Fourteenth Annual Meeting

of the

United States Live Stock

Sanitary Association

CHICAGO, ILLINOIS
December 5, 6 and 7, 1910

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December 5, 6 and 7, 1910
NOTICE

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

<table>
<thead>
<tr>
<th>Constitution and By-Laws</th>
<th>3-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officers and Standing Committees</td>
<td>4</td>
</tr>
<tr>
<td>Report of Secretary-Treasurer</td>
<td>15</td>
</tr>
<tr>
<td>Reports of Committees</td>
<td>151-155</td>
</tr>
</tbody>
</table>

**Reports of State Sanitary Officials—**

| Arizona                                                      | 157  |
| Arkansas                                                     | 157  |
| California                                                   | 158  |
| Delaware                                                     | 159  |
| Massachusetts                                                | 163  |
| New York                                                     | 166  |
| North Carolina                                               | 164  |
| North Dakota                                                 | 165  |
| Oregon                                                       | 160  |
| South Carolina                                               | 166  |
| South Dakota                                                 | 171  |
| Tennessee                                                    | 171  |
| Texas                                                        | 172  |
| Wisconsin                                                    | 172  |

**Members of U. S. Live Stock Sanitary Association, 1909-1910.** 175-176

**Addresses—**

| Address of Welcome, Hon. John W. Moore                       | 7    |
| Response to Address of Welcome, Dr. J. R. Mohler             | 9    |
| President's Address, Dr. Charles E. Cotton                     | 11   |
| Tick Eradication in the South, Dr. R. P. Steddom              | 18   |
| Federal and State Co-Operation in Live Stock Sanitary Control, Dr. A. D. Melvin | 23   |
| Heavy Loss of Cattle from the Effects of Oesophagostoma Inflatum, Dr. D. F. Luckey | 25   |
| Hog Cholera Serum, Dr. W. B. Niles                            | 29   |
| Preparation of Hog Cholera Serum in Hungary, Dr. Adolph Eichhorn | 33   |
| Some Necessary Precautions in Anti-Hog Cholera Field Work, Dr. F. A. Schoenleber | 49   |
| The Veterinarian as a Factor in Sanitary Control Work, Dr. Joseph Hughes | 60   |
| Tuberculosis Control from a Layman's Standpoint, Ex-Governor W. D. Hoard | 69   |
| A Reasonable Method for the Control of Bovine Tuberculosis, Dr. O. E. Dyson | 71   |
| Control of Bovine Tuberculosis by Means of Vaccination, Dr. M. P. Ravenel | 77   |
| Extension of State Control of Tuberculosis, Dr. S. H. Ward     | 81   |
| Sanitary Milk from the Producer's Standpoint, Prof. W. J. Fraser | 92   |
| Sanitary Handling of Commercial Milk, Dr. Claude D. Morris    | 98   |
| A Sanitary Milk Supply for Cities from a Medical Standpoint, Dr. Robert A. Black | 104  |
| Sanitary Milk Supply for Cities and Towns from a Health Commissioner's Standpoint, Dr. W. A. Evans | 111  |
| The Russian Diagnostic Test for Glanders, Dr. John R. Mohler  | 121  |
| Reasonable Sanitary Measures in Live Stock Transportation, W. H. Manss | 129  |
| Equine Anemia Investigations in Nevada, Dr. W. B. Mack         | 137  |
| Infectious Equine Anemia, Dr. A. T. Kinsley                  | 143  |
OFFICERS—1911

President
Dr. J. F. De Vine, Goshen, New York

Vice Presidents
Mr. Fred Walker, Boston, Massachusetts
Dr. Charles Keane, Sacramento, California
Mr. G. T. Bryan, Guthrie, Oklahoma
Dr. W. F. Crewe, Devil's Lake, North Dakota
Dr. M. H. Reynolds, St. Anthony Park, Minnesota

Secretary and Treasurer
Prof. J. J. Ferguson, Chicago, Illinois.

Committee on Finance
Dr. D. F. Luckey, Columbia, Mo.
Dr. R. A. Craig, LaFayette, Indiana
Dr. C. Way, Harvard, Illinois

Committee on Legislation
Dr. J. R. Mohler, Washington, District of Columbia
Dr. O. E. Dyson, Chicago, Illinois
Dr. M. P. Ravenel, Madison, Wisconsin

Committee on Credentials
Dr. Charles G. Lamb, Denver, Colorado
Dr. Paul Fischer, Columbus, Ohio
Dr. A. T. Kinsley, Kansas City, Missouri

Committee on Resolutions
Dr. Charles E. Cotton, Minneapolis, Minnesota
Dr. F. S. Schoenleber, Manhattan, Kansas
Dr. M. H. Reynolds, St. Anthony Park, Minnesota

Committee on Nomenclature of Swine Diseases
Dr. V. A. Moore, Utica, New York
Dr. J. R. Mohler, Washington, District of Columbia
Dr. A. T. Peters, Springfield, Illinois
Dr. M. P. Ravenel, Madison, Wisconsin
Dr. M. Dorset, Washington, District of Columbia
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 committee 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 practical.

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. By 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.
Meeting called to order by the President, C. E. Cotton, at 2:15 o'clock, Monday, December 5, 1910.

The President: I take pleasure in calling the Fourteenth Annual Meeting of the Live Stock Sanitary Association together at this time. The first on the program will be an address of welcome by the Hon. John W. Moore, President of the Chicago Live Stock Exchange. (Applause.)

Mr. Moore—Mr. Chairman and Gentlemen: Addresses of welcome are often perfunctory affairs and cannot always be taken at their face value. When I have finished I trust that I shall not be credited with making that kind of a speech. I expect to be in earnest to-day. The orator on such occasions as this usually emphasizes the merits and the beauties of the entertaining city and at the conclusion of his address becomes so hospitable that he generally surrenders the keys of the city to its guests. I shall not surrender the keys of the city to you until I get better acquainted.

I have gotten a considerable distance away from my school days, and yet I think that the word doctor is derived from a Latin word which means to teach, and, if you will permit me, I shall call you gentlemen the schoolmasters from whom we are to learn. Your province will be to teach us, and our province will be to execute what you may suggest.

The State of Illinois, in its wonderful anxiety to acquire wealth, has neglected a few things that should have been attended to many years ago, and I want you to assist us in removing the pall from the State of Illinois that threatens not only live stock interests, but the consumers of milk and beef. I am aware that I am arguing this from a narrow and restricted standpoint. I am aware that the wide scope you have marked out will include other things, but, gentlemen, before you get through you will find that the storm center of this conference is tuberculosis in cattle and hogs. In conducting the commerce between the different states in cattle, I want
you to decide whether it is proper and right for the neighboring states to make Illinois the dumping ground for all of their diseased cattle. I want to know whether the states around us permit such dumping within their borders. If not, gentlemen, I beseech you to mark out the way, and as schoolmasters point out to us some legislation that will lead to the correction of such uncommercial conduct on the part of our neighbors. In other words, gentlemen, are we entitled to a wall surrounding the State of Illinois that will protect us from diseased dairy and breeding cattle from other states? If you, in your wisdom, will point out the way by which it can be done we will try to exclude them.

You are not, of course, a legislative body, but I know you are capable of devising legislative ideas, and when you get through here I hope you will have furnished us a text book so that we can go before our legislature and quote what you may have to say upon the subject of effective legislation.

Gentlemen, after repeated discussions and rival debates on the part of those who advocate a certain test and those who are against it, it is still an unsettled question whether or not the tuberculin test is infallible as a guide in determining the presence of tuberculosis in cattle. I see down in the State of New York on last Saturday night, at a meeting before what is called the Dairy Committee, that a resolution endorsing the tuberculin test as a reliable guide in determining the presence of tuberculosis in cattle was voted down. Is it possible that the states of Colorado, Nebraska, Ohio, Indiana and Wisconsin are in error, or do they lead the great states of New York and Illinois in the matter of protecting their cattle from a contagious disease? Gentlemen, schoolmasters, at this conference I want you to determine and tell us whether the tuberculin test is a reliable guide. If it is, then the problem which confronts us is partially solved. I shall expect the Live Stock Commission of the State of Illinois and the visiting doctors to leave a record here from which we can quote with reference to the reliability of the test. Is it possible that the State of New York has taken the right stand, or have they decided adversely in ignorance? That is one of the things I want you to determine while you are in the city.

But this was to be an address of welcome. And, gentlemen, you are welcome, and I shall tell you why you are welcome. You are welcome because we need you. If you can convince a guest at any time that he is necessary to you, you have no trouble in convincing him that he is welcome. You, gentlemen, are welcome because we need you at this particular time. I want to attach great importance to this organization, because as a whole you can perform more and effect more than you could as single units. You remember the fable of the sticks. When they were all bound together in a bunch the parent told the boy to break the bundle. He tried
his best to do it, but failed. Then he said to take them a stick at a time, and the boy had no difficulty in breaking them. So long as we are units the foes who oppose us will have a hard time defeating us. If they take a doctor by himself, if they take me as an individual, if they take Dr. Beer, Mr. Haner, or Secretary Baker there, as individuals, we shall never be seen or heard of.

Gentlemen, your meeting here is very opportune and I know from the intelligent faces that are before me that we may expect resolutions, we may expect discussions that will lead largely in cleaning the State of Illinois of a blot that never should have polluted the State of Illinois. Gentlemen, we are not asking drastic legislation for the people of the State of Illinois. The southern half of the state say, "We are not interested in the cleaning up of the dairy districts in the northern part of the state, and it is wrong to tax us down here to defray the expenses of cleaning up the dairy regions." Suppose, for the sake of argument, that we shall have to; I think the whole people have been taxed in many cases for exterminating conditions that ought not to exist. The government taxed the whole people for the extermination of foot and mouth disease, and it would be just as appropriate to tax the whole people of the State of Illinois for the purpose of ridding the state of tuberculosis, but we have never asked that yet. It is a reasonable proposition, gentlemen, that where disease is suspected, if you can determine the efficacy of this tuberculin test, to go ahead and administer that test; the little power that we seek is to take possession of the diseased animals and destroy them. Chicago is on the right track. No longer than last Saturday evening Chicago promulgated to the milkmen of this northern district that milk could not be sold in the city of Chicago except from tuberculin tested cows. I hope you will go on record, gentlemen, in that direction, and before I forget it, please do not forget that you are inaugurating a fight here in all probability that will take months and years to consummate. You can see conditions here in Illinois—the southern half of the state don't want anything to do with it, because in one respect the southern half is not interested. The northern district is filled up with cow speculators whose pocketbooks are affected if we touch this thing, and yet, gentlemen, as consumers of milk, and as consumers of beef, I want to know if we are not interested.

Gentlemen, I have talked longer than I expected to. I want you to do the talking, and I hope that by your wisdom you may contribute to the healthfulness of Chicago, certainly the fairest maid of the Mississippi valley. Thank you. (Applause.)

Dr. Mohler—Mr. Moore, Mr. President and Gentlemen: In behalf of the members of the United States Live Stock Sanitary Association I wish to thank you most heartily for the warmth and kindness of the words of welcome that you just extended to us. We knew that welcome
awaited our coming, because for the second consecutive year we have met in your city, and we still carry many pleasant memories and recollections of our previous visit.

We, as live stock sanitarians, guard the greatest income producing property in the United States. Few appreciate the vast investment which we have in this country in domesticated animals. There are, I believe, not less than five billions of dollars invested in the various kinds of domesticated animals, and this vast investment is threatened on every side by pestilence and disease. In fact, Government statistics will show that upwards of two hundred millions of dollars are annually lost from animal diseases in this country alone, and it is the universal opinion of competent men who make a study of this subject that a large proportion of this loss can be eliminated by judicious sanitary measures. The improvement and the protection of such interests as these are worthy of the most earnest consideration of both statesmen and scientists; and in our sphere as a sanitary organization we are working and endeavoring to do our part to secure the accomplishment of these objects. Indeed, this Association is working not only for the alleviation of the suffering and death of domesticated animals, but also for the protection of the public health. We have in view both of these problems, and there are many diseases which we are investigating and endeavoring to control, the suppression of which will mean as much to the human race as it does to dumb creation, for which we are the especial guardians. Especially will the subject of tuberculosis receive very careful consideration at this meeting, as you have requested, and as you will observe by our program.

Now, sir, in conclusion, I wish to say again that we appreciate fully and completely the kindness of your welcome, and we will accept your hospitality with avidity. We have come here because we feel that better results can be accomplished when we have pleasant surroundings. We are glad to have this opportunity of again meeting in your city, and I am sure that we shall return to our homes feeling that this meeting has been a memorable one. I thank you. (Applause.)

The President—Professor Ferguson, our Secretary, who has worked so hard to get up this program, is confined to his bed in one of the hospitals in the city of Chicago, and very much worried as to the success of this meeting. I have asked Dr. Peters to act as Secretary pro tem.

Dr. Melvin—Mr. President, before proceeding I move that a vote of sympathy be extended from the Association to Professor Ferguson.

Motion duly seconded and carried by a rising vote.

Dr. Steadman—I move that the temporary Secretary appointed by the President act as permanent Secretary for this meeting.

Motion duly seconded and carried.
PRESIDENT'S ADDRESS.

CHARLES E. COTTON, V. M. D.

The cordial welcome that has been extended to this Association by the City of Chicago, "the center of the world's live stock and meat traffic," and the prospect for a large and representative attendance of gentlemen engaged in sanitary control work, promises that this, the Fourteenth Annual Meeting, will be one of the most important in the history of our organization.

This Association, up to about seven years ago, was composed of veterinarians engaged in fighting the Texas fever in southern states, and met annually to discuss this all-important question. Other diseases and questions of importance were gradually taken up until it was found of such benefit to all that veterinarians and laymen engaged in sanitary work, not only from the south, but from states in all parts of the union, began to realize that it was to their interests and that of the state's welfare which they represented, to attend and take part in the meetings. Since this time our organization has grown until practically every state that is undertaking to do anything in the control of contagious diseases of animals, and the bureau of animal industry, have taken an active interest in and sent representatives to our meetings.

By the change in our constitution at the last annual meeting any person engaged in live stock sanitary work for federal, state, territorial, county or municipal governments, and any other person interested in live stock sanitation, is eligible and may be elected to active membership. This should make this association the leading and largest organization of its kind in the world, and we must not forget our responsibilities. We should be the advisory body for all federal, state, county and municipal legislation for the control of contagious diseases of live stock, and we should use our influence to have such legislation in harmony and not conflicting.

Our association is composed of laymen and stockmen interested in the welfare of our live stock industry, as well as scientific men engaged in investigation and control of contagious diseases. These laymen are of the greatest value in the accomplishment of our work to educate the public. At our meetings we learn of the study of the various diseases and the practical methods of controlling and eradicating them, and we return to our homes prepared and encouraged to educate the public in our localities and to work for proper legislation to control and stamp out contagious diseases.

The conservation of the live stock industry of the country, principally from the standpoint of the money value which it represents, and also from the standpoint of human health, places the work of the live stock sanitarium equal to if not of greater importance than any other branch of government control.
Our sanitarians in the last few years have successfully combated and exterminated contagious pleuro-pneumonia and the dread foot and mouth disease from our country.

The fight against the cattle tick is progressing slowly but surely, and there is no question but that in a few years, with sufficient funds, this scourge will also be eliminated, and the live stock industry of the south will then take rank with that of other sections of the country.

The work with hog cholera serum which is being perfected by the bureau of animal industry and a number of our states place this dread disease in the class of controllable ones, and in a very short period should be a saving of billions of dollars to the hog industry of the country.

