the serum test for glanders.

**Report II.**

Horses 14 and 15 were tested with mallein on February 7th and 8th, 1912. Horse No. 14 showed clinical lesions of glanders. In the morning, before the test was started, samples of blood were drawn and forwarded to Washington for serum test.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 14</td>
<td>105.2</td>
<td>105.0</td>
</tr>
<tr>
<td>No. 15</td>
<td>101.0</td>
<td>102.2</td>
</tr>
</tbody>
</table>

The results of this and the blood test proved No. 14 to be diseased and No. 15 healthy. No. 14 was injected with 2 c.c. of mallein. He showed clinical lesions of glanders and was injected with 2 c.c of mallein as an experiment, and as a result showed typical local and general reaction, stiffness of gait and refused feed on the 7th, 8th and 9th. Injection was made February 7th at 9 P.M. He still retained the swelling, stiffness of gait and loss of appetite. Temperature at 6 P.M., February 9th, was 105. Clinical lesions were several small ulcers on nasal septum and submaxillary lymphatic glands.

**Report III.**

Horses No. 16 and 17 were tested on June 9th, 1911. Horse No. 18 showed Nos. 17 and 18 were exposed and had been for some time.

First test—June 9th, 1911.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 16</td>
<td>102.0</td>
<td>105.9</td>
</tr>
<tr>
<td>No. 17</td>
<td>101.1</td>
<td>105.2</td>
</tr>
<tr>
<td>No. 18</td>
<td>No test.</td>
<td></td>
</tr>
</tbody>
</table>

Second test—November 13th.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 16</td>
<td>102.4</td>
<td>104.6</td>
</tr>
<tr>
<td>No. 17</td>
<td>101.2</td>
<td>104.0</td>
</tr>
<tr>
<td>No. 18</td>
<td>101.0</td>
<td>104.2</td>
</tr>
</tbody>
</table>

During the time between June 9th and November 13th, horse No. 16 carried an average rise in temperature of two degrees. On July 1st blood samples were taken from the above horses and forwarded to Washington for serum test and were reported positive.

**Report IV.**

Registered Percheron stallion, imported from Colorado without test.

First test May 9th, 1912, and second test May 24, 1912. Made at Cheyenne, Wyoming, by Federal veterinarian.

First Test.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 19</td>
<td>100.8</td>
<td>104.0</td>
</tr>
</tbody>
</table>

Second Test.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 19</td>
<td>100.4</td>
</tr>
</tbody>
</table>

Blood was drawn on the morning of May 24th and Washington test was positive for glanders.
Third Test, July 31st.

Maximum temp. Maximum temp.

Horse before injection after injection Remarks.

No. 19 101.0 102.4 Swelling at point of injection; 9 x 5 radiating lymphatics very sensitive, edema on sternum, testicles dropping, slight depression.

Report V.

Report of twenty horses killed on account of being infected with glanders, imported from Colorado by railroad contracting outfit. Six of these horses showed clinical lesions of glanders. All except these 6 clinical cases were mallein tested, and were positive reactors to both mallein and serum tests.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 20</td>
<td>101.2</td>
<td>105.4</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 21</td>
<td>101.6</td>
<td>105.6</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 22</td>
<td>101.2</td>
<td>105.3</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 23</td>
<td>101.5</td>
<td>105.8</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 24</td>
<td>100.0</td>
<td>105.8</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 25</td>
<td>101.6</td>
<td>104.7</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 26</td>
<td>100.8</td>
<td>105.4</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 27</td>
<td>101.6</td>
<td>106.4</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 28</td>
<td>102.8</td>
<td>106.0</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 29</td>
<td>102.2</td>
<td>104.4</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 30</td>
<td>101.8</td>
<td>104.6</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 31</td>
<td>102.4</td>
<td>105.5</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 32</td>
<td>101.8</td>
<td>105.0</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 33</td>
<td>101.0</td>
<td>105.7</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 34</td>
<td>101.4</td>
<td>102.2</td>
<td>Suspicious</td>
</tr>
<tr>
<td>No. 35</td>
<td>100.2</td>
<td>103.0</td>
<td>Suspicious</td>
</tr>
<tr>
<td>No. 36</td>
<td>101.0</td>
<td>102.2</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 37</td>
<td>100.9</td>
<td>102.2</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 38</td>
<td>100.6</td>
<td>102.6</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 39</td>
<td>100.0</td>
<td>100.4</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 40</td>
<td>101.4</td>
<td>100.8</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 41</td>
<td>101.4</td>
<td>101.6</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 42</td>
<td>100.8</td>
<td>101.6</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 43</td>
<td>102.2</td>
<td>101.8</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 44</td>
<td>101.6</td>
<td>102.4</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 45</td>
<td>102.4</td>
<td>102.0</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 46</td>
<td>101.0</td>
<td>101.5</td>
<td>Healthy</td>
</tr>
<tr>
<td>No. 47</td>
<td>101.6</td>
<td>102.0</td>
<td>Healthy</td>
</tr>
</tbody>
</table>

Nos. 34 and 35 were retested September 25, 1912. No. 35 positive and No. 34 negative.

Samples of blood from all of the above horses were sent to Washington and their serum test checked with the mallein test in every instance, with one exception—that of a horse not tested with mallein; but in the opinion of two veterinarians showed clinical lesions of glanders. A portion of the blood forwarded in this shipment was received in bad order. A number of the samples were in so decomposed a condition as to be unsatisfactory for diagnostic purposes and I take it that that is the reason why this sample did not give positive reaction.
Our first samples forwarded were samples of blood with no preservative added. The last samples have been as clear samples of sera as could possibly be secured and were forwarded without the addition of carbolic acid.

Report VI.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 48</td>
<td>101.0</td>
<td>106.1</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 49</td>
<td>101.0</td>
<td>106.0</td>
<td>Diseased</td>
</tr>
</tbody>
</table>

Positive reaction to mallein and serum tests for glanders.

Report VII.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 50</td>
<td>101.2</td>
<td>104.9</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 51</td>
<td>102.0</td>
<td>105.6</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 52</td>
<td>103.0</td>
<td>105.8</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 53</td>
<td>100.6</td>
<td>104.8</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 54</td>
<td>100.4</td>
<td>104.4</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 55</td>
<td>100.4</td>
<td>104.4</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 56</td>
<td>101.8</td>
<td>105.4</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 57</td>
<td>101.8</td>
<td>105.2</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 58</td>
<td>101.0</td>
<td>104.2</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 59</td>
<td>101.2</td>
<td>104.8</td>
<td>Diseased</td>
</tr>
<tr>
<td>No. 60</td>
<td>Chronic case. Lesions on nasal septum. No test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 61</td>
<td>Farcy and nasal lesions. No test</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Blood from all of the above horses was drawn and forwarded for serum test and found positive.

Report VIII.

All of the horses below showed very slight swelling, no depression or loss of appetite and temperatures shown and were negative to the serum test for glanders.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Maximum temp. before injection</th>
<th>Maximum temp. after injection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 62</td>
<td>101.7</td>
<td>101.0</td>
<td></td>
</tr>
<tr>
<td>No. 63</td>
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</tr>
<tr>
<td>No. 64</td>
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</tr>
<tr>
<td>No. 65</td>
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</tr>
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<td>No. 66</td>
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<td>No. 67</td>
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<td>No. 68</td>
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<td>101.1</td>
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<td>No. 69</td>
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<td></td>
</tr>
<tr>
<td>No. 70</td>
<td>100.1</td>
<td>100.4</td>
<td></td>
</tr>
<tr>
<td>No. 71</td>
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</tr>
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</table>

In every instance where blood samples were drawn, every antiseptic precaution was taken, blood was taken from the jugular vein, after small area had been clipped and disinfected, each horse was numbered with paint or hoofbrand, together with a complete description for record. Each bottle was number labeled and immediately forwarded to the Chief of the Bureau of Animal Industry, care of the pathological division, Washington, D. C.