The work of the bureau and state officials in eradicating scabies of sheep and cattle in western states is progressing rapidly, and Dr. Melvin states: "We are hopeful that the end of these diseases in the United States is in sight."

The outbreak of necrobacillosis of sheep in Wyoming is gradually being controlled and the quarantined area released.

Although a great deal has been accomplished in the past few years, we have a great responsibility still facing us. The greatest problems are still before us; viz.—the control of glanders, rabies, infectious abortion, dourine, infectious anaemia of horses, lip and leg ulceration, and above all, tuberculosis.

Rabies is on the increase in different localities throughout the United States and Canada, and it means that neighboring municipal and state organizations must co-operate more closely in the muzzling and quarantine restrictions, where there is an epidemic of rabies. The dog affected with violent rabies may run for miles from his home and infect a large territory. Great Britain has shown that general muzzling and quarantine successfully stamped out the disease in the islands. If the outbreaks continue to multiply it will eventually mean that the federal department of agriculture will be compelled to enforce the general quarantine.

Glanders is still quite prevalent throughout the country, especially in the large cities and the countries tributary to them. The use of mallein as a diagnostic agent has helped materially in the location and extent of the disease, but there has been such a divergence of opinion of members as to what disposition should be made of the diseased animals, that in the great majority of outbreaks little has been accomplished in stamping out the epidemic.

I hope that at this meeting something definite will be outlined and we will reach a common ground or basis that we may all follow in our individual districts as to the disposition of a reacting but nonclinical animal.
Some of our members have publicly committed themselves that they have little faith in mallein as a diagnostic agent. I am satisfied that no scientific man would make such assertions if he had made careful autopsies and bacteriological examinations. It has been shown by Wladimvioff and others that apparently normal lymph glands, removed from reacting animals, contained the germs of glanders. I do not wish to be understood that the mallein test is infallible, but I am satisfied that sanitary authorities are making a mistake when they undertake to question the most practical diagnostic agent we have, thus producing a wrong impression in the minds of the public.

It seems to me that the results of the work of Dr. Rutherford and of the Agricultural Department of the Dominion of Canada and that of Minnesota, who have been destroying reacting animals, and have practically stamped out the disease in their borders, is sufficient argument for the destruction of any animal which harbors the disease, whether in a latent or active form, as we never know when they will again be sources of infection and, if released from quarantine, to what extent they may spread the disease.

In the control of all other diseases which we know to be contagious, we destroy or quarantine all exposed animals, but some of us, from the fact that we have known a few cases in which a reacting animal has apparently recovered and been of commercial value for the remainder of its natural period of life, have hesitated to destroy the animals. How many of these are later sources of infection, even though they do not "break down" and become clinical cases we do not know, but our experience in Minnesota over a period of some twelve years shows that the large majority of reactors are often sources of infection, and many later break down and become clinical cases.

If we wish to control or stamp out the disease is it not better and would it not be more economical to destroy all reactors, than to allow them to harbor the disease and be the source of greater commercial losses?

Tuberculosis—The control of tuberculosis is without doubt the greatest and most important question with which we have or will have to contend. This disease has increased at least 40 per cent in the pure-bred cattle of the country in the past ten years, and as a result of the agricultural prosperity and the growth of the creamery industry, the farmer has introduced the pure-bred into his grade herds, thus creating new centers of infection. The meat inspection conducted by the bureau of animal industry has proven that tuberculosis has increased among swine from two-tenths of 1 per cent to between 4 and 5 per cent in the last twelve years.

In the past few years there has been some doubt spread throughout the scientific world as to the communicability of bovine tuberculosis to
man, but as a result of further scientific work this doubt has disappeared and it is now conceded that 10 per cent of tuberculosis in the human family is of bovine origin, and that 25 per cent of tuberculosis of children under 5 years of age is of bovine origin.

The International Commission on Bovine Tuberculosis have made their report to the American Veterinary Medical Association. This report is logical, concise and conservative and should be of great practical value to the members of this association as a common basis for legislation in individual states.

I hope that the study and discussion of this report at this meeting will lead to some practical and harmonious plan by which federal and state authorities may unite on a common basis toward the establishment of legislation looking to the control and eradication of this disease from our animals.

There are twenty-one states in the union who have done nothing in the way of legislation toward the control of this disease. Other states are testing cattle imported and are doing nothing toward the control of the disease in their own cattle. Some few states now have legislation that practically covers all of the recommendations of the tuberculosis commission, with the exception of the system of tagging animals shipped for slaughter.

I am satisfied that the public are now sufficiently educated to realize the necessity of the control of this disease, and that the time is now ripe for federal and state authorities to unite on some practical plan looking to the eventual eradication of the disease.

**Meat Inspection**—The inspection of meats, as carried on by the Federal Government, according to Dr. Melvin, covers slightly more than one-half of the total meat supply of the United States. All the rest of the meat is not inspected, except in a few instances, by local inspectors in cities, and these inspections are made by men who have no training, and the only qualification they have is their political influence. We all recognize the necessity of the extension of a thorough meat inspection to the state and municipal authorities.

The recommendation of the Tuberculosis Commission that all animals shipped for slaughter should be tagged in order to locate centers of infection, necessitates efficient state and municipal inspection, because in time tuberculosis cattle from various herds would be slaughtered under inspection.

In a great many localities the people are demanding legislation for proper local inspection, and I hope that at this meeting something definite
will be accomplished toward the establishment of a basis by which each state may enact some legislation covering this vital condition.

Since our last meeting the Association has suffered a severe loss by the death of Dr. Leonard Pearson, State Veterinarian of Pennsylvania. Dr. Pearson was recognized by both the veterinary and medical professions, not only in this country but throughout the scientific world, for his study of tuberculosis and other contagious diseases. He was a man of lovable character, high mind and great executive ability, which was demonstrated by the building up of the best organization in our country for the state control of contagious diseases.

At our annual meeting two years ago a committee was appointed to draft a law as a basis of live stock sanitary laws for the various states. This committee could not finish their work before our last annual meeting, and the chairman asked that it be continued another year. I hope and expect that we will have a complete report at this meeting, giving us some uniform basis for live stock laws.

Gentlemen, our worthy Secretary has prepared a very full program for our sessions, and I hope that when we depart for our homes we will feel that this meeting has been the most instructive and of more practical value to us in our work than any in history.

THE PRESIDENT—Next are the reports of the standing committees. The Committee on Publication is the first standing committee.

DR. PETERS—The Publication Committee secured the report of last year's meeting at a very low figure—$187.50 for 1,000 copies—and we feel that it was not our fault that we didn't get it out sooner, as the papers were slow in reaching us. It has been suggested to the Committee that the publication should reach the foreign libraries. The Publication Committee feels that the report is a worthy publication, and that every possible effort should be made to increase its circulation in this and foreign countries. Report accepted.

THE PRESIDENT—Report of the Secretary-Treasurer.

REPORT OF THE SECRETARY-TREASURER.

December 5, 1910.

The most important work of this office was the preparation and distribution of the Thirteenth Annual Report. The work of preparing the report for publication devolved upon Dr. A. T. Peters, Chairman of the Publication Committee, assisted by Dr. John R. Mohler and Dr. J. W. Connaway. Up to this date 335 copies have been sent out and paid for at the prices fixed by the Publication Committee, viz.: $1.00 for the first copy and 75 cents for each additional copy. The report should have a
much wider distribution and the active members of the Association are urged to make special efforts this coming year to see that a copy reaches every one engaged in Sanitary Control work.

A large amount of routine correspondence has been handled. While a few of the members answer letters promptly, there is a large number who are habitually tardy, entailing unnecessary work on the Secretary's office. Members are urged to answer correspondence promptly.

I present herewith my report as Treasurer, covering a period from October 29, 1909 (on which date I took over the records from the former Treasurer, Dr. Charles E. Cotton), up to November 30, 1910:

**RECEIPTS**

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**DISBURSEMENTS**

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**Total** $571.85

Balance on hand to date $339.24

All of which is respectfully submitted,

J. J. FERGUSON,  
Secretary-Treasurer.

Accepted.


To the President and Members U. S. L. S. A.

We, your committee, named to audit the financial report of our Secretary and Treasurer, have carefully examined the records kept of receipts and expenditures. We find all expenditures supported by properly signed vouchers, and that the report is correct in every respect.

L. J. ALLEN.
The President—When our constitution and by-laws were adopted last year it was done rather hurriedly; as a consequence we have an Executive Committee to pass on candidates for membership in the Association, to be later endorsed by a two-thirds vote of the Association. We also have the Credential Committee, and I don’t understand what this Committee is for, because the recommendations are taken up by the Executive Committee under the constitution.

Prior to this year this has simply been an organization of State Sanitary Boards. Each state was supposed to pay $10 dues, and that gave each member of the State Live Stock Board membership in this Association. Under the new constitution we charge $1.00 as dues, and then charge for the annual report. I know that Brother Ferguson has met with some little unpleasantness on the part of some of the members who were not present at the last meeting and did not understand this situation.

From the Treasurer's report we can all see that we are certainly in a better condition now than ever before financially. We are in better condition than ever before in the history of the Association, because, as a rule we usually finished on the wrong side of the ledger, and generally did not have money enough to pay the stenographer. I simply mention these things to show that this has certainly been a successful year. We have been successful as far as this past year is concerned, but there are some little discrepancies in this constitution which we ought to take up.

We shall now ask Dr. R. P. Steddom of Washington, D. C., to read his paper on ‘‘Tick Eradication in the South.’’
TICK ERADICATION IN THE SOUTH.
Presented at the Fourteenth Annual Meeting of the United States Live Stock Sanitary Association at Chicago, Ill., on December 6, 1910, by
DR. R. P. STEEDOM,
United States Bureau of Animal Industry.

Ever since the Bureau of Animal Industry of the United States Department of Agriculture discovered the astonishing fact that a certain species of tick, now known as Margaropus Annulatus, is the medium through which the infection of disease is conveyed to cattle, a quarantine extending across the United States has been in existence for the purpose of preventing the further spread of these parasites which, as a rule, are carried only by cattle of the southern portion of the country. The quarantine has been maintained through the efforts of the Federal Government, assisted by the interested states, with but varying success, as may be observed by noting the positions the quarantined area has assumed during the past eighteen years.

It may be argued that the effort to control cattle traffic from the south has been misdirected; that in case unrestricted movements and intermingling of cattle were permitted the ticks would be scattered throughout the land and gradually become acclimated to the conditions of the north and finally all our cattle would become as the southern cattle now are—immune to fever—and then the presence of the tick would no longer be a menace. In this connection it may be stated that there is no doubt that the infection is capable, to a certain extent, of adapting itself to climatic conditions; yet it is not at all probable that it could ever survive the severe winters of the north. Were this possible, however, and all the cattle of the United States should become immune to the fever, this very condition, desirable as it is where ticks exist, would mean millions upon millions of dollars annual loss on account of the detrimental effect that such immunity inflicts upon the animal economy. Moreover, the process of immunization would be at the cost of millions of cattle and the financial ruin of the owners.

It is, therefore, plainly apparent that while the ticks are with us some restraining action is absolutely essential for the preservation of the cattle industry. It is also obvious that something should be done,—that some radical step should be taken with a view of terminating, as early as practicable, this constant running fight with the tick.

It is comparatively easy to designate an imaginary line following state and county boundaries, and extending from the Pacific to the Atlantic oceans, thus dividing that part of our country which is free from the infection of disease from that in which the infection is present, and to formulate rules and regulations to govern cattle traffic between those two.
sections of the country. But it is quite another matter to get the owners and shippers of cattle to recognize the importance and maintaining such a line and of observing the regulations. This has been one phase of the Government’s work for many years, but it has been impossible to guard against infractions of the regulations. Thus, from time to time, cattle carrying fever-producing ticks have been taken to localities where non-immune cattle would become infested, and consequently the quarantine was changed to include the ticky section. Not only this, but by such extension of the infected area the non-immune cattle die in great numbers when ticks become attached to them, the fatality not infrequently reaching 90 per cent of entire herds. It is on account of these death-dealing ticks that the quarantine is imposed on the cattle of some of the southern states. Here the question arises: What is to be accomplished by quarantine alone, as it is only a temporizing measure? Without some additional action those conditions may be maintained, but no progress can be made in dealing with the situation. The quarantine must be supplemented by eradication of the ticks, for to these parasites the whole blame is attached.

It is entirely feasible to annihilate the fever tick which is the cause of all the loss and hardship. The Bureau of Animal Industry and some of the state authorities have shown conclusively that by excluding animals from premises for a few months, the seed ticks which remain will perish for the want of a host, as they cannot mature without the blood of an animal. If, after the expiration of the required time after the removal, the cattle are carefully cleaned of ticks by hand-picking and greasing, or by dipping them in a standard arsenical solution or crude petroleum, and they are then returned to clean premises, they will remain free from ticks. By these and similar methods, neighborhoods, counties and whole states are disinfected.

Under the provisions of the Acts of Congress appropriating funds to enable the Secretary of Agriculture to co-operate with state authorities, in eradicating the ticks which infest cattle and transmit disease, the Bureau of Animal Industry has for some four years past been assisting the states from California to Virginia along these lines. Anticipating the action of Congress, an investigation was made respecting the laws of the various states, and through the various attorney generals inquiry was made relative to the existence of state laws under which the Government could undertake the work of tick eradication. It was found that while some state laws afforded ample provisions, other states either had no law bearing on the subject, or the statutes were inadequate. However, many states now have new laws and the work is being pushed by the Bureau as far as possible in all of the different sections, and in some localities the results are satisfactory, indeed.
It may be of interest to know something of the detail of the actual operations of the campaign against the common enemy. The first step consists of a consultation between the state authorities and the Bureau, by which some feasible working plan is agreed upon. The memorandum of agreement between the state and Government indicates, in a tentative manner, the plan for co-operative work, as it is necessary that in each state the co-operation should be carried on as closely as possible, and although the detail of operation varies to conform to the state laws and regulations, the main object to be accomplished is the destruction of ticks. It is, of course, essential first to locate the infected animals and premises. This is done by careful inspection of all the cattle in the counties and sections which have been chosen as the most suitable localities for work. The zeal with which this work has been done in many localities is exceedingly encouraging. As previously indicated, the methods employed necessarily differ greatly to conform to the requirements in the different sections. For instance, both the local and federal inspectors in some parts of the west must be experienced men in the saddle and be able to rope and confine suspicious cattle wherever found, either on the open ranch or in pastures, with the expertness of old-time cowboys, in order to carefully examine the cattle for ticks. It is important that a close visual and digital examination be made for the purpose of detecting the presence of the parasites. Whenever infested animals are found the owner is informed of the most practical method of getting rid of the ticks. On some ranches it is practicable to remove all of the cattle to one portion of the ranch until the vacated portion is disinfected by starving the seed ticks which remain. Then the cattle are dipped in standard arsenical solution and returned to the disinfected premises, and it is only a matter of excluding animals from the other portion for a few months, when the entire ranch is clean. Under this plan sheep may safely occupy the premises infected by cattle, but it should be remembered that no horses or mules should be allowed therein, for these classes of animals may become infested with and perpetuate the ticks.

In the east, where the herds are smaller, the plan of operation is confined to the rotation of pastures, the picking and destruction of ticks and the application of parasiticides. In order to enlist an active interest, meetings are held in the various counties for the purpose of discussing the general subject of tick eradication and devising means to meet the local requirements.

Having followed these methods, 130,000 square miles have been released from quarantine, and a number of additional counties and parts of counties will be freed from ticks and released by April 1, 1911.

The essential features of a law which should be enacted by every state having fever ticks within its borders are as follows:
(1) Provide for local officials to enter premises for the purpose of inspecting animals.

(2) Provide for the quarantine of infected and exposed animals and premises.

(3) Provide for the enforcement of proper disinfection of infected and exposed animals and premises by the application of parasiticides, such as effective washes, sprays and dips, and by the changing of animals from one lot, field or premises to another, as may be necessary.

(4) Provide for the promulgation of rules and regulations by a duly authorized state official, board or commission, which shall have the effect of law.

(5) Provide that Federal representatives engaged in the work of tick eradication may be appointed as state officials without compensation, but with power to carry into effect the provisions of the local laws and regulations. In some of the states a constitutional amendment will be necessary before this provision can be effective.

(6) Provide for state and county funds for the employment of inspectors with whom the Government officials may work in close cooperation.

The appropriation of funds by the various states for this purpose gives them a more direct and intimate relation with the work, and is a stimulus to more lively interest in the undertaking than is manifest when the money is supplied wholly by the Federal Government. If it is not possible for the state to furnish sufficient funds to employ local inspectors, it may be that cattle owners and other interested parties will give financial support to this cause. A considerable amount of money has been tendered the United States Department of Agriculture by cattlemen who are enthusiastic on the subject of getting rid of cattle ticks. Such offers have necessarily been declined, as under no condition could money be accepted from such a source by the Department. The state, however, may be in a position to receive assistance of this kind and use it in conducting a successful campaign against the cattle tick, provided the laws are such as to permit of the necessary action. A law in each state governing the subject is essential before any material progress can be made. As in the case with laws governing other matters, it would not be necessary to apply the provisions of such a law except in rare instances.

Experience has shown that the citizens of a locality may willingly and faithfully expend their means and energy to accomplish a common good, while a single neighbor will persistently refuse to do his individual part in the plan to perfect it, and thus the whole scheme is defeated. So in the absence of adequate law, a man who declines to control and disinfect his
ticky cattle may prevent a whole community from enjoying the privileges of an unrestricted market. The Government can operate within a state only under the laws of that state, and when legislation as above indicated is secured in each state interested, and adequate annual appropriations are made by Congress for co-operation with the states, the problem of eradicating ticks will have been practically solved, for it is only a matter of money and men. With the means forthcoming the men will be at hand. The Bureau of Animal Industry is now training scores of men, who in turn are able to impart their knowledge and experience along these lines to others who will be needed when this work is undertaken upon a larger scale.

Any method of operation which tends toward the early destruction of ticks entails certain temporary difficulties and inconvenience to the parties involved. Those who undertake this work must reckon with the local butchers, who are to be supplied with cattle; with the owners of cattle teams which are driven on the public highway; with the men who permit their animals to stray at large, and ever with the man who disbelieves the well-established fact that cattle ticks transmit disease. These and other similar problems must be met and dealt with in accordance with local conditions. Once an individual is persuaded of the detrimental effect of the presence of these parasites he immediately recognizes the necessity of getting rid of them, so after all, the main difficulty in securing immediate large results lies in our being unable to convince the people of the harmfulness of their having tick-infested animals. The people, therefore, must be given every opportunity to become acquainted with the reasons why ticks should be destroyed. Their hearty support and co-operation in the work must be enlisted, for without their assistance, the undertaking would be of no avail. When the citizens of a county or group of counties in any one of the infected states enter earnestly upon the task of getting rid of the fever ticks which infest the animals, they easily accomplish their purpose without appreciable sacrifice or hardship. When a locality is freed from fever ticks and means are enforced to prevent their re-introduction, the Federal Government releases the quarantine so as to permit the interstate shipment of cattle therefrom to any part of the country.

The quarantine has been, and now is, directed at the ticks and not against the cattle. The Bureau of Animal Industry stands ready with all the means within its power to assist every state which, under its laws, can receive assistance in these matters, and not only revokes the Federal quarantine on tick-free sections, but will continue to help free infested localities of ticks.

The President—The next paper is that of Dr. Melvin, Washington, D. C., on "Federal and State Co-Operation in Live Stock Sanitary Control."
FEDERAL AND STATE CO-OPERATION IN LIVE STOCK SANITARY CONTROL.

Dr. A. D. Melvin, Washington, D. C.

Dr. Melvin—Since its organization the Bureau of Animal Industry and the officials in charge of live stock sanitary matters in various states have worked in co-operation to a greater or less extent for the control and eradication of contagious diseases of live stock. Some of this work has been very satisfactory and effective, but there are some things that have not been undertaken which could be done to our mutual advantage. There should be a closer co-operation between the various state officers and the Bureau in reporting contagious diseases of animals. Nothing of this kind has been done in a systematic way in this country. Several European countries have systems of reporting the presence and extent of contagious diseases of live stock, and the information thus compiled is of great value. Our Government is situated differently from those of Europe, and in the United States the Federal Government can not alone carry on such a service without considerable difficulty and expense, because of our form of government and the extent of our country. I believe that under our conditions a service of this kind can best be rendered by co-operation between the Federal and state authorities.

After giving considerable thought to this subject I have outlined a tentative plan for co-operation between this Bureau and the various state live stock sanitary officers in collecting and reporting information as to the presence of contagious diseases of animals, the extent of such diseases, and any further information that might be of advantage. The state veterinarians and their assistants or other live stock sanitary officials are usually well informed as to diseases of animals in the various localities of their states, and by a little extra effort could easily collect more definite and complete information upon this subject. I should like to arrange with them to report all such matters to this Bureau.

By reason of its work of eradicating certain diseases the Bureau is already very well informed as to Texas fever, sheep scab and cattle mange, but there are many other diseases as to the prevalence of which we have very little exact information, such information as we have being that received in an incidental way from some state officer or stock owner in correspondence, or from our own field inspectors. Some of the diseases about which fuller information is desirable are hog cholera, anthrax, glanders, tuberculosis, contagious abortion, scabies, necrobacillosis, contagious lymphangitis, and rabies.

The plan which I have in mind has been worked out in respect to minute details, but I have thought it desirable to give a rather general outline at this time, so that the state officers present at this meeting may have an opportunity to consider the matter prior to its presentation in more definite form.
1. Each State Veterinarian or Live Stock Sanitary Board should appoint a deputy or agent in each county of the state. (I believe there should be no difficulty in securing volunteer agents or deputies who would gladly undertake this work. They would be compensated for their labor by the prestige which would accompany their connection with state work.)

2. Each deputy or agent should agree to make every reasonable effort to keep himself informed regarding the prevalence of contagious and infectious animal diseases in his district, and to submit a report in writing at regular intervals to the central state authority. (As these reports will form the basis for the control of infectious and contagious diseases, it is, of course, essential that they be prepared by men who are known to be intelligent and trustworthy.)

3. Each deputy or agent should be supplied with blank forms upon which he should render his reports to the central state authority. (I am not prepared at the present time to recommend in detail the exact form of this report, but in my opinion it should embrace such diseases as hog cholera, anthrax, glanders, contagious abortion, scabies, necrobacillosis, contagious lymphangitis and rabies.) In reporting the occurrence of any of these diseases, the location in the county, owner's name, number of animals infected and exposed, losses, control measure taken and probable source of infection should be given. I have purposely omitted tuberculosis owing to its wide dissemination and because of the immensity of the problem involved in its eradication, it can be best considered independently. If the different state officers decide to enter into this co-operative work it is probable that arrangements can be made for the necessary report blanks to be furnished by the Bureau of Animal Industry. It might be found desirable to have the reports made out in duplicate, one being retained by the state authorities and the other forwarded to the Bureau of Animal Industry.

4. Deputies and agents should report to central state authorities at least once a month; state officers should transmit these reports, or summaries of them, to the Bureau of Animal Industry; the Bureau of Animal Industry, in its turn, should, at regular intervals, send reports to each of the co-operating states, giving the condition in each state. The outbreak of a new disease, or the unusual prevalence of any particular disease, should be made the subject of special reports. (The frequency with which these reports should be made will naturally depend upon the conditions existing in the different states. In the event of the presence of epizootic diseases, more frequent reports will be required than when the state is comparatively free of infection; but it will be necessary to have reports at stated intervals whether these diseases exist or not, as knowledge concerning the absence of disease is at times as necessary as it is regarding its prevalence.
Unless some maximum time limit is fixed for rendering these reports from agents to central state authorities, from these authorities to the Bureau of Animal Industry, and from the Bureau of Animal Industry back to the central state authorities, we cannot expect to obtain the full result.)

I trust this proposition will be given careful consideration by state officers, and I hope it will be fully discussed.

Meeting adjourned.

DECEMBER 6, 1910, 10 O'CLOCK A. M.

Meeting called to order by President Cotton.

THE PRESIDENT—We shall now take up the regular program and call upon Dr. Luckey for his paper

HEAVY LOSS OF CATTLE FROM THE EFFECTS OF OESOPHAGOSTOMA INFLATUM.

D. F. LUCKEY.

D. F. Luckey—Heretofore very little importance has been attached to the worm Oesophagostoma Inflatum. Practically none of the authorities on parasites have admitted that this worm is capable of producing fatal disease among cattle. In fact, it has been practically overlooked by all authorities on parasites, except Dr. B. F. Kaupp, who gives a good description of it, with cuts, on pages 116-121 of his book on "Animal Parasites."

A marked example of the effects of this worm was shown in a lot of cattle consisting of 102 head of short yearlings shipped to southeast Missouri in February, 1910, for grazing purposes. An examination of this herd was made on September 15th and 22 head were dead and the 23rd was killed for post-mortem purposes. All of the balance of the yearlings were in a very poor condition. After arrival in southeast Missouri, in February, this lot was given plenty of roughness that would ordinarily carry it through in good shape until spring. These cattle had access to good pasture, with plenty of red clover, throughout the summer. The history of the herd and the post-mortem examination left no room for doubt about the cause of the trouble.

This outbreak called to mind a large number of similar outbreaks in the state of Missouri in the spring of 1904. So many complaints of calves and yearlings dying by scours during the winter of 1903 and 1904 reached the office that a systematic investigation was made covering six counties. Post-mortem examinations were made on one or more animals in almost every infested herd. These examinations were so complete as to leave no room for doubt but what the Oesophagostoma Inflatum was the sole cause
of the extreme emaciation and of death in many cases. In one outbreak in a herd of 36 head in Jasper county, 23 head died and the remaining 13, mostly cows, were left in a very poor condition. One outbreak in Grundy county, in a herd of 320 head of grade and full blood Aberdeen-Angus cattle, resulted in the death of 83 head. In one neighborhood in Gentry county forty different farmers had cattle affected with this worm and lost by death from one to 34 head each. The amount of the loss from the emaciation of the cattle that lived was equal to the loss by death.

Contagious—In all of the outbreaks in the larger herds the disease was definitely traceable to some infested animal getting into the pasture or being added to the herd. In order to demonstrate that this worm spreads quite rapidly from one animal to another, two diseased heifers were shipped from King City to the State Farm, Columbia, Mo., arriving May 27, 1904. These heifers were placed upon a small grass lot with six other heifers which were supposed to be free from infestation. A post-mortem on one of the six on July 25 following showed the presence of some of the mature worms in the caecum and a few of the submucous cysts which invariably accompany infestation of this worm.

Symptoms—The symptoms vary greatly, according to the age of the animal and the kind of feed used. While a number of mature animals succumb to the disease, death was mostly among yearlings and under. A herd of cattle on a good grain ration seldom showed much effect from the worm, while among the cattle carried through the winter on roughness alone, the death rate was heavy. The mildest symptom shown by any cattle was a slight loss of condition. The only thing noticeable was that they required more feed than usual, and in many cases with all the feed they would eat they still remained in poor condition. In some cases emaciation, which gradually increased in the course of from eight to twelve weeks, became extreme in the end and resulted in the death of the animal. In most cases there was extreme diarrhoea, setting in from five to fifteen days before, and continuing to the death of the animal. A dropsical swelling of the jaws and throat was common in the last stages. The appetite was good throughout. An infested herd, as a rule, showed more evidence of the presence of this parasite during the winter when on dry feed than in the summer when on good pasture. The severe loss in the herd in southeast Missouri during the past summer may be attributed to the fact that there was considerable rain and the grasses and clover contained more water than usual.

Post-Mortem—The post-mortem examination on a badly affected animal, of course, showed extreme emaciation. An ordinary post-mortem examination would reveal nothing further. However, a close examination of the contents of the caecum and colon revealed the presence of the worm. In cases where extreme diarrhoea had prevailed the most of the mature
worms had been expelled and very few were to be found. In the cases where death was not preceded by the diarrhoea, immense numbers of the worms were found. In all cases there was found beneath the mucous membrane of the caecum and colon a peculiar cyst containing an embryo worm visible under a low power glass, and a small amount of yellowish, cheesy pus. These cysts vary from those of the Oesophagostoma Columbianum in that they are found on the inside of the guts instead of the outside, and in that their contents are of a yellowish cast instead of a greenish. In some cases the cysts were so numerous that the entire wall of the caecum and colon were studded with them sufficiently to interfere largely with the absorption of nutriment. In some cases the small number of mature worms and cysts in no manner correspond with the grave symptoms shown by the animal and the indications are that there was toxemia. It is possible that the obstruction of the absorption of food by the cyst does as much to reduce the strength of the animal as the sucking of blood by the mature parasite.

*Life History*—The life history of this worm is unknown. It has been partially demonstrated that an infested animal will spread the parasites to others within sixty days, and that the life cycle may cover less time. The cyst and the mature worm always occurring together indicates beyond reasonable doubt that the embryo found in the cyst and the mature worm are related to each other. It is impossible to say whether or not this worm propagates in the intestinal tract.

*Treatment*—The most important thing by way of treatment is to immediately give an infested lot of cattle plenty of nutritious feed and to avoid further use of infested pastures. We used as a preventative a condition powder containing sulphate of iron, sulphate of copper and salt. In many badly affected animals very satisfactory results were gotten by fasting twenty-four hours, giving a physic and following with a full dose of gasoline and sweet milk. It was impossible to follow up the results closely enough to determine just what course of treatment and care was best to pursue.

There is no doubt but that this worm is quite widespread in nature and that, when suitable conditions arise, it will cause a lot of damage among cattle. The heaviest losses were noticed following cool, rainy summers and among cattle which were roughed through the winter instead of being given plenty of nutritious food.

*The President*—Gentlemen, this paper is open for discussion.

**Discussion.**

**Dr. Ransom**—I would like to ask Dr. Luckey how he excluded other possible causes of the symptoms and deaths which he states were due to this parasite?
DR. LUCKEY—I could not absolutely exclude all other causes. I feel positive, because I made so many post-mortems and examined so closely for other causes.

DR. RANSOM—I might say that the worm is widely distributed in this country; in fact, it is very rare to find a herd of cattle in which it is not present so far as my examinations have gone. As a rule it does not seem to cause very much trouble.

DR. JUCKINESS—I have had experience along the same line in Nebraska during the past year. I investigated two herds; at one place twelve cows had died before my arrival and eight or ten were sick. Two or three were lying around, and some of them not able to rise. I held a post-mortem examination and made a diagnosis of Strongulus Micrurus. I may have been mistaken; it might have been the Oesophagostoma Inflatum, but I gave the treatment Dr. Luckey described for two weeks, and the cattle made an excellent recovery.

DR. POWERS—in South Carolina we have found the same symptoms and there has been heavy loss. The parasites most common are the Strongulus Micrurus, and in some southern states the Hook Worm shows itself. Our line of treatment in these cases is coal tar creosote, and we find it very satisfactory.