In concluding, I might add that it is my opinion that mallein is a most positive test for glanders, when carefully used by the experienced veterinarian. I do not deem it advisable to try to test with mallein; the horses we term 159.
"range or unbroken." Should I deem it advisable in the future to test out this class of horses, due to exposure to glanders, I would take blood from the jugular vein and forward it to the laboratory at Washington for serum diagnosis, and if positive, I would destroy them, as I would if they were positive reactors to the mallein test.

In the work of testing and selecting blood samples, I am in debt to the following veterinarians for their valuable assistance:


For the making of the serum tests, I am indebted to the employees of the pathological division of the Bureau of Animal Industry, at Washington.

THURSDAY, DECEMBER 5, 1912
MORNING SESSION.

President Ravenel called the meeting to order at 10 o'clock A-M.

The President: We have with us Mr. Lively, who asks the privilege of the floor for a few minutes to present a matter of importance to the Association.

(On account of lack of space the first part of Mr. Lively's remarks has been omitted.)

Mr. D. O. Lively: It is with pleasure that acting for the President and Directors of the Panama-Pacific Universal Exposition to be held in San Francisco in 1915, I have the honor to extend to the United States Live Stock Sanitary Association a cordial invitation to hold its 1915 meeting in San Francisco.

This city has been selected by Congress, with the approval of the President of the United States, as the official site for celebrating the uniting of the waters of the Pacific and Atlantic through the Panama Canal, the greatest physical accomplishment achieved by man. The exposition will not only attempt to show that which is most advanced in invention, most interesting in art and of greatest scientific value, embracing all that is most important in the material progress of the world, but it will be the aim of the directors to make it rank in intellectual interest above all previous expositions; to bring together so much wisdom, so much of practical scientific thought, and so much of broad grasp of the world's important problems, that the progress of mankind shall be advanced a quarter of a century.

To assist in achieving this aim, we invite your presence in the city of San Francisco in the year 1915.

I trust, Mr. President, and gentlemen of this Association, that you will accept that invitation, and that you will assist in arranging for an international congress of men who are engaged in the same scientific work that occupies your attention. I thank you.
The President: You have all heard this invitation. The Executive Committee has considered this matter and it seems to us to be a great opportunity for the association, but I don't think any of us are in a position to say at the present moment what we are going to do and what we will not do.

(A motion was made that the chair be instructed to appoint a committee to take the matter of the 1915 meeting under consideration; which motion was duly seconded and carried.)

Dr. Gibson: I would like to move that the Secretary be instructed to tender the thanks of this Association to the Panama-Pacific Exposition Committee as represented by Mr. Lively, and that he forward a copy of this resolution to the committee.

(Motion duly seconded and carried.)

REPORT OF THE COMMITTEE ON LEGISLATION.

Your committee begs leave to submit the following as its report on legislation for the period covered since our last meeting:

The present year may be termed an off year in so far as the enactment of livestock sanitary legislation by the various states is concerned. Most of the state legislatures which meet biennially convene during the odd year and of course nothing has been promulgated by these states during 1912. One of the few states which has the biennial session during the even years is Kentucky, and during the last few days of the session in March a carefully drawn up bill was introduced which would have had the effect of nullifying the present law regarding the tuberculosis test of cattle within the state, and of preventing any city or town in the state from requiring the tuberculosis test of cattle furnishing such city or town with milk or other dairy products. This reactionary legislation passed both the Senate and the House, but happily was vetoed by Gov. McCreary after he had called a public meeting for the purpose of hearing discussions on the merits of the bill, several of the members of this association taking part in this discussion.

Very few state legislatures which meet annually have, so far as your committee is aware, promulgated new legislation along the line of livestock sanitary measures.

In August, 1912, the General Assembly of Georgia appropriated $15,000 annually for the eradication of the cattle tick. Regulations were also adopted to prevent the spread of hog cholera, and to quarantine against the disease. Another regulation calls for the endorsement by the Federal Bureau of Animal Industry of all veterinary biological products offered for sale in Georgia, and the State veterinarian is required to issue a permit allowing such sales. Furthermore all sales of such products must be reported to the State veterinarian. Alabama has a somewhat similar law regarding the endorsement and sale of veterinary biological products.

With the growing use and abuse in veterinary practice of serums, antitoxins and vaccines, there seems to be great need for federal legislation to supervise the preparation of such products for interstate commerce, similar to the authority which has been given the U. S. Public Health Service relative to similar products for use in human medicine. Biological remedies have an important place in the field of sanitary medicine and this field is constantly becoming larger and more important. Some of these products, however, have
been found to be frauds and a menace to the live stock industry. One of the most unpleasant developments of the recent outbreak of forage poisoning in various sections of the United States was the great amount of "faking" which was carried on through the exploitation of various biological products. Numerous kinds of different serums, vaccines, etc., developed like mushrooms and were exploited in almost every community devastated by the disease. Congress has been requested for the past two years to supply the necessary legislation to prevent such occurrences, but thus far without result. The need for this control is deemed of such importance that your committee would respectfully recommend that the subject be referred to the Committee on Resolutions for appropriate action.

It is further suggested that state officials should cooperate with the future Committees on Legislation, by sending all newly enacted legislation to the respective chairman.

Your committee anticipates that next year a more encouraging report will be forthcoming in so far as constructive legislation is concerned, since several western states and one or more eastern states have been gathering together the best features of rational and successful sanitary legislation with the view of having them enacted into law at next year's sessions of their respective legislatures.

Respectfully submitted,

J. R. MOHLER, Chairman,
C. A. CARY,
S. H. WARD.

REPORT OF THE COMMITTEE ON FINANCE.

Your Committee on Finance beg to report that we have checked statement of the Secretary-Treasurer and find same to be correct as follows:

Receipts ............................................$1,099.14
Expenses ........................................... 580.14

Balance in Bank ..................................... 519.00
Bills receivable from program advertising............ 270.00

Total Balance ..................................... $789.00
All of which is respectfully submitted.

W. F. CREWE, Chairman.
F. JUCKNISS.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

The following resolutions were presented by the Committee and all were duly adopted by the Association:

RESOLVED, that we recommend to the Federal Government and various State authorities, within and without the quarantine area, that they modify their present laws so as to prohibit the movement or transportation of cattle, horses or mules which are actually carrying fever ticks on their bodies.

WHEREAS, this Association has always advocated and encouraged tick eradication, and

WHEREAS, tick eradication is the key to live stock industry of a large area of the United States; and

WHEREAS, it is of vital economic importance to all the people of the United States; therefore,
BE IT RESOLVED, that the United States Live Stock Sanitary Association request Congress to increase the Federal appropriation for tick eradication work.

RESOLVED, I. That the use of the Dorset-Niles-McBryde serum should be limited to its proper application in connection with sanitary control and eradication of hog cholera and that as a rule it should be administered only by competent persons under official supervision.

II. That only officially authorized State and Federal persons should be permitted to use hog cholera virus in connection with serum.

III. That the production of all hog cholera serum that is to be sold interstate should be under the Federal supervision; and that all hog cholera serum handled intrastate should be under State supervision.

WHEREAS, it has come to the attention of this Association that certain serums, antitoxins, vaccines and analogous products have been found to be unsafe, unreliable, and a menace to the live-stock industry of the country;

RESOLVED, that Congress confer upon the Secretary of Agriculture the authority to permit the importation of these biological products under such regulations as he may deem necessary and that the preparation, sale and distribution of such products within the United States by establishments engaged in interstate commerce be under the supervision of and subject to the regulations of the U. S. Department of Agriculture;

RESOLVED, that copies of this resolution be forwarded to the Chairman of the Committee on Agriculture and Forestry of the U. S. Senate and to the Chairman of the Committee on Agriculture of the U. S. House of Representatives.