DR. MOORE—the presence of this worm has given occasion for a great many erroneous diagnoses in our state. In a good many animals slaughtered after the Tuberculin test, this worm has been found and diagnosed as intestinal tuberculosis. I had occasion to investigate very carefully this subject in connection with some herds that were killed after the Tuberculin test, where the veterinarian in charge pronounced these intestinal lesions tubercular. I regret that errors, due to this worm, have crept into our data in regard to the lesions in the intestines of cattle affected with tuberculosis.

DR. LUCKEY—I can easily see why an inexperienced person could mistake the nodules caused by the Oesophagostoma Columbiana for those of Tuberculosis. I think I came pretty near doing that myself once or twice, but the Oesophagostoma Inflatum is within the intestinal walls, and in the course of a post-mortem examination will be overlooked entirely; there is no indication of its presence. The thick walls of the caecum and the colon obscure them until they are opened, cleaned off, spread out and held up the light, when they will be observed.

DR. MOORE—I feel that in a careful post-mortem you would open the intestines; I don’t think that you could say that a post-mortem was carefully made without the examination of the inside. On that point I think Dr. Luckey and I do not agree.
THE PRESIDENT—The subject of hog cholera will now be taken up. The first paper is by Dr. Niles of Iowa.

HOG CHOLERA SERUM.

Dr. W. B. NILES.

Dr. W. B. Niles—Mr. President and Gentlemen of the Association:

I may say that our experimental work during the past year has been to a considerable extent a repetition of what we have done before.

First, I wish to speak on the method of Hyperimmunization. You are aware of the fact that we have been hyperimmunizing our animals by the subcutaneous method, the intravenous method and by what may be termed the intraperitoneal method. The subcutaneous method is employed by many of the workers, and by it we are enabled to produce a potent serum. By the intravenous method we feel we produce a better serum than by any of the other methods. This, as you are aware, consists of injecting the blood into the circulatory system through the veins. Our intravenous serum gives us a most satisfactory result. During the past season we have had occasion to use serum made by the intravenous method in varying doses. We found that it fully protected shotes weighing as much as 75 pounds when given to the hog in 5 cc. doses. Consequently, I have come to feel that I am just a little safer if I use the intravenous serum for special tests.

Referring now to the intraperitoneal method, we have here a method which can be easily carried out. It is easier to perform, and there is less bother in injecting the virulent blood into the peritoneal cavity than by the other processes. However, the tests of serum made by this method have not convinced me that as potent a serum can be secured in this way, unless a very large dose of virulent blood is used, and consequently there is no saving in the amount of blood needed for hyperimmunizing. We find in making serum by this method where the dose used is 5 cc. per pound of body weight, that the serum is not up to standard in potency. The same may be said when the dose is 7½ cc. per pound, but if we use as high as 10 cc. per pound, the same as is used by the subcutaneous quick method, we can secure a potent serum. Even by the use of this large dose, however, it is a question whether we secure regularly as reliable serum as by the other methods of hyperimmunization. When using as high as 10 cc. per pound body weight there is no saving; consequently, convenience in making the injection is all there is to recommend the method. As already mentioned, I am of the opinion that serum made by the intravenous method of hyperimmunization is the most potent of all.

We have been doing some work along the line of reinforcing the hyperimmunized animal, or what might be called re-hyperimmunization. We find, of course, as you are aware, that the serum gradually runs down in potency, and that after a time the hyperimmuned hog loses the power
to produce potent serum, and the question arose early as to whether this power to produce potency might not be brought back by the use of a smaller amount of virulent blood than administered at first. With a view of getting some idea of the amount of virulent blood needed to restore the potency a number of hogs were re-hyperimmunized. Some figures regarding a few of these may be of interest. For example, hog No. 1, hyperimmunized by being given 5 cc. per pound body weight, intravenously was bled four times from the tail, yielding 2300 cc. of serum. Following the fourth bleeding, within a few days, the animal received a reinforcing dose of 2½ cc. per pound intravenously; then four more bleedings were made; that is, three tail bleedings, and then the animal was destroyed. The four bleedings yielded 3380 cc., or a total of 5680 cc., an average of about 45 cc. per pound from that animal.

Another, which may be termed hog No. 2, weighing 180 pounds, also received the customary dose of 5 cc. per pound intravenously. This animal, on being bled four times, yielded 3600 cc. Following the fourth bleeding this animal was reinforced the same way by receiving intravenously 2½ cc. per pound, and then yielded 4275 cc. for the four last bleedings, making a total of 7875 cc., or not quite 45 cc. per pound as an average.

The third animal, weighing 130 pounds, was hyperimmunized by the same method, receiving the same dose of 5 cc. per pound; one being bled four times yielded 3700 cc.; was reinforced by a very small dose. It happened that a larger dose was not available at this time, so this animal received only 100 cc. as a reinforcing dose. On being bled four times again 3980 cc. was obtained, making a total of 7680 cc., or an average of 60 cc. per pound of that animal. A comparative test of the results obtained in the first four bleedings and the last four bleedings from these animals showed, as far as we could ascertain, no difference in the potency of the two series of bleedings.

In some other experiments hogs were first hyperimmunized by the slow method and then reinforced also by being given a subcutaneous dose. The amount of serum obtained was very similar to quantities just mentioned. Animal No. 4, for example, weighing 140 pounds, was hyperimmunized by the slow method. The first four bleedings resulted in securing 3245 cc.; it was reinforced by 5 cc. per pound given subcutaneously, as in the first place. The last four bleedings yielded 5300 cc., a total of 8545 cc., or 60 cc. per pound.

Hog No. 5 was also hyperimmunized by the slow subcutaneous method. This hog, on being bled four times, yielded 2275 cc.; was reinforced by 5 cc. per pound, then yielded on being bled four times again, 4509 cc., or a total of 6784 cc.; that is, a little over 67 cc. per pound total serum.
The sixth animal, weighing 200 pounds, was treated in the same way as hog No. 4; was hyperimmunized by the slow method and then reinforced with a subcutaneous dose. The animal was bled four times and 3671 cc. obtained; reinforced with 2 cc. per pound and bled again four times, 5095 cc. being obtained, making a total of 8766 cc., or an average of 44 cc. per pound. The test on the serum from these three animals did not reveal any apparent difference in the potency between the first and second series of bleedings.

In comparing results obtained from these animals and from a number of others, it would seem that it does not take a very large amount of virulent blood to restore potency so that the second four bleedings will be as potent as the first four. Comparative tests on the first and second series of bleedings as nearly as we could determine showed no difference in the potency. I think it will, however, be understood that the size of the re-hyperimmunizing dose should depend upon the time when it is given: If a long time elapses between the last tail drawing and the giving of the reinforcing dose, then I would consider almost a full dose—that is, the same as the first given—necessary; but if the hyperimmunization is done soon after the fourth tail drawing has taken place, then it is evident that only a small amount of blood is necessary to put the animal back in a position to furnish three tail drawings and a final drawing of potent serum.

As it takes three or four days or a week for an animal to recover from the loss of blood, I think the reinforcing dose should be given about five or six days after the fourth tail drawing. The time of re-hyperimmunizing will also, of course, in practice, depend somewhat upon the time when virulent blood can be secured for the work. I would consider that, if given in one or two weeks, a small dose, as mentioned, will suffice, but if a longer time elapses I would increase the amount, giving after a month or so a full dose.

In regard to the practical application of the serum treatment: As you are aware, we may immunize by the use of serum alone, or by what we term simultaneous treatment—the use of serum in connection with a small amount of disease producing blood. In the use of serum alone only a temporary immunity is obtained, but there is no danger of starting disease. However, in simultaneous treatment there is a possible source of danger. Notwithstanding this we are often called upon to apply the simultaneous injections in order to permanently immunize herds.

In order to avoid any possible complications arising from the presence of the hog cholera bacillus in the virulent blood used in making the injections, the chief of the Biochemic Division of the Bureau, at an early date in our work, suggested the use of phenolized blood with a view of destroying this organism, it having been found that sufficient carbolic acid
could be added to destroy the bacillus without injuring the filterable virus which is the cause of the disease. For example, experiments have shown that virulent blood containing one-half of 1 per cent Phenol will retain its virulence for two or three months and possibly longer. In 1½ per cent and also in as high as 2 per cent Phenol the same blood will retain its virulence for twenty hours or longer. At the same time the hog cholera bacillus and other organisms are destroyed.

It will thus be noted that in connection with simultaneous treatment you can use phenolized blood with a view of eliminating the complications arising from the B. C. S., and also with a view of attenuating slightly the action of the cholera virus. For example, if you are required to use simultaneous treatment on the pure-bred herd or on a herd in a distant part of the country which you cannot keep under observation, you feel a little safer in using phenolized blood in the treatment of that herd. As to the amount of blood to be used in connection with simultaneous treatment, that would depend upon whether you were using the plain, untreated blood, or whether you were using the phenolized blood in which the virus has been attenuated. It has been found that one cubic centimeter of even phenolized blood in which attenuation has not taken place is sufficient to insure permanent immunity, and while I don’t know that there is any great difference as to whether you use one cc. or two cc., I generally feel a little safer in using one cubic centimeter instead of two. However, if you are using blood sufficiently phenolized to attenuate it, I would advocate the use of two cc. Sometimes you are called upon to go to a distant part of the country where there is no cholera, where the man insists upon his herd being made actively immune, and where you are not able to keep the herd under observation; then you feel like being on the safe side.

Perhaps a word or two in regard to offspring from immune mothers might be of interest? Some years ago we bred quite a number of immune sows. We bred immune sows to immune boars and the offspring from these sows were exposed to cholera in different ways. We found that offspring of immune parents had more resistance to cholera than the offspring of susceptible sows. They did not, however, have enough protection to withstand heavy infection; that is, if exposed to virulent hog cholera by being placed with the sick, or injected with virulent blood, a considerable per cent would die. The per cent surviving, however, was usually larger than in case of pigs from unprotected mothers. Pigs raised from hyperimmune animals showed more resistance than pigs from simply immune mothers. During 1907 we vaccinated a number of herds near our experiment farm and we found the next year on buying pigs indiscriminately over this territory for experiment purposes, that the pigs coming from those farms on which we had practiced vaccination did not contract as acute disease as pigs procured from other farms; so we discontinued buying pigs from
those farms until they had secured other animals for breeding purposes. Consequently, while we were not able to determine the exact amount of protection given these animals through the immune mothers, we were well satisfied that they had more immunity than animals from other sources.

I shall simply say in regard to our field work during the past year that it has not been extensive; some of you gentlemen have done much more extensive field work than we have, and some of you have had possibly more experience with phenolized blood. I may say, however, that the results attending what we have done have been the same as in former years. We were called upon to immunize some herds by the simultaneous method and succeeded very nicely. We were asked, among other things, by the Secretary of the International Show, to vaccinate the breeding stock here last year and also this season, which we did, using serum alone. Under the circumstances we did not deem it advisable to use the other method, so we gave serum alone with a view to making them temporarily immune. We found that this was very satisfactory, and the owners of the herds vaccinated last year wanted us to do the work this year. They had no trouble from cholera after returning and we do not anticipate any trouble this year.

**THE PRESIDENT**—Gentlemen, we have another paper, which is not on the program,

**PREPARATION OF HOG CHOLERA SERUM IN HUNGARY.**

**DR. ADOLPH EICHHORN,**

Bacteriologist, B. A. I., Department of Agriculture.

**DR. EICHHORN**—Mr. President and Gentlemen:

*Location of the Establishment*—The establishment visited is located in a suburb of Budapest, known as Kobanya, which was the principal feeding place for hogs until 1895, when this industry received a severe blow by the appearance of hog cholera, which, until that time, was unknown in Hungary. These feeding yards cover an area of over 500 acres, and are conducted by a corporation, which undertakes the fattening of hogs for individual hog breeders or speculators. Before the appearance of hog cholera the number of hogs there usually varied between 400,000 and 500,000; now, the number hardly ever exceeds 200,000. The breeds are principally the Hungarian “Mangolocza,” which is a lard producing hog, their average weight after fattening being 600 pounds. Beside this breed the Yorkshires and Berkshires are also in prominence.

The hogs are installed as a rule when 1½ years old, and the fattening and finishing process takes nine months. Cornmeal mash and dry corn are fed.

A part of this establishment, an area of about six acres, has been rented to the Government for the preparation of hog cholera serum. This
is surrounded by a brick wall, and has only one entrance. A laboratory consisting of four rooms has been erected on the ground at its entrance, and immediately adjoining this building is the shed in which the inoculations are made, and here also the hogs are bled from the tail.

The ground is divided into two parts by an alley which runs through the center. On both sides of this alley pens are located. The ground is well paved with brick, and any part of the premises can be readily washed and disinfected, if so desired.

**History of the Development of the Serum Establishment.**

After confirming the work of Doctors Dorset and McBride regarding the etiology of hog cholera, Professor Hutyra undertook laboratory experiments for the immunization along the lines following the method of Dr. Dorset. The results were satisfactory to such an extent that Professor Hutyra undertook the serum preparation for the application in practice. For this purpose he applied for funds to the Department of Agriculture, and it was then decided to establish a serum institute, as suggested by Professor Hutyra, in which the necessary quantity of serum could be produced to supply the entire demand of the country. Thus, in the early part of 1909, the work was started on a small scale, but by July about 450 animals were employed for the production of the serum, and this number remained stationary until December, when it was raised to 560, and from that gradually until in April, 1910, the total number was 1,400 hogs, which number remains now almost stationary, proving a sufficient quantity for the necessary production of serum.

In 1909 the total production of serum amounted to 609,363 ccm. of defibrinated blood and 318,517 ccm. of serum. The preparation of serum was commenced after the instalment of two large centrifugal machines. During 1910 the monthly output of serum amounted to 260 liters, the serum dose being only one-half of the quantity of the dose of defibrinated blood.

**Method of Preparing Hyperimmunized Hogs.**

One to two hundred hogs of about 200 pounds weight are purchased and placed in an infected pen; they usually contract the disease in twenty days. After the appearance of the disease, the animals are carefully watched, and the more severely affected animals are marked for easier identification. Immediately after the appearance of cutaneous hemorrhages the animals are removed from the pen and bled. The virus thus obtained is then used for the hyperimmunization of hogs which have already recovered from the disease. (See page 35.)

The hogs are placed in groups in the different pens, according to the progress of the process of immunization. For the production of virus only acutely affected animals are used. The bleeding is performed in the same
manner as when taken from the hyperimmunized animals when they are bled to death. The table upon which the animals are placed for the bleeding is made of castiron, and so constructed that the animal is placed on its beveled surface, and secured by one front leg being drawn backward and upward by a rope, which is then secured to a ring attached to the other side of the table. The other leg is drawn forward and tied through a hole on the front part of the table. The animal lies on the right side. The pectoral region is shaved, washed and disinfected with 75 per cent alcohol. The specially constructed knife is then introduced near the entrance of the thoracic cavity, the carotid and jugular are severed, and the blood then runs freely into the receptacle. (See photograph No. 2 for construction of table, and No. 4 for securing of animal.) The knife is about 18 inches long. The tube part is about two-thirds of an inch in diameter, and terminates in a lance-shaped cutting end. Immediately below the cutting end are openings through which blood enters the tube of the knife. (See illustration 3, figure a, page 37.)

The receptacle into which the blood is allowed to flow is made of galvanized iron, and has a capacity of about one gallon. The container is supplied with a cover which has an extension of a metal cylinder through which blood flows into the container. It also is provided with a handle and a dasher, with the aid of which the defibrination of the blood is accomplished. The container at its bottom is supplied with a faucet through which the defibrinated blood is drawn off. (See illustration 3, figure b.) The blood is then inoculated without much delay into the animals used for the hyperimmunization.

The hyperimmunization is accomplished by three successive subcutaneous inoculations of 500 cc. of the virus. These three inoculations are given to the recovered animals at intervals of from ten to fourteen days. After the three inoculations, the animals are bled twice from the tail. The first time, eight days after the third inoculation of virus; the second time, five days later. Then again the animals are injected with 500 cc. of virus (fourth time), in order to increase the reduced immune bodies. Eight days following the fourth inoculation, the animal is again bled from the tail, and repeated five days later. In four more days the animal is finally bled to death. Inoculations of the virus are made into the loose connective tissue of the groin, frequently on both sides.

The subcutaneous inoculations of the virus are now exclusively used in the preparation of the hyperimmunized hogs. However, during my visit experiments were in progress with intraperitoneal inoculations. With these experiments it is aimed to establish whether the quantity of virus could not be reduced, and also whether the intervals between the inoculations could not be lessened.
I.  a. Bleeding knife
   b. Container for defibrinating blood
   c. Blood collector and defibrinator for tail bleedings

II.  a. Stall for securing hogs for bleeding from tail
      b. Table for final bleeding of hogs

III. — Securing hogs for final bleeding

IV. — Centrifuge of seven liters capacity for separation of serum from blood corpuscles
In the preparation of the hyperimmunized hogs, the large quantity of virus necessary is the principal factor, and as a result of this the production of the serum is quite expensive. This important item can be considerably reduced when in the vicinity of such a serum establishment hog cholera prevails. In that case virus can be obtained from time to time in considerable quantities without expense from the acutely sick animals. This method has been practiced in Budapest, but at the present time there has been no outbreaks of hog cholera in the surrounding country, and therefore they are compelled to obtain the virus from the animals which became sick at their own establishment.

To secure hogs for inoculation a very ingenious arrangement is used at the serum establishment of Kobanya. It consists of a stall, three sides of which are stationary, the remaining side being movable and held in place by a bar. The temporary side is provided with four rollers, and to the inside and lower part, a wide strap is fastened. The hog enters through a door on the side of the stall into the stand, walks with the front leg over the strap, which is allowed to hang loose on the floor of the stall. Immediately after the animal is secured the cross-bar is released, the side falls down to the ground onto the roller, and the animal lies secure. (See figure 5, page 39.)

Bleeding of Hyperimmunized Hogs.

The animals, after ready for their first bleeding from the tail, are placed on a stand made of castiron, which consists of a stall of just sufficient size to hold a hog. These stands are provided with rollers, by the aid of which they are rolled to a small door which is made in the hog pen. Inside of the hog pen to this door a chute is made, through which the animals are driven through the door into the stand. The stand is provided with leather straps in the front and back, one securing the animal on the abdomen, right in front of the hind leg, the other over its loin, while in front there is one to secure the animals in front of the shoulders. The straps are fastened by a lever with which the releasing and securing of the animals can be accomplished by a single motion. The head is also secured by passing a rope around the upper jaw and fastening the same to a ring in the wall. (See illustration 1, figure a, page 41.)

After securing the animal in the stand, the hair of the tail and also around its base, is well clipped; it is washed in hot water and disinfected with 75 per cent alcohol, and then it is submerged in a dish containing hot water of 50 degrees C. for five to ten minutes. This is done in order to produce a hypermia in the blood vessels. Another method by which the flow of blood can be hastened, that is the hypermia of the vessels produced consists of placing an electric bulb in close contact with the tail, the reflection of the light of this bulb being directed towards the tail. In some
instances this method has proven very satisfactory. However, uniform good results are obtained from the hot water method. After the removal of the tail from the hot water, a piece is cut off, irrespective of whether it strikes a joint or not. The instrument used in this operation is shaped somewhat like an emasculator, sharp on both edges, and only a slight effort is required to cut the tail with this instrument. Should the flow of blood cease before a sufficient quantity of blood is obtained, the stub of the tail is rubbed with a piece of sterile cotton, and if the flow should not be renewed by this method, another piece is clipped off, and if this should fail it is placed again into the hot water.

The receptacle into which the blood is allowed to flow has a capacity of about 500 ccm., and two such receptacles are filled with blood from each hog. It takes about an average of an hour to draw the desired quantity from each animal. The receptacle into which the blood is received from the tail bleedings consists of a fruit jar, which fits in a framework, to which a lid is fastened to cover the jar. This lid has a cylindrical projection and somewhat resembles the cover of a milking pail. After placing the empty jar in the frame it is covered with the lid; the blood is then allowed to flow from the tail directly into the cylindrical projection of the lid into the jar, and when it is filled the jar is taken from the frame. The blood is then broken up in the jar by attaching to it an apparatus consisting of a wheel with a handle (egg-beater shaped) which revolves a rod to which seven crossbars are attached. This is then placed on the jar, and by alternately revolving it in both directions the clot is broken up in about one minute. Then the beating apparatus is removed and the jar is covered with its regular lid. (See illustration 3, figures c, d and e, page 37.)

After the conclusion of the bleeding of the animals on a particular day, the blood in these jars is filtered through gauze into a large bottle from which it can be drawn through a faucet close to the bottom.

Four bleedings from the tails are made at intervals stated above, and at each bleeding 900 ccm. to 1 liter of blood is drawn from each animal. The last bleeding, during which the animal is bled to death, is accomplished in the same manner as when the virus is drawn from an affected animal for hyperimmunization. The same kind of a knife is used for severing the carotid and jugular, and the securing of the animal is also carried out in the identical way as described in the bleeding for the virus. The blood is also allowed to run into a receptacle which was described above, in which the defibrination is carried out in a churning-like manner.

The defibrinated blood, whether obtained from the tail bleeding or from the final bleeding, is conveyed into the room where the centrifugation takes place. Two centrifugal machines of 7 liters capacity each are installed. The centrifugal machines have an arrangement for 10 containers
of 700 ccm. These containers are filled with the defibrinated blood, the lid is tightly secured, and the machine is set in motion by gradually increasing the speed. The power is furnished by a gasoline engine, and the machine makes 2,000 revolutions per minute. (See illustration 4, figure a, page 37.)

The process of centrifugalization lasts one hour, when the centrifugalized blood in the containers is taken out and placed on a table where the siphoning of the serum is accomplished. This is carried out with the aid of a vacuum pump attached to an ordinary hydrant pipe. From the pump a rubber attachment is made with a "Woulff" bottle, which serves to take up the water in case of an overflow from excessive pressure. From this bottle a rubber attachment is made with another large bottle, which serves for the collection of serum. To this serum bottle a rubber tube with a small drawing pipette is attached. This whole apparatus represents simply an arrangement with the aid of which serum is easily siphoned off from the red blood corpuscles. This is accomplished without the slightest difficulty, and there is absolutely no loss of serum by the appliance of this method.

The serum thus obtained is immediately preserved in proportion to 9 parts of serum to 1 part carbolic acid solution.

Carbolic acid equals 5.5
Carbolis acid 20.0
Glycerin 74.5

Filling Bottles for Shipment of Serum.

The large bottle containing the carbolized serum has an arrangement for an outflow of serum close to the bottom, to which a rubber tube is attached which connects with the gradual cylindrical container. The container holds 600 ccm., being divided into 25 ccm. graduations. The serum is allowed to flow into this cylindrical container by opening a stopcock attached to a glass tube running from the side of the container. As soon as the desired quantity has flowed into the container the flow is checked by closing the stopcock. The bottom of the container connects with a glass tube to which also a stopcock is attached. With the opening and closing of this stopcock the desired quantity of serum is allowed to run into the different sized bottles, which are used for the shipment of the serum. There are always different sized bottles varying from 50 ccm. to 500 ccm. filled with the serum ready for shipment.

The serum is filled into bottles of different sizes; they are temporarily plugged with cotton, and after the filling is concluded the cotton plugs are replaced with corks which have been autoclaved and submerged into hot paraffin.
Bottle to collect serum

Centrifuged, defibrinated blood
Shipment of serum is accomplished with the following directions:

*Directions for the Immunization Against Hog Cholera (Swine Plague.)*

The serum is obtained from artificially hyperimmunized hogs containing 0.5 per cent carbolic acid. Inoculated into the body of healthy hogs it produces in the majority of cases a passive immunity lasting at least three weeks, which, however, would become active should the animal immediately after the inoculation become exposed to natural infection.

The serum, until it is used, should be kept in a cool place (ice box, ice chest, or cool cellar), and should be injected under the skin on the inner surface of the ham, with a previously carefully boiled and cleansed syringe. The doses are the following:

<table>
<thead>
<tr>
<th>Hogs weighing under 20 kilo.</th>
<th>8 cem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot; &quot; &quot; 20.40 kilo.</td>
<td>10 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; &quot; 40.60 &quot;</td>
<td>13 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; &quot; 60.75 &quot;</td>
<td>15 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; &quot; 75.90 &quot;</td>
<td>20 &quot;</td>
</tr>
</tbody>
</table>

Over that........................................ 25 "

Inasmuch as the inoculation protects the animals only for a short period it should be employed in infected droves where hog cholera (swine plague) has appeared only very recently, or only in such cases where the healthy drove is threatened by danger of immediate infection.

In such droves it is advisable to inoculate all the animals with the exception of those which are already severely affected, and it is best to slaughter such animals as soon as possible.

From the inoculations good results can only be expected at the onset of the infection; therefore, if in a drove many deaths have occurred, and if 20 to 25 per cent of the animals are sick, then it may be readily seen, only little success can be expected.

It is advisable to retain the drove in the infected place until the infection has entirely passed off. In the meantime, it is advisable to isolate those animals which show the characteristic indications of the disease (inappetence, dullness, diarrhoea, exudate on the eyes, etc.).

If the inoculation does not check the infection in from one to two weeks it can be repeated.

Besides these directions there is also sent to the veterinarian a printed blank to furnish the establishment with statistical data on the results of the inoculation. From these reports the Serum Institute compiles its annual report.
The results of the inoculations of 1909 are compiled in the accompanying statistical tables, and from these can be readily seen that the mortality in all the inoculated herds averages only between 8 and 9 per cent. Of course it should be taken into consideration that in numerous instances the serum has been applied in badly infected droves where the infection before the inoculation existed in more than 25 per cent of the animals. I was shown numerous reports by Professor Hutyra which indicated that the serum had been employed at the onset of the outbreaks, and in most of these instances the infection was abruptly checked without any further loss of animals.

### Inoculations in Infected Drovers of Apparently Healthy Animals

<table>
<thead>
<tr>
<th>No. of Deaths</th>
<th>No. of Drovers Inoculated</th>
<th>No. of Animals Inoculated</th>
<th>No. of Deaths</th>
<th>No. of Animals not Inoculated</th>
<th>No. of Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>573</td>
<td>91</td>
</tr>
<tr>
<td>0.1</td>
<td>5.0</td>
<td>12</td>
<td>2442</td>
<td>1122</td>
<td>147</td>
</tr>
<tr>
<td>5</td>
<td>10.0</td>
<td>3</td>
<td>498</td>
<td>509</td>
<td>104</td>
</tr>
<tr>
<td>10</td>
<td>20.0</td>
<td>9</td>
<td>1816</td>
<td>1203</td>
<td>710</td>
</tr>
<tr>
<td>20</td>
<td>30.0</td>
<td>4</td>
<td>707</td>
<td>328</td>
<td>111</td>
</tr>
<tr>
<td>30</td>
<td>40.0</td>
<td>3</td>
<td>576</td>
<td>136</td>
<td>86</td>
</tr>
<tr>
<td>42</td>
<td>63.0</td>
<td>5</td>
<td>872</td>
<td>509</td>
<td>269</td>
</tr>
</tbody>
</table>

### Results of Protective Inoculations Against Hog Cholera

<table>
<thead>
<tr>
<th>No. of Drovers</th>
<th>No. of Animals</th>
<th>Deaths</th>
<th>Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>6177</td>
<td>0.1</td>
<td>107</td>
</tr>
<tr>
<td>27</td>
<td>5335</td>
<td>5</td>
<td>179</td>
</tr>
<tr>
<td>11</td>
<td>2316</td>
<td>10</td>
<td>483</td>
</tr>
<tr>
<td>17</td>
<td>3364</td>
<td>20</td>
<td>281</td>
</tr>
<tr>
<td>9</td>
<td>1149</td>
<td>30</td>
<td>308</td>
</tr>
<tr>
<td>7</td>
<td>869</td>
<td>40</td>
<td>516</td>
</tr>
<tr>
<td>6</td>
<td>879</td>
<td>62</td>
<td>1876</td>
</tr>
</tbody>
</table>

The results are about uniform in all the reports which in all cover over 250,000 animals. The average mortality in the inoculated herds remains stationary, about 8-9%.

### Selection of Hogs for the Production of Serum

Experiments were conducted with various breeds of hogs, such as the Hungarian, Mangolicza, Yorkshires, Berkshires and Poland China; while the quality of the serum proved in all instances satisfactory, nevertheless the quantitative production of the serum from these various breeds varied,
particularly from the tail bleedings, the amount of blood which could be obtained was considerably less in the English breeds than in the Mangolicza. This can be principally attributed to the thin and wiry structure of the tail in the English breeds, while in the Hungarian breeds it is much thicker and looser. Beside, the constitution of the finer bred hogs is more delicate, and they do not stand rough handling in the attempt to secure them for the different operations as well as the tougher Hungarian breed.

During the process of the preparation of the serum the hogs are fed only lightly, as it is desired that they should not become fat, but at the same time they should remain in good condition. The food which they receive consists of 10 parts ground corn and 3 parts of bran, mixed with water. In addition to this ordinary dry corn is also given.

The personnel of the Serum Institute in Budapest consists of three veterinarians, one of whom is in charge of the establishment. Beside, there are three assistants who are laboratory helpers, and seven men who perform laborers’ work.

The personal experience which I have gained at the Serum Institute at Kobanya afforded me a splendid opportunity to study the systematic method of the preparation of hog cholera serum, and judging by the increased demand for the serum in Hungary, it appears evident that great progress is being made in that country toward the combating of that disease, and without a doubt with the progressive work stimulated by these results, it will be possible to eventually have the disease under perfect control.

At the conclusion I desire to make brief mention that at the request of Dr. Dorset, I inquired from Professor Hutyra whether the simultaneous method of inoculation is applied in that country, and I was told that the recent results obtained with that method are highly satisfactory. The simultaneous inoculation was tried in the latter part of 1909. The first experiments were very unsatisfactory as the result of this simultaneous inoculation 18 to 20 per cent of the animals died. Since then, however, the dose of the virus has been reduced to 1 ccm., and the results have been very gratifying, and this method of immunization has been commenced in practice on over 3,000 hogs. This work is under the direct supervision of the Serum Institute. Of all the recent inoculations only three animals died, which constitutes about 0.1 per cent of the inoculated hogs.

In connection with the production of the serum it will no doubt be of interest to mention the disposition of the meat of animals used for the preparation of serum. The practice adopted at Budapest is carried out in accordance with the regulations in existence under disposition of carcases affected with hog cholera (swine plague).
The carcasses of which the blood has been used for the production of virus, and which were killed in the acute stage of the disease, are also judged by the extent of the lesions existing in the carcass. Thus, if the septicemia lesions are of such a character as would demand condemnation according to the regulation, the carcass is condemned. However, if the lesions are more or less confined to the skin or affect only slightly the visceral organs, the animals are passed for meat of inferior quality, which is then sold under declaration.