WHEREAS, the fact of the transmissibility of many animal diseases being now well established and

WHEREAS, the majority of medical schools do not include the subjects of comparative pathology as hygiene in their curricula; therefore

BE IT RESOLVED, that this Association urge the establishment of such chairs in all Universities where medical instruction is given, and

BE IT FURTHER RESOLVED, that copies of this resolution be transmitted to all institutions of medical training.

WHEREAS, a member of this Association has admitted on this floor that the Live Stock Sanitary Board of which he is a member is violating a resolution of this Association pertaining to the lay testing of cattle for tuberculosis, and

WHEREAS, this Association considers such methods inaccurate and dangerous; therefore

BE IT RESOLVED, that the Board of which he is a member show reason why it should not immediately discontinue this practice, and

BE IT FURTHER RESOLVED, that all certificates for interstate shipments issued by the Sanitary Board of the State of Wisconsin be not accepted by other State Live Stock Sanitary Boards, which are members of this Association.

WHEREAS, the success of any Association is mainly due to the efforts of the officers,

WHEREAS, this Association has reached its present standing as the leading and most influential live stock sanitary Association of the world, largely through the untiring efforts of its present Secretary.

BE IT RESOLVED, that this Association express its appreciation of the good work done by Prof. J. J. Ferguson.
REPORT OF THE COMMITTEE ON UNIFORM REGULATIONS.

Section 1. The importation by railroad, boat, in wagon, by express or other common carrier, on hoof or in any other manner of live stock diseased or exposed to disease into the State of ............is hereby prohibited; and to determine which fact the following regulations shall be observed by all persons, firms, transportation companies, corporations, express companies and other common carriers, State veterinarians and all other officials, State and Federal, authorized to inspect and issue certificates of health for live stock.

Sec. 2. It is hereby ordered that any person, firm, corporation or any common carrier wishing to import bulls, work oxen or female cattle over six months old not intended for immediate slaughter, into the State of ............ must procure before shipment a health certificate and a tuberculin test chart in triplicate from a veterinary inspector of the Bureau of Animal Industry, the State veterinarian or assistant State veterinarian, of a veterinarian whose competency and reliability are certified to by the authorities charged with the control of diseases of domestic animals in the State from which the cattle are to be transported or moved. The original of this health certificate and tuberculin test chart must be attached to the waybill. The duplicate health certificate and tuberculin test chart must be sent to the State veterinarian or proper official at destination in ample time to reach him before the arrival of the cattle. The triplicate health certificate and tuberculin test chart must be sent the proper State official at place of origin. The health certificate and tuberculin test chart must show that the cattle are free from Texas fever ticks and symptoms of tuberculosis and all contagious, infectious and communicable diseases. The tuberculin test chart must show that at least three temperatures were taken before injection of tuberculin two to three hours apart and five temperatures were taken after injection two hours apart, beginning ten hours after the tuberculin was injected.

Sec. 3. It is hereby ordered that any person, firm, corporation or any common carrier wishing to import horses, mules or asses into the State of ............ must procure before shipment or movement in any other manner a health certificate and a mallein test chart in triplicate from a veterinary inspector of the Bureau of Animal Industry, the State veterinarian or assistant State veterinarian, or a veterinarian whose competency and reliability are certified to by the authorities charged with the control of diseases of domestic animals in the State from which the horses, mules and asses are to be transported or moved. The original, duplicate and triplicate copies of the health certificate and mallein test chart shall be handled as certificate and tuberculin test chart as provided for in Section 2. The health certificate and mallein test chart must show that the horses, mules or asses are free from symptoms of all contagious, infectious and communicable diseases, and the test chart must show that at least three temperatures two to three hours apart were taken before injection and five temperatures were taken after injection two hours apart, beginning ten hours after the mallein was injected.

Sec. 4. It is hereby ordered that any person, firm, corporation or any common carrier wishing to import sheep or goats into the State of ..........., for purposes other than immediate slaughter, must procure before shipment or movement in any other manner a certificate of inspection issued by an inspector of the United States Bureau of Animal Industry, certifying that the sheep or goats are free from symptoms of any contagious.
infectious or communicable disease, including scabies, and that they have been dipped once within ten days of time of entry into the State in either a nicotine or lime-and-sulphur dip which has been approved by the United States Bureau of Animal Industry. Provided, however, that sheep and goats not accompanied by certificate as above indicated may be shipped by rail or boat to points within the State of ................. if billed to or through public stock yards where Federal Government inspection is maintained, and there unloaded and dipped under the supervision of an inspector of the United States Bureau of Animal Industry.

Sec. 5. It is hereby ordered that any person, firm or corporation or any common carrier wishing to import swine into the State of ................. for purposes other than immediate slaughter, must procure before shipment or movement in any other manner a health certificate in triplicate from a veterinary inspector of the Bureau of Animal Industry, the State veterinarian or assistant State veterinarian or a veterinarian whose competency and reliability are certified to by the authorities charged with the control of diseases of domestic animals in the State from which the swine are to be transported and moved. The original, duplicate and triplicate copies of the health certificate shall be handled as certificates and tuberculin test chart as provided for in Section 2. The health certificate must show that the swine are free from symptoms of all contagious, infectious and communicable diseases and have been immunized against hog cholera by the Dorset-McBryde-Niles serum not more than thirty days prior to shipment.

Sec. 6. It is hereby ordered that cars, boats and other vehicles used in the transportation of all live stock into or within the State of ................. shall first be cleaned of all litter, washed and disinfected with a mixture made with not more than 1½ pounds of lime and ½ pound of pure carbolic acid to each gallon of water, or liquor cresolis compositus (U. S. P.) (6) six ounces to every gallon of water.

J. A. KIERNAN, Chairman.
M. E. KNOWLES.
J. I. GIBSON.

The above amended report was adopted.

REPORT OF THE COMMITTEE ON TICK ERADICATION.

The report of this committee was adopted as read and referred to the Bureau of Animal Industry.

REPORT OF THE COMMITTEE ON COMPETITIVE TICK ERADICATION WORK.

Mississippi.—In all, seven county live stock associations were organized and each worked for the prize. Each county has not less than 75 vats. The counties and the state spent a total of $32,000 and the Bureau of Animal Industry spent in the counties $13,500. In all but two of these counties 95 per cent of the cattle were dipped regularly every two weeks from spring to fall. One county made 70,000 dippings each month. Oct. 23rd at the State Fair the committee on awarding these prizes (Dr. Tait Butler, H. E. Blakeslee and Prof. Archibald Smith) decided from the records furnished that the counties did such meritorious work that each county should receive 1 beef bull and dairy bull. They were given to the County Live Stock Associations which agreed to look after the welfare of the cattle.
REPORT OF THE SECRETARY-TREASURER.

During the past year there has been a steady increase in routine correspondence owing to a constantly growing interest on the part of our members in the work of the Association. There has also been a large amount of correspondence with various livestock associations, agricultural and livestock papers covering the entire country. The thanks of the Association are due our newspaper friends for the large amount of free space they have given us whenever called upon. Many of the papers which appeared in our Fifteenth Annual report were quoted or reproduced in the leading livestock papers over the country. In this way the influence of this Association has been widely extended to reach those actively engaged in the livestock industry.

We had a large amount of correspondence with legislators and officials of various States where primary or revised legislation was under consideration by the legislature. I suggest the desirability of appointing a standing committee, which might properly be known as the "Advisory Committee on Legislation" to which could be referred all important questions from States requiring advice on legislation problems. Such a committee should grow into a strong connecting link between this Association and the various State Legislatures.

The editing and publication of the Annual Report involved much detailed work, which was most ably and cheerfully handled by Dr. O. E. Dyson and Dr. John R. Mohler. Again I regret to report a conspicuous lack of interest on the part of state officials in furthering the legitimate object and purposes of copies were sold in 1912 than were sold in 1911, whereas our membership showed a very large increase. This report is of great interest and value to many people not directly connected with the Association. I want to urge upon our members that they are overlooking a chance for doing helpful work for the livestock interests of the country when they fail to interest the right people among their acquaintances in securing copies.