On the other hand, all carcasses which were hyperimmunized are passed for food without any restrictions. This, of course, reduces considerably the expense of the production of the serum.

The Institute charges for the serum the price of 1 crown per dose, which in American money is 20 cents. I have been told these minimum charges are sufficient to cover the expense of the production, and that on this basis the institute can be run without any great deficit.

The apparatus and instruments which I have described in the production of the serum can be obtained from the firm of Samuel Garay & Co., Budapest, IV., Kossuth Lajos St., No. 1. He supplies the Institute with all the instruments, and particularly his syringe used for the injection of virus is highly recommended. I have used the syringe and it works with the best satisfaction. The pressure necessary for the injection of the blood is very slight, which usually afforded considerable trouble in the other makes I have used. The prices I was given for the syringe of 100 grams capacity, with one needle and complete attachment, $8. The knife for the bleeding of the hogs costs $3. A complete outfit for serum inoculation, consisting of one 30-gram syringe with needle and wooden case, $7.50; one tail cutting emasculator, $3.

THE PRESIDENT—The next paper is

SOME NECESSARY PRECAUTIONS IN ANTI-HOG CHOLERA FIELD WORK.

DR. F. A. Schoenleber, of Kansas.

DR. Schoenleber—The Veterinary Department of the Kansas State Agricultural College has, in the last year, produced by the Niles-Dorset method the serum for vaccinating over 20,000 head of hogs. Nearly all of this serum was used in the serum-alone method, and the work has been confined nearly entirely to infected or exposed herds.

The college controls the output and insists that the vaccinating be done, for the present at least, by graduate veterinarians who have had training in the work. This is done for several reasons; first, proper antiseptic precautions are necessary for best results. It frequently happens that abscesses occur at the point of vaccination in spite of all precautions, owing to the general unsanitary surroundings or the lack of proper attention following the operation.
In the administration of the serum in an infected herd it is of the utmost importance that the animal be given the maximum dose corresponding to his size, general physical condition and character of, or stage of the disease. I am of the opinion that a great many more sick hogs could be saved if they could receive a second or even a third dose of the serum at variable intervals of time. The single dose treatment, if best results are to be obtained from it, must be given with judgment, which can obviously only be had by experience in the sick herd.

Upon receiving an injection of serum the hog undergoes more or less of a febrile reaction, his vitality is temporarily lowered and it is always advisable to take the following precautions before and after treatment: Light feed, and very little corn for a day or two before and for several days following vaccination; plenty of water at all times; comfortable, clean quarters as free from mud and dust as possible; protection from the weather, especially drafts of cold wind or snow, and above all, vaccinate as soon as possible after infection of the herd. Our experience has been a saving of from 45 to 100 per cent in infected herds, averaging between 85 and 90 per cent of those vaccinated. The per cent saved was in direct proportion in nearly all of the herds to two conditions, viz.: The length of time that the herd had been infected before vaccination and the sanitary condition of the surroundings. Another feature worthy of note is that the temperature of a hog is comparatively easily raised, and running or worrying the animals before or while vaccinating does not do them any good. They should be under perfect control in order to reduce injuries while handling to a minimum.

In vaccinating in infected herds, it has been our plan not to disinfect the pens and surroundings for at least a week or ten days after the work is done. This frequently aids in conferring a longer immunity and in most herds gives the same results as the simultaneous method.

Dr. Schoenleber—You probably recognize the fact that we are peculiarly situated in some respects. We have a great many cattle feeders in our state who have hogs following cattle. A great many of those hogs are shipped in from other states and are turned out in all sorts of weather, and contract pneumonia because of such exposure. We have outbreaks which very much resemble cholera. We must keep up the reputation of our serum, and do not send it out without knowing that herds are infected with cholera. Furthermore, it is a hard proposition to control the work, and frequently after treatment we find the hogs turned right back into muddy pens, and the results at times are very discouraging. So we try to control the work in our state by sending out men who will do the work properly. In looking up our records I found that in 84 herds reported where infection had been a number of hogs had been lost. Out of the 84 herds, 40 herds lost no more after vaccination, saving 100 per cent.
DISCUSSION.

DR. FISCHER—In Ohio we have been unfortunate in not being supplied with funds to conduct scientific investigations. We have been compelled to direct almost all of our energies to the development of the practical side of protective inoculation based on the knowledge we already have. Our greatest efforts were made in demonstrating to our swine breeders the practicability of protective inoculation and, incidentally, to raise money to carry on the work. Perhaps a brief resume of our work would be of interest at this time.

Aside from an appropriation of $25,000.00 for the purchase and equipment of a serum farm, which latter has just been acquired, we have no special appropriation for this work. Two years ago we received an appropriation of $3,000.00 to equip a temporary plant, and this has been our working basis ever since.

With this plant we produced, in 1910, 1,250,000 cc. of serum, or about 60,000 20 cc. doses. We always refer to 20 cc. as a dose, or unit. This serum was produced from 312 hyperimmunizations. Every hyperimmunization is followed by four or five bleedings. The first bleeding is made ten days after hyperimmunizing. Thereafter they followed at seven-day intervals. After the fourth bleeding the pig is rested two weeks, or longer, and then rehyperimmunized.

For the first hyperimmunization we use 5 cc. of virus per pound weight, invariably using the intravenous method. We think this is more economical and more accurate. It takes less virus and we know all the blood injected gets into circulation.

These 312 hyperimmunizations are divided as follows:

190 pigs in all were hyperimmunized.
90 pigs were hyperimmunized once;
60 " " twice;
40 " " three times;
6 " " four times.

We expect to get 20 cc. of serum per pound weight of the hyperimmune for each hyperimmunization. That is, we expect a 200-pound pig to furnish 4,000 cc. of serum, including the phenol solution which is added to it, in the course of four bleedings. Thus, if a 200-pound pig is hyperimmunized four times it will furnish at least 16,0000 cc. of serum, or 800 doses.

Out of 312 hyperimmunizations we lost fifty-five pigs as a result of the injection of blood.
A mitigating circumstance, however, is found in the fact that we use field virus, which must be collected under all sorts of conditions. By field virus I mean the blood obtained from natural outbreaks of cholera, upon farms. Our own veterinarians collect this blood where they are vaccinating infected herds for farmers. Although they are instructed to use every possible precaution to prevent infection, complete asepsis is out of the question in most cases. Some of the material thus collected is carried 150 miles, and though we aim to transport it in a semi-frozen condition there are occasional cases of contamination or increased bacterial growth.

Dr. Peters—Were these all intravenous injections?

Dr. Fischer—All except a small number which were intraperitoneal.

Dr. Peters—You had fifty-five deaths?

Dr. Fischer—Yes; fifty-five deaths in 312 hyperimmunizations, or nearly 18 per cent. Of these twenty-seven deaths were due to septicaemia.

Dr. Ravenel—What do you mean by septicaemia?

Dr. Fischer—I am using that term in a general sense. No specific diagnosis was made, but all animals showed high temperature and died three to eight days after injection of virus. The post-mortem lesions were those usually found in septic infection—hemorrhagic condition of organs, enlarged spleen in all cases and poorly coagulated blood. Since these pigs were immunes, hog cholera was excluded.

Dr. Niles—One question, Dr. Fischer, at this point. These fifty-five pigs did not all die on the first hyperimmunization?

Dr. Fischer—No, they followed first, second, third and even fourth hyperimmunizations. After these deaths occurred, investigations that followed showed that most of them resulted from the use of virus obtained from certain herds. I have in mind two of these in particular, in which the blood was furnished chiefly by sick pigs that had been recently castrated. These pigs were undoubtedly suffering from a mixed infection in addition to cholera. I think this explains at least some of the deaths. Twenty-two pigs died very soon after injection of the virus—within five minutes to two hours thereafter. The principal post-mortem change was a marked pulmonary edema.

Two died of peritonitis. Our Dr. Fitzgerald is here, and since he conducted all laboratory work, he could give more details in regard to these cases.

I would like to call attention to our work vaccinating suckling pigs. At first this work was confined to pigs not less than three or four days old. Success with these encouraged us and we treated younger ones. In several
instances treatment was applied within a few hours after birth. Results were uniformly successful. We had no deaths due to vaccination. Serum and virus were used in graduated doses at the rate of one-tenth cc. of virus and one-half cc. of serum per pound weight. For pigs weighing 20 pounds or over 2 cc. of virus and 20 cc. of serum are administered.

In field work we always use the simultaneous treatment whether herds are infected or free from disease. We never use anything but tested serum. In cases of very valuable animals, especially in herds that have in no way had exposure, we observe the additional precaution of using tested virus.

Serum is tested by selecting four young pigs, belonging to the same litter to ensure equal susceptibility. Each pig is infected with 2 cc. of virulent blood. No. 1 receives, in addition, at the rate of 20 cc. of serum per 50 pounds weight; No. 2 receives half this amount of serum; No. 3 one-fourth, and No. 4 no serum at all. As a rule No. 4 dies of cholera, No. 3 becomes sick and may die, or recover. Nos. 2 and 1, the half and full dose pigs, remain well. In some cases even No. 3 remains well, showing that one-fourth doses will protect.

If the serum comes up to our standard in potency, the half and full dose pigs remain well. And if the virus is active the unprotected pig will die. As a rule the latter is killed when about at the point of death and the blood from this pig is used for virus with the serum from the same test. Here we have a double check or test, one for the serum, the other for the virus. We feel safer in using virus obtained from test pigs, however. While it is still sufficiently virulent to kill, it is somewhat more attenuated than the original with which the serum was tested.

We assume this on the strength of our experience that all of our virus loses its disease producing power, or at least its killing power, after three or four passages through pigs. I know this is not in line with the experience of Dr. Niles and others, but it is an invariable experience with us. We always feel safer in using virus obtained from a "test" pig rather than untested field virus.

Last year we treated 24,780 pigs by the serum simultaneous method, and as far as I know have never caused an outbreak of the disease with our vaccinations. There was one apparent exception to this at the time. This brings up the question suggested by Dr. Schoenleber, viz.: that of guarding against vaccination of supposedly healthy herds that are in reality diseased.

One of the first herds that we treated was this kind. The animals appeared perfectly healthy and thrifty. We had little experience at that time and relied wholly upon the statement of the owner in regard to the previous history of the herd, possibilities of exposure, etc. The herd was
composed of 100 pigs averaging about 100 pounds in weight. I applied the treatment personally. Each pig received 2 cc. of virus and at the rate of 20 cc. of serum per 50 pounds weight, or practically 40 cc. of serum. To be more accurate, it should be stated that the Parke-Davis all metal syringe used for this work discharged only about 30 cc. when filled up to the 40 cc. mark. The serum, however, was of excellent quality, previous tests showing that it protected in much smaller quantity.

In the course of six or eight days ten of these pigs became violently sick, later a few more came down. Investigation showed that this herd was composed of five distinct lots bought in as many places and mixed just before we vaccinated them. Although ten of these pigs died, all deaths and sickness occurred in two of the purchased lots of pigs—together, perhaps, 25 or 30 animals, as nearly as I remember. I am convinced now that these animals were infected at the time they were treated. Thereafter we observed the precaution of making more careful observations on the condition of health, history of exposure, etc., of every herd vaccinated.

Last year we recorded the temperature of each of the 25,000 pigs vaccinated, and our records show that we were successful in recognizing the presence of infection in a number of herds where neither the owner nor any one else could have suspected it from appearance alone. The high fever temperatures revealed the true conditions that existed. These experiences suggest that many apparently bad results from serum simultaneous treatment are not as bad as they seem to be.

We can not always depend on the views expressed by the owner in regard to the health of his herd. The thermometer is our best guide.

I want to discuss one more point, the duration of immunity in suckling pigs. We have found that when pigs weighing 50 to 60 pounds were given serum simultaneous treatment, the immunity lasts practically indefinitely; that is, it lasts until the pigs are ready for slaughter.

With suckling pigs our experience is different. To illustrate: On the 19th of April, 1910, we treated about 60 suckling pigs on a farm near Washington C. H., Ohio. These pigs, as well as the mothers, were apparently perfectly healthy, though there were sick and dying pigs in the adjacent pens. The treated sucklings remained well, although exposed to the adjacent pens.

On August 15th, four months later, we received a report that those vaccinated sucklings were getting sick and a request from the owner to re-vaccinate them. Investigation showed that a number of these pigs had cholera. In this case the immunity lasted just four months. All of the pigs were again treated, and with the exception of a few deaths, did well.
I would like to hear reports from others also, and since I have taken up so much time I shall close my remarks.

Dr. Dorset—Before Dr. Fischer concludes I would like to ask that he state the loss in sick herds after treatment, and also losses in exposed herds after treatment. I don’t think you gave these figures.

Dr. Fischer—I am sorry that I can not give you a direct reply. During the year 1909 we treated about 5,000 pigs by the serum simultaneous method. Of these perhaps 2,000 were in healthy herds and 3,000 in infected herds. Last year we treated 25,000 pigs, and of these possibly 20,000 were in infected herds. These are mere guesses, however. We have no accurate information on the results of these inoculations except for the year 1909. At the end of that year one of our inspectors visited every farm on which we vaccinated a herd of pigs and got a report from the owner as to the results. As yet, we have not compiled this information, but we expect to do so very soon, and I shall be glad to give you the information at a later time.

Dr. Ravenel—Before Dr. Fischer ends I would like to ask him a question. You state that 22 hogs that were hyperimmunized died within five minutes to a few hours after injection. Were those first or second injections?

Dr. Fischer—These sudden deaths occurred after first injections and also after second injections.

Dr. Fitzgerald—All of these 22 pigs died from five minutes to a few hours after the time of hyperimmunization. They all showed the same clinical symptoms: A marked dyspnoea, bloody, frothy discharge from the mouth and nostrils. Careful autopsies on all of these pigs disclosed as the cause of death a pulmonary edema.

In three cases death was apparently due to a respiratory paralysis. Autopsies were practically negative in these cases.

In regard to the 27 deaths accredited to septicaemia, I would like to state that the virulent blood used to hyperimmunize these pigs was collected from three herds in which there were a number of pigs having infected castration wounds. From the blood from two of these herds I was able to isolate in pure culture a rod shaped bacterium which was virulent for little pigs. By the term septicaemia, as used here, is meant a bacteremia other than hog cholera, recognizing the fact that hog cholera is itself a septicaemia.

Dr. Reynolds—Mr. Chairman: In Minnesota we have adopted the policy of taking temperatures in sick herds when the vaccination is done, under circumstances that we can control. If a hog has a temperature of
103½ we give an increased dose. If he has a temperature of 105 we do not give any. In the handling of hogs we have had some experience. In one or two cases that I have in mind where our serum was used on infected herds, it was reported that the serum killed the hogs, that they were sick in the evening and died the next morning. I have adopted the policy of sending a man to investigate every such report when I can, and I find in such cases that the hogs were sick when vaccinated. It is our experience that handling a hog sick with cholera is very liable to kill the hog within a few hours, whether he is vaccinated with serum or not. The reasonable inference in such cases of sudden death after vaccination is that they had died by reason of the struggle and long confinement. We don’t like to have sick hogs vaccinated. When vaccination is done in sick herds where temperatures cannot be taken, we like to have the hogs given the least possible handling.

Some one mentioned a point this morning that called to my mind a case where some of our serum was used in a garbage feeder's yard by two young men who vaccinated something like 320 hogs. About 45 of them had been in a lot by themselves, fed cooked garbage, and were kept in very much cleaner quarters than the others. The entire herd was treated with the same serum. There was no loss in this bunch of 45 that were fed cooked garbage and kept in clean quarters, but there were 50 lost of the remaining 270 hogs. I tried to get some careful post-mortem records; these were not altogether satisfactory, but the evidence was reasonably plain that some of the hogs died from garbage poisoning. A few of them had evidently died from cholera, and some of them had died from septicemia. Now we didn’t know whether the cooked garbage had anything to do with it, or whether the cleaner quarters protected the 45 first treated. That same serum had been used with perfect results the week before on the University farm, and we feel sure that it was good. It is our purpose next year to keep on hand during the season, two strains of virus; one of the highest virulence we can possibly obtain and the other of low virulence. We have been able to keep up a high virulence by the use of light hogs for our virus pigs, preferring to use nothing over 70-pound pigs, and usually running from 45 to 55 pounds, and we have had no trouble in keeping up virulence. We expect to keep up this highly virulent strain next season, and to maintain a very low grade virus by using heavy hogs weighing about 80 to 100 pounds. The plan is to use the low grade virus for simultaneous vaccination in the field. We don’t know yet that a low grade virus will give immunity. I may say, incidentally, that it is our plan to get hogs weighing 80 to 100 pounds with long tails, and then try to reduce the virulence so they will live 18 or 20 days. When we want some fresh virus, instead of carbolizing, we will run a pig in and shave his tail, and get fresh virus. We may change our doses for another year. I am satisfied that our present schedule of doses is large enough for serum, only vaccination and pen ex-
posure, and I may say that our doses are very much lower than the doses that have been mentioned here this morning. I am convinced that our dose is large enough for pen exposure, but perhaps not quite large enough for simultaneous work. In our simultaneous work during the season we have had more losses than we like. We have been using a 2 cc. dose of very high grade virus instead of a 1 cc., as has been recommended here, and we have used a low serum dose. Our dose runs under 20 pounds, 10 cc.; 60 to 75 pounds, 20 cc.; 75 to 100 pounds, 25 cc. Most of the other men reporting here are giving 40 to 45 cc. to 75 to 100 pound pigs. I suppose we shall increase our dose for simultaneous work next year 30 to 50 per cent.

Our method of testing may be different from that of other workers. We take three pigs and give them all the standard two cc. dose of virus; we give one 75 per cent of standard dose and another a full standard dose, according to our schedule. In order that serum may be considered standard the pig must show no serious disturbance in the three-quarter dose. That gives us a margin of 25 per cent of safety for field work. Even with that margin of safety we had had a small per cent of loss. We have been using the intraperitoneal normal salt method with the best of satisfaction. We figure that this has greatly reduced the cost of serum. We are also using the re-hyperimmunizing idea for the same purpose.

We have sold all serum that we possibly could produce, at 2½ cents per cubic centimeter. Next January when we have made inventory, we shall know where we stand in a business way. We have adopted and very much prefer the intravenous method whenever it can be used. We worked for a long time with the slow subcutaneous method, but had too many carcasses condemned which otherwise would have been sold. For that and other reasons we discarded the subcutaneous method and adopted the intravenous, with an occasional intraperitoneal hyperimmunization where intravenous is out of the question. Occasionally we get a hog for that purpose that has mutilated ears, or for some other reason the intravenous is not practical, then we use the intraperitoneal. We have had our share of loss from the intraperitoneal. Concerning the losses in hyperimmunizing by intravenous method we have also had experience. In some of our later work Dr. Spencer has apparently saved some hypers by prompt tail bleeding.

We have had some unfortunate experiences when hogs were castrated at the time of treatment or soon after. I remember a lot of boars treated with serum only, castrated within a day or two, and exposed to cholera. They received a full dose of good serum and should not have died. Yet some two or three out of five castrated boars developed clear cases of cholera and died. We had a similar experience in connection with a sow that had been hyperimmuned. She had taken the hyperimmunization perfectly, show-
ing that she was unquestionably immune. Subsequently she was rehyper-immuned and aborted, and a short time afterwards developed a typical case of cholera and died.

Our loss and disappointment in the field have not been due to fault of the serum or the method, or the general plan of production, but rather to the human element.

I am not sure whether I should say anything on what we call our V. B. work. Possibly some of you noticed a small article in the American Veterinary Review concerning some research we have been doing with young pigs from immune sows. For about two years we have been conducting experiments along the line of cheaper and simpler immunization. We have found that very young pigs from immune sows, during their first four or five weeks, up to at least five weeks, are very highly immune to cholera by any method of infection. We could give such pigs large doses of very high virulence blood without ill effect. During two years we have worked with about 25 sows and 80 pigs from these immune sows. The pigs have practically all been highly immune under such infection. Our losses out of a hundred pigs were small. Whether the pigs from a simultaneous immune sow will stand that sort of treatment or not we don't know. We have worked with one sow whose pigs did not stand the test. We have not done enough work with pigs from susceptible sows, but what we have done indicates that they have no resistance, and die like flies when we put virus into them.

Then the question arises will a little pig, a sow pig given this V. B. immunization—as a little pig—hold that immunity and produce immune pigs which will stand the same process in the next generation. We have had a limited amount of experience in that, and so far as it goes it indicates that they do. We have had one litter of pigs that we have worked with in the second generation. We have quite a number coming on. The pigs of this sow of the second generation on this process stood the immunization just as well as they did in the first generation. As to the duration of immunity, we treated a litter of very young pigs over a year ago, and left checks. We recently took three of that litter—hogs weighing 200 pounds. There was one check pig and two vaccinated; the check pig died very promptly under the dose of 2 cc.; the other pigs continued well.

We have several intelligent farmers and stock men within reach, who are co-operating with us in this.

Dr. Eichhorn spoke of the use of the word “serum,” saying he did not know whether it was correct to use that term, as in this country it usually was used for defibrinated blood. He referred to the custom in Europe, principally Hungary, of using the serum by separating the blood corpuscles and using the serum alone, reducing the quantity.
Dr. Marshall, upon invitation from the president, said he could add nothing, but that they had had success in their virus work, using virus obtained from Iowa, which was the most satisfactory of all used, although variable in potency. The field virus, he said, had not given good service. He mentioned, too, possible loss from impotent serum.

Dr. Craig of Indiana said that the intraperitoneal method had not proven satisfactory and they would discontinue it. They were now using the normal salt solution for the protection of hyperimmunes with good success, as after experimenting they had found that in a hundred-pound virulent blood hog the best quantity to inject was 2500 cc., and that about two hours and a half before killing a virulent hog is about the best time to inject the normal salt solutions.

Dr. Moore expressed his interest in all that had been said on this subject and asked how, in the diagnosis of cholera in cases of outbreak, they could tell whether or not it is genuine hog cholera in time to use the serum with efficiency.

Dr. Niles was asked if he could answer the question, and said in reply that it was not easy to diagnose cholera at the beginning of an outbreak, as the first one or two post-mortems do not show very definite lesions, but the history of the herd would help, the appearance of the animals before and after death. He mentioned hemorrhagic lesions as being characteristic, but chronic lesions must be watched for later. Sometimes it was necessary to make two or three autopsies. He suggested that Dr. Fisher tell his method.

Dr. Fisher said much depended on the history. They took temperatures where a herd appeared healthy, and if the temperature ranged from 105 to 107 they called it cholera; two or three post-mortem examinations were frequently necessary. There was no positive way, he said, of diagnosing cholera, except in a general way by lesions of the disease.

Dr. Moore spoke of the demand for serum in the preliminary work they had done last year. The herds were small, he said, and they had attempted to make inoculations of healthy pigs with the blood of the animals in the outbreak. They had no serum and tried to find out what percentage of those outbreaks would produce the disease and found about 30 to 40 per cent of the so-called outbreaks where one or more animals died, the diagnosis was unsatisfactory. They were afraid of bringing the serum into disrepute by bad results where good could not be expected.

Dr. Fitzgerald added to Dr. Moore's remarks that they had used in hyperimmunization 52 strains of virus collected from 52 outbreaks, all tested on susceptible pigs. In all but two cases out of the 52 they produced symptoms.
Dr. Dorset was invited by the president to enter the discussion and recommended careful consideration of plans or methods used in serum distribution. The object in sending out serum should be the eradication of hog cholera, and not merely the mitigation of losses that occur from the disease. The plan suggested by Dr. Melvin was to have deputies in each small district or county to carry the information of an outbreak of cholera to a central state authority, who could take action intelligently when the outbreak occurred. But more important is to stop the disease at the original center of infection, thus avoiding to a large extent its spread.

Before adjournment the president announced additions to the Committee on Fundamental Basic Law. Drs. Schoenleber, Ravenel and Juckiness were appointed to work with Drs. Reynolds and Steddom.

The meeting adjourned until 2 p.m.

2 P.M. Meeting called to order by President Cotton, paper by Dr. Hughes.

THE VETERINARIAN AS A FACTOR IN SANITARY CONTROL WORK.

Joseph Hughes, Chicago.

Away back in ages so remote that the period cannot even be approximated, evidences of the practice of the veterinary art are to be found.

These evidences are depicted on ancient Egyptian frescoes, whereon veterinarians are plainly represented ministering to the ailments of oxen and other animals. Obviously early man selected animals which were of a tractable nature, so that he might adapt them to his own uses, and naturally as maladies of a simple or serious character developed in these animals they were treated by remedies which he considered appropriate. Thus in all probability dawned the practice of veterinary medicine.

There is little doubt but that at the period alluded to frequent pestilences ravaged the flocks and the herds of the primitive people, just as they are doing at this present time, but there is no evidence that sanitation or control in any form was taken into account, or that agencies of a physical nature were ever considered responsible for the production of diseases of a ravaging character; on the contrary, the people regarded inflictions of this kind as proceeding directly from an avenging Providence, or at least as events created by Divine direction.

The first recorded animal pestilence is of biblical origin. In the Book of Exodus we read that in Egypt during the reign of Pharoah IV. a visita-
tion described as a "very grievous murrain" among horses, camels, asses, oxen and sheep arose in that country. It is known as "The Fifth Plague of Egypt."

Immediately preceding, accompanying or succeeding this fifth plague, manifestations of an unusual and awful character are described. Following a damp winter came a summer with cold, dewy or rainy nights, while during the days a blazing sun burned on desert and plain, and in the valley of the Lower Nile, with its rank vegetation, great stagnant pools resulting from the recession of the waters, evaporated their polluted contents producing a pestilential condition of the air. Hail storms, thunder and "lightnings running along the ground," followed by great droughts, appeared in the autumn. The water in the river streams and pools turned red in color, killing all the fishes. In the altered corrupted waters swarms of frogs developed, covering the land of Egypt, and on dying were gathered by the people into huge piles; the emanations from their decomposing bodies vitiating the air and inducing disease and death among the stricken people. We are told further that at this time myriads of winged insects and troublesome detestable vermin of divers kinds, invaded the Egyptian country and covered the bodies of men and animals.

In these fearful pestilential surroundings the oxen and the sheep, the horses and the asses and the camels developed a plague; a "grievous murrain" whose spread was augmented by great storms of sand and dust, producing "biles" and "swelling blains" which almost exterminated men and animals.

Here surely is a picture not met with or repeated, or if repeated, not recorded throughout all subsequent years. Outside of the plague observed in Egypt, historical records antedating the Christian era and dealing with animal pestilences are few and indefinite. The existence of veterinary surgeons is not noticed until A. D. 69, when Columella, a Roman veterinarian, and Dolus Mendicius, a veterinarian of Egyptian extraction, are mentioned as having a definite influence on the progress of veterinary science. In A. D. 400, Vegetius Renatus, a count of Constantinople and a skilful agriculturist and hippiatrist, in describing the sanitary control of a disease affecting cattle, states that "by feeding on the same grass they infect it, and the fountains also by drinking in them, and they also infect the cribs and the stalls where they stand, so that oxen previously perfectly sound and in good health perish by the smell and by the breath of those that are sick and diseased, blowing on them. The dead carcasses also must be thrown out at a great distance beyond the bounds of the villa and buried very deep in the earth lest the bodies of those that are sound be infected by them and they perish."
He says further, "Therefore it is that the animals which have been attacked must with all diligence and care be separated from the herd, put apart by themselves and sent to those places where no animal is pastured lest by their contagion they endanger all the rest, and the negligence of the owner be imputed to the Divine displeasure."

From the time of Vegetius—that is, 400 A. D., ten centuries pass by, during which numerous and constant outbreaks of communicable diseases among animals are recorded as occurring in nearly every known country on the globe. Prior to the fourteenth or fifteenth century historians are, except in few instances, unable to identify these epizootics, and during these one thousand years no particular effort was apparently made in the way of sanitary control. About the commencement of the eighteenth century (1711 to 1723) Lancisi and Ramazzini, two Italian physicians, writing of highly contagious diseases of cattle then occurring in Europe and Asia, give not only succinct descriptions of the symptoms, but also of the means by which the diseases were spread and the methods adopted in suppressing them. Lancisi, in describing one of these plagues, intimates: "Every fact already shows that the cause of the plague is some exceedingly fine and pernicious particles which pass from one body to another by contact. It therefore resembles a special virulent poison, a few particles affecting the whole organism and acting in all likelihood just as we see a ferment act in bread or wine, a minute portion leavening the entire mass." He tells us that the plague started "as a neglected spark at first; it at length set Italy in a blaze;" that the contagion was not only carried by sick oxen, but was spread by shepherds and veterinary surgeons who brought the infection to the healthy and that it was disseminated by dogs and other animals, which touched the diseased with their hair or feathers. In the way of repressive measures, the skinning of carcasses and the sale of hides was interdicted and the flesh, horns and fat of affected animals were ordered to be buried in deep pits and covered with quick lime. Edicts prohibiting the sale of cattle were promulgated and because owners brought diseased cattle into the city of Rome secretly by by-ways, inspectors were appointed to visit the markets, and only those portions of flesh stamped with a red hot iron by an inspector were allowed to be sold. One of the edicts issued prohibited the bringing of cattle into the city district of Rome under penalty of death to a layman and of the galleys for life to an ecclesiastic. Lancisi counselled that every diseased animal should be killed, for if left to a slow death the costs of medicine, veterinary surgeons and attendants would be great, and besides, the presence of the animals would assist in diffusing the contagion. He advised destruction by the pole-axe so that no affected blood might escape on the ground; that roads and by-paths be carefully guarded; that healthy cattle be removed from their former pastures, which must be regarded as contaminated; that fountains and vessels used by animals be disinfected; that the clothes of the attendants be fumigated, and that the dead
carcasses from which “not one hair” was to be removed, be buried in deep pits. He also advised that the milk of infected cows be instantly buried and that the severest punishment be inflicted on those who disobeyed this order.

These edicts were met with a rebellious spirit on the part of the people, but, notwithstanding this, they were to a great extent carried out and the Roman government arose to the occasion and allowed liberal compensation to the cattle owners, with the result that the district of Rome and the adjoining Campagna were rid of the disease in nine months, while in other portions of Italy it raged for several years. Such were the repressive methods adopted in and about the year 1711—two hundred years ago—by Lancisi. In principle and in practice the same suppressive measures are being used to-day.