Since our 1911 meeting there has been a splendid increase in interest on the part of State Officials in furthering the legitimate objects and purposes of the Association. The success of this organization depends upon the interest and support of individual members. The measure of success which we have enjoyed is directly due to the hearty cooperation of our members, but there yet remain many State officials outside our membership.

Three years ago the Association had 42 members. At this date we have 149 members in good standing and a number of applications awaiting acceptance. The Association should have a membership of 500.

I beg to present herewith my report as Treasurer covering period from November 30, 1911 to November 30, 1912.

Receipts.

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Expenses.
Printing, stationery and circulars .......................... 576.74
Exchange on checks deposited ................................. 2.40

580.14

Balance on hand November 30, 1912 ......................... 788.00

Detailed items of receipts and expenses are attached herewith together with vouchers covering all expenditures.
All of which is respectfully submitted.

J. J. FERGUSON, Secretary-Treasurer.

REPORTS OF STATE LIVE STOCK SANITARY OFFICIALS.
CONNECTICUT.

Connecticut is making some progress along the line of protecting the dairy and cattle interests against bringing into this state diseased cattle from other states, as the general assembly of 1911 passed a law forbidding any cattle being brought into this state except they were accompanied either by a certificate of health approved by the state official having charge of the diseases of domestic animals in the state from which they were shipped, or by a permit issued by the Commissioner on Domestic Animals of this State. I have formulated rules and regulations which provide that cattle brought into this state for dairy or breeding purposes under permit issued by this office shall be subjected to the tuberculin test, supplemented by a competent physical examination at the expense of the owner by a veterinarian approved by this office. Working oxen or steers brought in under a permit may be released by physical examination. Cattle may be brought into this State under a permit for immediate slaughter under proper inspection at the time of slaughter.

In regard to the work of suppressing bovine tuberculosis in this state, the commissioner is limited to "a competent physical examination" in condemning cattle. During the past fiscal year ended Sept. 30, 1912, 661 cattle were condemned, which is only a few more than have been condemned each year for several years past. I have not felt in the past that we were making any progress here in the work of stamping out the disease, as under our old law Connecticut was being made the dumping ground for diseased cattle that could not be shipped in to other states, or that were being "tested out" by farmers and dairymen in other states in their efforts to clean the diseases out of their herds.

H. O. AVERILL, Commissioner on Domestic Animals.

FLORIDA.

Legislation needed here is more particularly a law requiring the mallein test for horses and mules entering the state, as most of my time is taken up investigating glanders brought into the state. It may be that we have ample power under our existing "glanders law" to promulgate a regulation requiring mallein test record and also tuberculin test record. The latter is not noticed here yet. Florida-raised cattle are singularly free from tuberculosis. We have it here, however, in dairies where cattle have been imported. Cattle are only housed in Florida long enough to milk them. Hence the chances of infection which obtain in colder climates are few here.

CHAS. F. DAWSON, Veterinarian State Board of Health.
The work of the Veterinary Department of Iowa is progressing quite favorably, in some respects possibly better than ever before. The Animal Health Commission has in view a number of questions that must be dealt with in the near future, but on account of lack of funds at the disposal of the Veterinary Department certain rulings contemplated by the Animal Health Commission have not yet been promulgated—we are awaiting the action of the Legislature. Chief among these projects in mind is the control and eradication of hog cholera. The writer is willing to stake his reputation on the statement that hog cholera may be quite successfully controlled, even entirely eradicated. We are to ask for a liberal appropriation for this purpose and in the appropriation bill we hope to have it specifically stipulated as the duty of some person or officer in each township to immediately notify the State veterinarian of the appearance of disease of any kind in a herd of hogs in his township. This duty may best be assigned to the township clerk.

We further expect to ask the Legislature to give the State veterinarian a field staff of not less than four veterinarians who shall devote all their time to sanitary work in the State who shall be appointed by the Governor with the approval of the state veterinarian or Animal Health Commission and who shall be men especially qualified to diagnose and handle contagious and infectious disease—in other words real sanitarians of character and ability. With four or six such men distributed in districts throughout the State, much better work can be accomplished in the control and eradication of contagious, infectious and communicable diseases of live stock. We now consider the Dorset-McBryde-Niles hog cholera serum a reliable preventive, one that properly and intelligently used will prevent the widespread outbreaks of cholera by taking prompt action in connection with initial outbreaks on the initial premises.

A movement has been launched by the live stock interests of Iowa to secure an appropriation for the purpose of indemnifying owners of live stock where the destruction of such is recommended by the state veterinarian or Animal Health Commission. The first to act in this respect was the State Dairy Association, which unanimously adopted the following resolution:

"Inasmuch as the Legislature of Iowa has not, at any of its sessions, appropriated money to be used for the purpose of indemnifying owners of stock found to be diseased, and its destruction, recommended by the Veterinary Department of the state, and whereas the members of the Iowa State Dairy Association believe such a fund should be set aside for such purpose;

"Be it resolved: By the officers and members of this Association in annual convention assembled, that we favor the appropriation of $50,000 annually to be used by the Animal Health Commission in such a manner as may be determined by the Legislature for the purpose of indemnifying owners of domestic animals, when in the opinion of the state veterinarian and the Animal Health Commission, such animals should be destroyed to prevent the further spread of such disease.

"Be it further resolved: That a copy of this resolution be spread upon the minutes of this Association, and the secretary be instructed, to present a copy to the Speaker of the House and the President of the Senate of the Thirty-Fifth General Assembly."

The department is meeting with some difficulty in attempting to prohibit the importation of diseased stock, especially tubercular cattle by unscrupulous dealers. During the past summer we have tested a number of shipments inspected by unreliable veterinarians whose health certificate and test record
was not worth the paper it was written on. The results of our placing such herds in quarantine and retesting at the proper time has shown over 50 per cent of the cattle so shipped to be tubercular. We have not yet decided how we can effectively prohibit these shipments. A majority of the shippers and immigrants are perfectly willing to comply with the regulations of the state and submit their animals to proper test, but there are a number of individuals who resort to all known methods of escaping the requirements and deceiving the authorities in control. However, I presume we have no more trouble along these lines than the departments of other states. Tuberculosis in hogs is becoming more serious and we are taking special steps to clean up and eradicate this disease as often as we can trace it to a given point. One packing company has started a system of tattooing hogs and with each tattoo is a number, a key to the name and address of the owner of the hogs. When such hogs are found to be tubercular we can readily trace them back to the premises from which they came, even though they be in a mixed load. When we receive such information we go to the premises to investigate the conditions, and when necessary test the cattle on the premises in the hope that we may soon be able to cut down the percentage of tuberculosis found in hogs and cattle.

The most vexing problem in regard to glanders is connected with the shipments of unbroken horses, and it is impossible to make a proper test on such horses at origin or destination of shipment. The Animal Health Commission may yet deem it advisable to issue a ruling forbidding the importation of unbroken horses into the State of Iowa.

J. I. GIBSON, State Veterinarian.

KENTUCKY.

The work in live stock sanitation and of the study and eradication of infectious diseases of stock in Kentucky is at the present time making rapid strides. It is the aim of the Kentucky Experiment Station, the State Live Stock Sanitary Board and the state veterinarian to aid the farmer in every way possible in preventing and curing diseases among his herds and flocks.

At the present time great strides are being made in the distribution of hog cholera serum among the farmers of this State as a preventive of hog cholera. The demand for the serum has rapidly increased until at the present time two competent veterinarians are now employed by the Experiment Station for the purpose of immunizing hogs in all sections of the State and to teach veterinarians how to use the serum properly. The serum is manufactured and dispatched from the laboratories of the Kentucky Agricultural Experiment Station, under the supervision of Professor E. S. Good, head of the Division of Animal Husbandry. The serum is sold to the farmer at a partial cost of production and a competent man furnished to administer it without charge for his services. The present quotation on serum is 1 cent per cubic centimeter. The last Legislature made an ample appropriation to the Experiment Station for a new laboratory and other buildings for the purpose of preparing serum in large quantities. A contract was recently let for a serum laboratory to cost $10,500.

The Experiment Station co-operates with the State Live Stock Sanitary Board in studying and suppressing outbreaks of infectious diseases, such as blackleg, whenever time permits.

Kentucky sustained a heavy loss from the feeding of moldy corn to horses, cattle and mules during the past winter and spring.

The loss in Kentucky from contagious abortion in both cattle and horses is heavy.
The Kentucky Legislature of 1910 created a State Live Stock Sanitary Board. This Board at once undertook the eradication of the disease of scabies from the sheep of the State. The State had already been quarantined by the Federal Government on account of this disease. The State Live Stock Sanitary Board secured the co-operation of the Bureau of Animal Industry, Washington, D. C., in this work. Dr. A. J. Payne of the Bureau was made chief inspector. Eight Bureau men were detailed in the State for the purpose of visiting the different county live stock inspectors for the purpose of teaching these men how to diagnose and treat sheep scab and to see to it that the actual work was properly done. The first official inspection of sheep for sheep scabies in the State of Kentucky took place in 1910. On February 2, 1912, Dr. A. J. Payne reported to the Board that scabies had been found to exist in sixty-one counties, and that more than 1,150 flocks containing 42,000 head of sheep were found to be infected with this disease. More than 800,000 inspections had been made. On reinspection after treatment, through the agents of the Bureau of Animal Industry and the work of the County Live Stock Inspectors, 95 per cent of the sheep treated were found to have been cured. This work was continued through the year 1912, and that part of the State west of the Green River found to be free of scabies was released from Federal quarantine. On July 19 every flock of sheep found to be affected with sheep scabies had been treated with the exception of one flock. The second reinspection, this fall showed only five or six flocks of sheep in the state to have the disease. They are now being treated, and the spring inspection will in all likelihood show the State so free of this trouble that the Federal quarantine will be lifted. Through the co-operation of the Federal and state officials this work has been thoroughly and rapidly done, and Kentucky today is freer of scabies than ever before in her history. The present members of the State Live Stock Sanitary Board are as follows: Hon. J. W. Newman, Commissioner of Agriculture, Chairman; E. S. Good, Animal Husbandman of the Kentucky Experiment Station, and G. N. McGrew, Fred R. Blackburn, H. M. Froman, who are members of the State Board of Agriculture.

On account of its not being definitely proven that the disease affecting horses in Kansas and Nebraska during the past summer and fall to be non-contagious, the State Live Stock Sanitary Board issued a proclamation quarantining against the movement of horses and mules from the states mentioned into Kentucky. The Board removed the quarantine as soon as it was determined by the Bureau of Animal Industry to be non-infectious.

During the year the State Live Stock Sanitary Board appointed Dr. Robert Graham State veterinarian. Dr. Graham will work in conjunction with the State Board of Health, State Live Stock Sanitary Board and the Experiment Station. The office of the State veterinarian will be at the Experiment Station, Lexington, Ky.

With the aid of the inspectors of the Bureau of Animal Industry and the former state veterinarian, Dr. F. T. Eisenman, practically all the cattle supplying milk to the city of Louisville have been tested for tuberculosis, notwithstanding that there was considerable opposition to the test. The dairymen in Fayette County submitted to the test but not until this spring when Governor McCreary vetoed the bill which passed the last session of the Legislature, making the tuberculin test non-compulsory. The attitude of the dairymen since this bill was vetoed has changed markedly and many applications are being made to have herds tested. There are also many scattered herds of pure bred cattle which have been tuberculin tested, but it is believed that Kentucky will probably never make great progress toward eradicating the disease of bovine tuberculosis until more suitable legislative
measures are adopted. The average cow owner in this state is in favor of the test but seriously objects to sustaining the loss of the reactors. A move is now under foot whereby a bill will be presented at the next Legislature which will provide an indemnity for reacting animals, as well as making the test gratis to the owners of herds. This bill will undoubtedly pass the Legislature if the dairymen stand united in favor of its passage. At the present time glandered animals are destroyed without opposition, as an indemnity is paid.

ROBERT GRAHAM, State Veterinarian.

LOUISIANA.

Respecting new legislation we have the pleasure to report that the last legislature increased our appropriation $5,000 per annum, $2,500 additional for general sanitary control work, and $2,500 for office expenses. This additional fund having been available for the past four months has enabled us to carry into effect excellent field control work in combating contagious and communicable outbreaks.

Anthrax.—Anthrax has been extremely prevalent this season, having manifested itself in eighteen parishes, in twelve of them simultaneously. From personal investigations and reports of inspectors, the mortality from this disease during the past year I have estimated at approximately eight thousand head. With more available funds for fighting this disease, however, and the application of special regulations for its control, there have been universally satisfactory, concerted sanitary precautions observed, respecting its combatment.

Hog Cholera.—There have been but few extensive outbreaks of this disease in the State during the past ten months, and our hog cholera plant operated and maintained under the supervision of this Board has had no difficulty in promptly supplying all requests made upon us for serum. We are extremely gratified with the excellent results of our hog cholera serum which has proven protective to a degree of eighty per cent universally, and where used by ourselves and assistants as high as ninety per cent. During the past year we have manufactured and distributed eighteen thousand doses of potent serum, all of which was properly tested before prepared for distribution.

In the production of hog cholera serum we have endeavored to adopt modern suggestions relating to its preparation, together with a uniform system, with the view of producing a standard quality permanently, of marked efficiency.

Blood collected from the throats of infected hogs, inoculated with acute virulent material, is finally prepared into one mixture, after same has been properly defibrinated. Our available hyper-immunes are then placed upon the scales and weighed, and for every one pound weight, there is injected intra-venously, five c. c. of this infectious serum. When the bleeding of each hyper-immune thereafter is effected, the same careful defibrinization is observed, and the serum thus obtained phenolized and stored in a refrigerator. After a number of such bleedings from various hyper-immunes have been thus collected, there is a general mixture made from the aggregate which is bottled after being properly tested. This method has proven highly satisfactory to us, and insures the distribution of a product of uniform standard and potency.

Glanders.—Seven outbreaks of glanders have been investigated by this Board during the past year, and proper sanitary control work instituted re-
specting suppression of same. The total number of animals destroyed as the result of mallein test and upon physical examination being forty-five head.

**Spinal meningitis.**—Several outbreaks of this disease have been reported from various localities, the majority of these animals having received damaged corn.

The importation of all live stock into this state must be accompanied by a certificate of inspection given by a qualified veterinarian, endorsed by the Live Stock Sanitary Board or state veterinarian, of the State in which shipment originates, or certificate given by a B. A. I. inspector at least twenty-four hours preceding the shipment of such live stock. Additionally, we require that all cattle shipped into this state for breeding and dairy purposes be accompanied by a tuberculin test chart showing their freedom from tuberculosis.

Louisiana State Live Stock Sanitary Board,
E. PEGRAM FLANDER, D. V. S.,
Secretary and Executive Officer.

**MICHIGAN.**

There has been no new legislation during the past year concerning live stock sanitary control work in this state. The legislature will convene in January, 1913, and it is not advisable to discuss the prospects of new legislation at this time.

The need of new legislation is apparent. The testing of cattle and horses and the examination of other live stock for interstate shipment is not satisfactorily performed in this state. It is hardly worth while to discuss the reasons for this at this time. The state veterinarian is aware of the weaknesses and evils which exist and is attempting to remedy these conditions. In the future we will answer the question of how successful he may be.

A question which we believe only time will answer is this: Can official tests be made satisfactorily by practicing veterinarians, or must this work be done by public officials paid by the public? The unusual wide-spread prevalence of hog cholera in this state is quite notable. We are making the Dorset-Niles serum in larger quantities than ever before, and its use is becoming more common amongst the hog raisers, but there is an enormous loss due to deaths from this disease in Michigan, which is not considered a large hog-raising state. We send both this serum and virus out to any responsible person, either professional man or layman, and this material may be administered by anyone at the discretion of the owner of the pigs. This is far from being an ideal method of dispensing this valuable prophylactic. A question in connection with this matter is not solved in our minds: Shall the serum-simultaneous method be employed by any except professional men who have received special training in this work and who are public officials working at public expense?

These are the matters which concern us at the present time in Michigan. Our state has the following law governing the entrance of breeding and dairy cattle imported from other states, but there is evidence that this law is ignored by shippers and not properly enforced by the officials of this state. This, we believe to be a matter which will eventually solve itself after a process of education:

"Sec. 25. The importation of cattle into the state for breeding or dairy purposes is hereby prohibited, excepting when such cattle are accompanied by a certificate of inspection made by a duly qualified veterinary surgeon,
who is a graduate of a recognized veterinary college in the United States, Canada or Europe. Such certificate shall show that at the time of said inspection and within sixty days prior to shipment said cattle had been subjected to tuberculin test and were free from tuberculosis. Duly certified certificates of inspection, giving in full the temperature records of the tuberculin test, must be prepared in triplicate, one of which is furnished the shipper, one furnished the transportation company hauling the cattle, and one forwarded immediately to the president of the State Live Stock Sanitary Commission. The expense of such inspection and certificate shall be paid by the owner of the cattle."

WARD GILTNER, State Veterinarian.

MISSISSIPPI.

In the laws, rules and regulations governing the Live Stock Sanitary Board of this State provision is made for interstate shipment of cattle to be used for breeding and dairy purposes. The additional legislation we hope to enact at the next meeting of our legislature will be along the improvements of certain rules governing the tick eradication work. We have no provision made for infectious or contagious diseases other than tick eradication and hog cholera work.

The State veterinarian has assistant veterinarians who are located in different sections of the State and are paid when they work by the people for whom the work is done and by the County Board of Supervisors, who are authorized to make such appropriations as are necessary to eradicate diseases of animals.

We also require certificate of health for animals other than cattle being shipped into this State.

E. M. RANCK, State Veterinarian.

MISSOURI.

Anthrax.—The State has had two outbreaks of anthrax. In both instances they were promptly placed under control and the loss was very light.

Forage Poisoning in Horses.—During the latter part of September and the first of October, it looked for a time as if we might have considerable loss in horses from forage poisoning in the western part of the State. However, cool weather rapidly checked the disease and the loss was perhaps less than 7 head.

Glanders.—Glanders shows a more decided decrease in the number of cases reported than any previous year; in fact for the whole year we will have less than 30 cases for the entire state.

Hog Cholera.—The state is passing through one of the worst outbreaks of hog cholera in its history. The disease covers practically the entire state. The infection was unquestionably carried over from last year and unless some radical measures are adopted, looking to the control of hog cholera, the loss will unquestionably continue indefinitely. We believe that hog cholera should be looked after the same as any other contagious or infectious disease. The immediate quarantine and disinfection of the premises, the proper disposition of dead carcasses and the prompt use of serum will assist materially in solving this problem.

Rabies.—The state has been very fortunate in the number of outbreaks of rabies; in fact we have had only two reports of rabies in livestock. Several cases in dogs have been reported, but perhaps less than any former year.

Sheep Scab.—As to sheep scab, we have had, up to the present time, 17
cases of infection reported. We are giving this our prompt attention and hope to eradicate this disease, as much as possible from the state within the next year.

Swamp Fever.—We have received reports of several cases of swamp fever, especially from the southeastern part of the State; in fact we are inclined to believe that this disease is on the increase and should receive more careful attention the coming year.

Tick Eradication Work.—In our tick eradication work in January, 1912, we had parts of four counties under State and Federal quarantine for tick infection. We have eliminated the ticks from three of the four counties and reduced the infection in the fourth until it will require only a limited amount of work next year to eradicate the disease from that county. On August 19, of this year, we caused to be issued a proclamation against the movement of cattle from tick-infested areas to free areas and vice versa. This proclamation also covers drifting, which was very dangerous and caused us considerable annoyance. The proclamation has been of wonderful assistance to us and has helped us very materially in solving the tick problem.

Tuberculosis.—In the tuberculin work we have tested over 10,000 dairy and breeding cattle and have condemned 376 head for tuberculosis, showing a little less than 4 per cent diseased animals in this state. It was necessary to take my three field veterinarians out of the tuberculin work on June 1, to look after the tick eradication work in the southern part of the state, otherwise we would have tested a great many more cattle.

All lines of work have proceeded satisfactorily, and we feel that we have made considerable progress along the lines of sanitary control. In addition to the above, our greatest need is more funds; in fact we have been unable to attend to a great deal of work that was of vital importance to the state on account of our funds being exhausted. We trust that the next legislature will be more liberal in its appropriation and will see the necessity of providing more funds for the proper protection of the live stock interests of this State.

S, SHELDON, State Veterinarian.

NEW YORK.

No new legislation was enacted during the past year in reference to the control of infectious diseases of animals in this State.

The present statute prohibits the shipment of live stock into New York State unless free from an infectious or contagious disease and provides for the due examination of breeding and dairy cattle. This is considered to mean a tuberculin test.

Tuberculosis and glanders are the most important diseases with which we have to contend.

During the past year more cattle have been tuberculin tested in this state than in any one previous year. The number of diseased animals so detected, when compared with the total number of dairy cattle in the state, has no appreciable effect in suppressing the disease. The testing of all cattle and the destruction of reactors is impracticable because of the large percentage of tuberculous animals in the State of New York.

The opposition of the general public to allowing tuberculous but physically sound cattle to be used, except under rigid restrictions makes it difficult to see any definite prospect of controlling the disease by the use of the tuberculin test, although we recognize tuberculin, when properly used, as the most reliable diagnostic agent for the detection of bovine tuberculosis. The
adoption of a physical examination of all dairy cattle is being strongly urged as a solution of the difficulty and it is probable that some such method will be attempted in the near future.

The test and slaughter of glandered horses offers a somewhat similar economic problem. The control of this disease in the rural districts is not difficult. We encounter the greatest obstacles in city districts where conditions are such as to render segregation of suspected animals impracticable and where the natural resistant powers of the animal itself are lessened and where sanitary conditions are not in many cases satisfactory.

Swine diseases in New York are quite prevalent, but much confusion in relation to the specific causes exist. True hog cholera has been kept under satisfactory control by the use of serum.

Rabies, anthrax, blackleg and other infectious diseases of animals are prevalent in this State, but do not present as serious a problem as do tuberculosis and glanders. A better understanding on the part of the live stock owner and the use of preventive treatment, especially with reference to anthrax and blackleg, have done much to lessen the losses from these diseases.

The following statistics for the fiscal year ending September 30, 1912. will indicate the extent of the work of the Bureau of Veterinary Service of the Agricultural Department which has control of these matters. Our records in reference to diseases other than tuberculosis and glanders are not complete at the present time.

### Tuberculosis

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cattle tested</td>
<td>21,421</td>
</tr>
<tr>
<td>Number reacted</td>
<td>4,178</td>
</tr>
<tr>
<td>Number of localized cases</td>
<td>2,690</td>
</tr>
<tr>
<td>Number of generalized cases</td>
<td>1,117</td>
</tr>
<tr>
<td>Number of no lesion cases</td>
<td>93</td>
</tr>
<tr>
<td>Total appraised value</td>
<td>$253,313.00</td>
</tr>
<tr>
<td>Total indemnity</td>
<td>$186,966.80</td>
</tr>
<tr>
<td>Receipts for cattle and hides</td>
<td>$34,231.34</td>
</tr>
</tbody>
</table>

In addition to the above, which have to do with official examinations there were 12,038 cattle tested in the State of New York by private practitioners, with a small percentage of reactors and about 16,000 cattle tested either before or after entrance into the State which were shipped from other States.

### Glanders

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of animals affected</td>
<td>1,814</td>
</tr>
<tr>
<td>Total number of animals dying prior to appraisal</td>
<td>183</td>
</tr>
<tr>
<td>Total number appraised</td>
<td>1,631</td>
</tr>
<tr>
<td>Total number manifest clinically</td>
<td>1,294</td>
</tr>
<tr>
<td>Total number not manifest clinically</td>
<td>329</td>
</tr>
<tr>
<td>Total number no lesion cases</td>
<td>8</td>
</tr>
<tr>
<td>Total appraisal</td>
<td>$160,801.00</td>
</tr>
<tr>
<td>Total indemnity allowed</td>
<td>$90,891.30</td>
</tr>
</tbody>
</table>

J. G. WILLS, Chief Veterinarian.

NORTH DAKOTA.

We have had no new legislation in this State during the current year. Our legislature meets biennially, the next session occurring in 1913.

As far as legislation is concerned our laws are all that could be desired at this time for carrying on live stock sanitary control work, the only impediment being the lack of sufficient appropriation for extending our serv-
ices in field work in the manner in which we desire. We have always faced a deficiency at the close of the biennial period which restricts our operations. However, I believe that our department is popular with the people and we will be able to have this condition remedied during the coming session.

Our law requires that all cattle imported into North Dakota must be accompanied by a certificate of health, and in case of cattle for breeding and dairy purposes a certificate certifying that such animals over 6 months of age have been tuberculin tested within thirty days prior to shipment and found free from tuberculosis and all other contagious and infectious diseases. The law also requires that the test must be made by a graduate veterinarian whose inspections are endorsed by the official in charge of live stock sanitary work in the State where the inspection is made. The certificate of health and test chart must accompany the shipment and the duplicate be forwarded to this office.

W. F. CREWE, State Veterinarian.

OREGON.

Report of State Veterinarian.

At the present time the state veterinarian is a member of the Oregon State Board of Health, and is under their direct control. We have the supervision and control work of all contagious, infectious, and communicable diseases among animals in the state of Oregon. The law provides for the quarantining of all cases regarded as positive, also the quarantining of all contact and exposed animals to any such disease.

The state veterinarian has full authority to destroy any animals infected with contagious, infectious, or communicable diseases, excepting tuberculosis, which is not a slaughterable disease in the state of Oregon. Besides quarantining and slaughtering, we supervise burying and proper disinfection of infected premises.

Tuberculin test is not compulsory, except for interstate shipment.

The shipment of live stock into the state of Oregon is regulated as follows:

Horses, mules, asses. Physical inspection, with certification that such animals have not been exposed to any contagious disease, prior to shipment. Those used on railroad and construction work must be submitted to the mallein test.

Cattle. Tuberculin test, together with health certificate, excepting for strictly range cattle, or those intended for immediate slaughter.

Hogs. Physical inspection.

The state veterinarian has supervision of the diseases among all animals, excepting sheep, which comes under the supervision of our State sheep inspector, working under the State Board of Sheep Commissioners.

The State does not provide for assistant state veterinarians, but for county veterinarians, appointed by their respective county courts, in case of prevalence of any of the contagious diseases, enumerated in the statutes. Among the chief difficulties that this office has to contend with we have:

1st. Lack of funds to carry out the work properly.

2nd. Lack of co-operation from other boards who are directly or indirectly interested in this work.

3rd. Lack of assistance.

Two years ago, at the meeting of the legislature, a bill was presented, known as Senate Bill No. 43. An act for the eradication and suppression of contagious, infectious and communicable diseases of animals, providing for
the appointment of a State Live Stock Sanitary Board, and providing for its compensation, and fixing its powers and duties; providing for the appointment of deputy state veterinarians and county veterinarians; providing for the compensation in certain cases for animals which may be slaughtered on account of contagious, infectious and communicable diseases.

At the time being, the bill passed both houses, but was vetoed by the governor.

The different live stock organizations have recommended the passage of this bill for next January, and undoubtedly it will be passed, thus transferring the state veterinarian from the Oregon State Board of Health to the State Live Stock Sanitary Board.

After having studied carefully the contents of this bill, I find that it was weak in many points. Deficient as to the power conferred to the state veterinarian, not providing for the necessary funds, and from a standpoint of remuneration, an injustice to the veterinary profession.

This bill needs radical change in many of its sections.

In connection with the present statutes, I wish to bring to your attention the fact that the law does not provide for any compensation for the slaughtering of any animals infected with any infectious disease; an animal infected with such a disease has no property value in the state of Oregon.

J. F. MOREL, State Veterinarian.

Report of Sheep Inspector.

In reporting the activities of the office of State sheep inspector, we are pleased to make mention of the fact that scabies of sheep has been practically eradicated from the flocks of Oregon. At the present writing there is an occasional outbreak of scab in some one of the small farm bands of Western Oregon. These small flocks may at the present time be said to be the principal source of danger to the scab free flocks of the state. The laws governing the control and eradication of diseases of sheep, unfortunately were framed without a full knowledge of the methods of running the small bands of the coast region, where throughout the year small numbers run at will in the thickets and underbrush sections of this region. These sheep are obviously very difficult to gather for inspection or dipping purposes and hence when an infection once becomes existent in this section, it is difficult to get the same results as would be had from dipping an infected band in Eastern Oregon where sheep are run under extensive range conditions. Our present laws provide that, such dips as are recognized by the U. S. Department of Agriculture shall be recognized by the State of Oregon as an official dip. This measure was passed at a time when only the tobacco and the lime and sulphur dips were recognized by the Department of Agriculture. Since the advent of the coal tar and the coal tar creosote dips upon the market with Government recognition upon the submission of a sample and a guaranty that future products would be up to the standard of the sample submitted for analysis, there has appeared upon the market upwards of one hundred of these dips, and while some of these coal tar products are meritorious and up to the standard of efficiency there are others that are not, and as our laws read we are forced to accept the use of certain brands that we practically know are not efficient as a remedy for scabies. Two changes that should be made in our present laws are, a provision wherein owners can be forced to gather sheep for inspection and dipping purposes and an amendment to our present laws giving the Board of Sheep Commissioners power to designate the official dips to be used.

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Outside of sheep scab there are practically no diseases in the sheep of Eastern Oregon. In Western Oregon the fringed tape worm and liver fluke is the cause of considerable losses to the sheep industry.

WILLIAM H. LYLTE.

SOUTH CAROLINA.

New Legislation During the Past Year.

At the last session of the General Assembly the following laws were enacted:

1. An act requiring the immediate burning or burying of all dead animals. Unfortunately public sentiment is not strong enough to require the strict enforcement of this law.

2. An act authorizing County Boards of Commissioners to appropriate funds to be used in co-operation with the state veterinarian and the U. S. Department of Agriculture in the eradication of cattle ticks. Two counties of this state are exempt from this act and the amount to be appropriated in each county was unfortunately limited to $100.

3. An act making it a misdemeanor for a person, firms, or corporations owning or controlling tick infested cattle to fail or refuse to disinfect same in the manner prescribed within five days after being served with written notice by an authorized state inspector.

New Regulations Adopted During the Past Year.

During the past year State quarantine regulations for the control of splenetic fever were modified to provide for the release from Federal quarantine of five additional counties and portions of three others. In all, nine entire counties and portions of three others are now above the Federal quarantine line. An area of over 7,000 square miles has been freed from ticks since tick eradication work was commenced in South Carolina in 1907. This State regulation also provides for the protection of ten additional counties into which tick eradication work has been extended during the past year.

Present Condition of Live Stock Sanitary Work.

At the present time the condition of live stock sanitary work in South Carolina is very encouraging. Increased interest is being shown in the live stock industry and in the control of diseases affecting the same. With the exception of the very severe outbreak of hog cholera which occurred during the past year outbreaks of contagious diseases have been less numerous. The serum plant at the State Agricultural College has been enlarged and we are now able to supply the demand of the citizens of the State. Serum is distributed to stock owners at two cents per c.c. No virulent blood is distributed.

New Legislation.

With the exception of certain amendments of the present laws additional legislation is not expected this year.

South Carolina requires the tuberculin testing of all dairy and breeding cattle over six months of age, this test to be made within thirty days immediately preceding importation.

M. RAY POWERS, State Veterinarian.
TEXAS.

Work accomplished during the past fiscal year, beginning September 1, 1911, and ending August 30, 1912.

1. There have been dipped under the personal supervision of our inspectors 125,296 cattle at points in the red area and certified to for official movement for points above the State and Federal quarantine line—all cattle being dipped two or three times.

2. There have been dipped for tick eradication under personal supervision of State and Bureau of Animal Industry inspectors 209,700 cattle. There have been inspected and found free from ticks by the State and Bureau of Animal Industry inspectors in blue area 114,855 cattle.

3. There have been inspected and found free from ticks by the State and Bureau of Animal Industry inspectors in white area 520,634 cattle. Considering the adverse legislation that we have to contend with, we have found that scab is being successfully eradicated from the white area.

3. During the past fiscal year there have been inspected and certified for official movement 10,740 horses and mules and jacks for movement to points above the quarantine line.

This state has a law requiring all cattle over six months old imported for breeding and dairying purposes to have a tuberculin test, also requiring a health certificate showing all horses entering the state as being free from any contagious or infectious disease.

We have had no new legislation or regulations adopted since the last meeting of the United States Live Stock Sanitary Association, but we expect to bring before our next legislative body which convenes in January next, the same bill which I read before your committee last winter, with probably a few alterations.

The lack of proper legislation has of course retarded to a certain extent our work in various ways, but we find that co-operation among the cattle men is much better now than it was a year ago, also that there is a good deal of interest being taken by the small stock man and farmer in general.

There have been released from local quarantine in the provisional quarantine area during the fiscal year the counties of King, Pecos and portions of Howard and Terrell. In the white area, quarantined for scabies, the counties of Dickens, Kent, Scurry and Motley have been released.

W. N. WADDELL,
Chairman Live Stock Sanitary Commission.

WYOMING.

My recommendations to our legislature which meets the second week in January are as follows:

To require the mallein test for all horses, mules and asses imported into this state.

To require the dipping of all neat cattle before coming into the state from an area quarantined for cattle scab that are intended for feeding or grazing purposes.

To require the tuberculin test for dairy and registered cattle for breeding purposes and for exhibition at county and state fairs.

To regulate the public service of stallions and jacks.

To regulate the practice of veterinary medicine.

To regulate the sale of horses at public auction.
To require the testing for tuberculosis of all dairy cows supplying milk or cream to towns or creameries in the state.

To prevent the gathering of swill in incorporated towns or cities, county, State or Federal institutions, when such swill is intended to be fed to swine.

The above recommendations have the approval of the Dairy, Food and Oil Commissioner and the State Board of Live Stock Commissioners, and I feel reasonably sure that my recommendations will be favorably acted upon by our next Legislature.

B. I'. DAVIS, State Veterinarian.

MEMBERS UNITED STATES LIVE STOCK SANITARY ASSOCIATION, 1912 AND 1913.

Allen, Dr. L. J., Fort Worth, Tex.
Anderson, Mr. Wm. Penn, Amarillo, Tex.
Archibald, Dr. R. A., Oakland, Cal.
Atwood, Dr. Frank G., New Haven, Conn.
Atwood, Dr. G. C., New Haven, Conn.
Banksen, Dr. P. F., Atlanta, Ga.
Baker, Dr. A. H., Chicago, Ill.
Beer, Dr. Henry J., Blue Island, Ill.
Bennett, Dr. S. E., Chicago, Ill.
Behneke, Dr. A. E., Milwaukee, Wis.
Bostrom, Dr. A., Lincoln, Neb.
Brewer, Dr. Frank W., Oklahoma City, Okla.
Brinker, Mr. J., Amarillo, Tex.
Brooks, Mr. F. S., Kansas City, Mo.
Bush, Mr. Leslie, Oklahoma City, Okla.
Campbell, Dr. D. M., Chicago, Ill.
Cary, Dr. C. A., Auburn, Ala.
Chittick, Mr. Hugh, Sao Paulo, Brazil
Chrisman, Dr. W. G., Raleigh, N. C.
Cock, Mr. Frank R., Belle Fourche, S. D.
Cohenour, Dr. H. H., Bismarck, N. D.
Connaway, Dr. J. W., Columbia, Mo.
Cotton, Dr. Chas. E., Minneapolis, Minnesota.
Craig, Dr. R. A., Lafayette, Ind.
Crewe, Dr. W. F., Devils Lake, N. D.
Dalrymple, Dr. W. H., Baton Rouge, Louisiana.
Davis, Mr. F. L., White River Junction, Vt.
Dawson, Dr. Chas. F., Jacksonville, Florida.
Dorset, Dr. M., Washington, D. C.
DeVine, Dr. J. F., Goshen, N. Y.
Dyson, Dr. O. E., Chicago, Ill.
Edwards, Prof. S. F., Guelph, Ont., Canada.
Eisenman, Dr. F. T., Louisville, Ky.
Ellenberger, Dr. W. P., Washington, D. C.
Ellis, Dr. Robt., New York, N. Y.
Erickson, Dr. O., Pelican Rapids, Minn.
Ferguson, Prof. J. J., Chicago, Ill.
Fischer, Dr. Paul, Columbus, Ohio.
Fitzgerald, Dr. A. D., Reynoldsburg, Ohio.
Fianagan, Dr. D. J., Grant Park, Ill.
Flowe, Dr. B. B., Raleigh, N. C.
Forbes, Dr. E. R., Fort Worth, Tex.
Fox, Mr. F. C., Amarillo, Tex.
Gaumnitz, Prof. D. A., South St. Paul, Minn.
Gibson, Dr. Jas. I., Des Moines, Iowa.
Gilliland, Dr. S. H., Philadelphia, Pa.
Giltnor, Dr. Ward; East Lansing, Mich.
Goldsall, Dr. F. W.; Kewanee, Ill.
Graham, Dr. G. G., Detroit, Mich.
Graham, Dr. Robt., Lexington, Ky.
Greeder, Dr. Herman, Cedar Rapids, Iowa.
Gross, Dr. Herman, Webster, S. D.
Hadley, Prof. F. B., Madison, Wis.
Halverson, Dr. H. M., Yankton, S. D.
Hanner, Mr. Phil S., Taylorville, Ill.
Harrell, Mr. Wm., Amarillo, Tex.
Hastings, Dr. E. G., Madison, Wis.
Hawkins, Dr. J. D., National Stock Yards, Ill.
Hecker, Mr. Frank, Jackson, Miss.
Henderson, Dr. A. M., Aurora, Ill.
Hernshein, Dr. J. T., Pleasant Prairie, Wis.
Ierring, Mr. C. T., Amarillo, Tex.
Iershey, Dr. S. E., Charleston, W. Va.
Turner, Mr. Avery, Amarillo, Tex.
Van Es, Dr. L., Agricultural College, N. Dak.
Waddell, Mr. W. N., Fort Worth, Tex.
Walker, Mr. Fred F., Boston, Mass.
Ward, Dr. S. H., St. Paul, Minn.
Way, Dr. Cassius, Harvard, Ill.
Weaver, Dr. P. V., Glen Cove, N. Y.
Wells, Dr. T. G., Arthur, Ill.
White, Dr. Geo. R., Nashville, Tenn.
White, Dr. Henry A., Wyoming, Ill.
White, Dr. John L., Chicago, Ill.
Whiting, Mr. Rex A., Lafayette, Ind.
Wiggs, Mr. Chas. F., Billings, Mont.
Wight, Dr. A. E., Little Rock, Ark.
Wills, Dr. J. G., Albany, N. Y.
Wilson, Dr. R. H., Rochester, Mich.
Wood, Dr. E. P., Raleigh, N. C.
Wright, Dr. J. M., Chicago, Ill.
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