Since that time many murderous pestilences have swept the nations of the civilized world, the improvements in transportation developing traffic in animals, and consequently disseminating infectious diseases. To combat these pestilences the various governments of Europe and portions of Asia, constructed and liberally endowed veterinary schools. In 1762 the illustrious Bourgelat, a French veterinarian and an advocate, observing the ruin wrought by the cattle plague, established the first veterinary school, locating it in Lyons. One year later the French government constructed a veterinary school at Alfort, and shortly afterwards another at Toulouse. Within a few years governmental veterinary schools were established at Vienna, Berlin, Munich, Dresden, Hanover, Carlsruhe and Stuttgart. Italy built four schools, and in Spain, Holland, Switzerland, Denmark, Sweden and Russia schools were constructed for teaching veterinary science. With the advent of these schools began scientific research into and well directed sanitary control regarding animal diseases. In 1792 a veterinary college of a private character was established in England, and this was subsequently followed by others similarly organized. America, apparently emulating England, established private veterinary schools later.

Closely scanning historical data dealing with the diffusion and ravages of infectious diseases of animals, we find that these diseases “followed fast and followed faster” as intensified civilization developed improved transportation facilities, and, as the movements, especially of cattle, sheep and swine grew, the veterinarian came into great demand.

On account of its segregated situation the American continent, until comparatively recent years, escaped the European and Asiatic plagues, and some of these pestilences, such as cattle plague, sheep pox, and surra have, so far as we know, never reached these shores.

At what period such diseases as anthrax, swine cholera, glanders, influenza, Texas fever, hemorrhagic, septicemia, scabies, rabies, tuberculosis, strangles and infectious abortion reached the United States, or where they
came from, is a problematical matter upon which we have no definite data, but of dourine, contagious pleuro-pneumonia of cattle, and foot and mouth disease we have precise and conclusive evidence as to their source and the period when they reached here. We get glimpses of these two latter diseases with much frequency as we examine the records of the past two thousand years, so that they must be looked upon as pestilences which, on many occasions, despoiled the nations of the east.

As to contagious pleuro-pneumonia and foot and mouth disease, it would be difficult to estimate which would be the greater scourge, if widely disseminated in a country having the animal industry and the area of the United States. These diseases are dissimilar in almost every respect. The one, insidious, deadly, spread only by contact of animal with animal, and depending chiefly for its distribution on the boundary fence, the auction mart, and the cattle trader, shows a period of incubation that permits animals to change hands many times and sometimes travel thousands of miles before the disease manifests itself, thus infecting many and distant points simultaneously. The other, effervescent, yet comparatively benign, with an incubative period of a few days, employs every conceivable agency to favor its dissemination, and under favorable circumstances, borne seemingly by the four winds, it affects herds far and near temporarily and often permanently demoralizing them.

To whom belongs the credit of expeditiously exterminating these two plagues in the United States? Primarily to our wise and generous government which fortified itself by enacting laws dealing with such pestilences, by creating a Bureau of Animal Industry to supervise the welfare of its live stock and to enforce these laws, and by appropriating funds for defraying expenses and compensating owners.

The chief of this bureau and his assistants were eminent veterinarians and the time having already come to exercise the functions of their office, they promptly grappled with the situation confronting them and showed professional acumen and executive ability of the highest order. They knew the ways and the traits of the cattle owners; they thoroughly understood the environments, the habits and the mode of life of animals; they were acquainted with the history, the nature, the symptoms, the mode of spread and the mode of control of these pestilences, and armed with this knowledge—knowledge which I insist is only possessed by veterinarians—they went to work. They enlisted the services of prominent veterinarians outside of the department, they amalgamated with state veterinarians and state live stock boards in the infected states, and conjointly they threw cordons around the suspected areas and flooded the territory with veterinarians; they halted live stock traffic, examined every susceptible animal, hunted down every clew, disinfected, fumigated, quarantined, slaughtered, sanitarily and safely disposed of the carcasses and, lastly, in part or in whole compensated the owners for their losses.
There is no infectious disease that can withstand aggressive measures of this kind if intelligently and faithfully carried out, and the brilliant work of the Bureau of Animal Industry in the recent Pennsylvania-Michigan outbreak of foot and mouth disease, substantiates this statement, if substantiation were necessary.

On the other hand, what if through apathy or ignorance on the part of the veterinarians, the outbreak just alluded to went unrecognized and was allowed to slumber during the winter months when cattle are more or less confined in pens and barn yards, hemmed in by frost and snow, and, on the advent of spring and early summer with the activities of the cattle trade, with the return of birds and the re-appearance of rodents and insects—probably the greatest carriers and distributors of the infection—what, I ask, might have been the result? Who will say that under such circumstances this cattle pest riding on the wings of the wind, might not reach the central states and, crossing the Mississippi, entrench itself in the western cattle country. If such a calamity should ever occur it would be a dire misfortune to the nation, for, apart from the incalculable monetary losses which would ensue, the difficulties attending its extermination would, on account of the extent of the territory, be almost insurmountable.

Notwithstanding the efforts that are being made to exterminate foot and mouth disease, economists and sanitarians must remember that it is ever present on either the European or Asiatic continent, and that in a small island country like England it lasted without cessation from 1839 to 1886, causing enormous losses to that nation.

If during the period mentioned England had entrusted the enforcement of the various acts known as the "Contagious Diseases (animal) Acts" which became laws, to a board constituted of, or even advised by her veterinary sanitarians, it would have been better. Instead, however, the administration of these laws was placed in the hands of a body of titled self-sufficient laymen, advised by a titled medical officer, the collective body rejoicing in the bombastic title of "The Royal Cattle Commission"—which, in turn employed the butcher and the baker and the candlestick maker to carry out the details. As it turned out England was held up to derision by her own citizens and countrymen for harboring foot and mouth disease for forty-seven straight years.

Sanitary control work is being actively and successfully prosecuted in the various states by veterinarians and shows remarkable progress. In the south the state and federal veterinarians engaged in tick eradication are annihilating the invertebrate host of the Texas fever organism and incidentally circumventing the boll weevil by yearly placing many counties in each state above the danger line.
What with the opening of the Panama canal, the probability of establishing a deep water way from the Lakes to the Gulf, the draining of the Mississippi delta and the consequent minimizing of danger from anthracoid infection, the eradication of the tick, the elimination of the boll weevil, the transformation or partial transformation from cotton growing to mixed intensive farming, and, last but not least, the retention of its present able veterinary corps who have done so much excellent work from a sanitary standpoint, surely the south has a bright future.

The making of cholera serum and immunization of hogs is unquestionably the most valuable branch of control work in which veterinarians are engaged and reports regarding its efficacy are of a distinctly laudatory character.

Glanders is fast disappearing in Illinois under the strict repressive measures exercised against it. During the past three or four years it is unusual to meet with a case of this disease in this city of Chicago, where it was once so common. The same may be said regarding rabies. Very common three years ago, it has apparently vanished from the city, although no special restrictive measures were adopted in caring for it.

Outbreaks of influenza and distemper in horses are readily controlled by the administration of sera, provided the veterinarian is fortunate enough to procure the particular serum which is adapted for the particular outbreak. The commercial influenza anti-toxin manufactured by one firm fails in arresting the progress of the disease in Stable No. 1, while in Stable No. 2 it acts like a charm. The same product manufactured by another firm controls the outbreak in Stable No. 1, but fails in No. 2.

Autogenous bacterins made and used by veterinarians are giving excellent results in controlling disease.

Varying the subject slightly, is it an assumption to ask why the laboratories of the Department of Agriculture, with the aid of state laboratories, should not prepare and dispense all the sera, anti-toxins, vaccines, or other biological products used for conserving the health of the live stock of the nation? Past experiences should teach the country that commercial unsupervised products of this kind are a constant menace for the reason that they may be virulent or impotent; and granting that one or other of these conditions exist when a product reaches the market, it is questionable as to which is the worst.

If it is virulent it may be sold over a wide area, distributing disease wherever it is used. If it is impotent, as is frequently the case with mallein or tuberculin, it leaves unrecognized glanders in stables or tuberculosis in herds.
Outside of the question of virulence or impotency, comes the matter of control of these products by the federal or state authorities. Is it not a fact that to-day all the biological preparations, including tuberculin, are being peddled about like proprietary or patent medicine, and can be purchased at or ordered through many cross-roads drug stores in many states by any person, however irresponsible? If such is the fact, it strikes at the very foundation of this Association, and unless some feasible remedy has been proposed—and I trust it has—it utterly subverts the good that might otherwise come from the deliberations of one of the most important sections of this meeting—that on tuberculosis. I share the opinion of the members of this Association and have the most supreme respect for and confidence in properly prepared tuberculin as a diagnostic agent for tuberculosis. Intelligently and honestly used, it is not only reliable but nearly infallible. Under existing conditions, however, its use may be made farcical and dishonest in the extreme, and so long as the output of tuberculin remains uncontrolled, the nation and the state are placing a premium on dishonesty.

The veterinarian in the dairy or breeding districts in the past and, for that matter, at the present time, should be commiserated. In the past he was permitted, or rather he was instructed, to purchase tuberculin from what source he pleased, and unconsciously getting hold of impotent material, he was discredited and his permit revoked because he could not get results. At present he is supplied with the reliable government product, but when he conducts a test the crafty herd owner may anticipate him by about a week, using something he acquired through his drug store, and the cattle owner gets certificates showing a clean herd.

So long as such practice is continued the veterinary profession cannot expect to progress in public esteem, nor can we expect to make headway in ridding our stock farms and dairy herds of this pest.

We should at the same time endeavor to remove the odium which has been and is being cast on the country members of our profession by people who fail to appreciate immediate conditions.

The veterinarian in the breeding and dairy districts is to-day a much vilified man. He has done much and is doing much to raise the veterinary standard and improve sanitary conditions in his community. He is a remarkable improvement on his predecessor whose shoes he occupies, but his inheritance is not an enviable one. While federal and state veterinarians are wrestling with the mighty problems of interstate and state movements of live stock, and the contagious diseases carried and disseminated by them, the unofficial and unassuming rural veterinary practitioner is fulfilling a function that can neither be despised nor ignored. He is a steady conservator of the live stock industry, inasmuch as he is readily accessible, and while
applying treatment and having the lives of animals, he is contributing to the wealth and upbuilding of the nation. To him it matters not whether a given number of animals succumb from sporadic conditions or from a scourge; they are a dead loss to the nation, and from his standpoint he who succeeds in controlling these losses is a public benefactor. In serious outbreaks of disease he is on the scene before state or federal authorities arrive, and very frequently he has the condition under control before outside assistance reaches him. While he may not be a proficient bacteriologist, or pathologist, he has gathered sufficient regarding these subjects from his instructor and studies to blend with his natural practical knowledge, and this constitutes him an invaluable man in his community.

His intimate association with the people in his locality encourages mutual repose of confidence and his word goes further in a case of friction or conflict between his client and the official veterinarian than any other. Thus by his influence and advice he brings about a more ready enforcement of the law. In the battle against animal tuberculosis we need such men.

In these days when the agricultural and dairy districts are being depopulated, the younger generation—the brain as well as the brawn—flocking to cities and crowding business houses, or settling amidst blackened chimneys and restless furnaces; and the older people, who, having robbed the land of its natural productiveness without giving it much if anything in return, lease the dairy farm and retire to town, leaving the poor renter with diseased cattle and infected premises on his hands, the country veterinarian becomes counsellor in the situation.

In these days when the cry, "back to the land," is being preached from the house tops and is caught up and acted upon chiefly by physical weaklings who have lost out in the struggle and turmoil of city life, with their accession to the stock raising and dairying ranks, their success may be materially aided by the counsel of the educated country veterinarian who, as a general rule, was himself at one time a farmer or a farmer's son.

In the widespread movement against tuberculosis in animals the veterinary profession is on trial, and at this time even more than at any other, efficiency, honesty and integrity should be its motto.

The trained veterinarian must always remain immeasurably superior to the amateur. We are no longer grappling with ignorance and empiricism. Let us demonstrate to those misguided educators, who fortunately are outside of our profession, that an agent possessing the subtleness of tuberculin should not be accessible to the ordinary cow owner, and that he who instructs him in its use is also instructing him in its misuse. It is difficult to conceive of a more conscienceless procedure, for the illicit traffic in known tuberculosis animals which it is bound to engender, differs morally
and materially from traffic in tuberculous animals not known, and consequently not recognized.

Illinois is and has been receiving its full share of this illicit traffic. Its great dairy district, comprising the northern division of the state, has for years been the concentrating ground for reacting tubercular animals from nearby and distant points.

Illinois has invited and still invites this condition of affairs. While every state in the Union having any kind of pretensions to an animal industry has its borders safeguarded against incoming tuberculosi, Illinois persistently and stubbornly keeps its fence down. In the meantime unscrupulous cow dealers, both within and without this state, are repeating the unlawful practices deprecated by Lancisi in Rome 200 years ago, and which the Roman laws punished with death. In the meantime, too, consumption in the form of a great, gaunt ogre, stalks the land, tainting the fonts from which we derive our milk; a commodity forming the principal sustenance of our children and which is consumed daily by our people at large. May the time not be at hand when the dairy cow will stand out prominently in the foreground, the proven, the unquestionable cause of widely disseminated tuberculosis affecting mankind. The pathology and bacteriology of tuberculosis and infective diseases generally are unstable and vacillating, and have been since these branches first engaged attention. To-morrow upsets the conclusions of to-day. Still, progress is being made. The tubercle bacillus in man and cow are not constant in their types, but because they differ morphologically is no evidence against their being essentially one and the same. It would, indeed, be singular if they should not exhibit transformations where the soil, the temperature and the general environments are so distinctly different. When vaccination was first introduced, in the last year of the eighteenth century, the magnitude and nature of the principle it involved was not appreciated, because it was not even vaguely understood. It is not beyond the bounds of possibility that the dairy cow, which beneficently gave the world an immunizing agent against the dreaded human variola, may with the future development of scientific thought and investigation, be demonstrated to be the great infecting and disseminating medium of human and animal tuberculosis.

The President—we will now take up the subject of tuberculosis. The first paper is that of Ex-Governor Hoard of Wisconsin. Governor Hoard was unable to be present, but has sent his paper, which I will ask Dr. Kiernan to read.

Tuberculosis Control from a Layman's Standpoint.

Dr. Kiernan—This report is in the form of a letter, and dated Oct. 29, 1910, addressed to Mr. J. J. Ferguson, Secretary of United States Live Stock Sanitary Association, Union Stock Yards, Chicago, Illinois.
Mr. J. J. Ferguson, Secretary U. S. Live Stock Sanitary Association, Union Stock Yards, Chicago, Illinois.

Dear Sir—I have your letter asking for a brief summary of my experience in eradicating tuberculosis from my herd and maintaining its exemption from that disease for over ten years. It is a simple proposition, so simple, indeed, as to escape the respect and adherence of too large a class of farmers.

First, let me say that without the tuberculin test I could not have done what I have. Therefore, I wish to put that test to the front as being the only test whereby a farmer can determine with any degree of exactness whether the seeds of the disease are in his herd.

About twelve years ago I was building up a registered Guernsey herd. I determined to put my cattle on a clear and determined basis of health. Accordingly I employed a competent veterinarian, who had made a special study of tuberculosis, to give my cattle a tuberculin test. The herd was composed of about twenty-five animals, young and old, of which half were registered and the balance grade Jerseys and Guernseys.

The first test disclosed four animals, as I remember, which reacted, all of which were grades that I had bought in the immediate vicinity. These were killed and a post-mortem held over each carcass. The disease proved to be there, just as the tuberculin said it was. The next year two registered cows that I had purchased, both valuable animals, responded to the test, and were likewise killed and buried. The post-mortem on these justified the tuberculin test, although with one cow we had to search closely before we found the lesion. In 1899 two more were detected and killed, the post-mortem proving the accuracy of the test, as before. In the meantime the entire stable room was disinfected, first by spraying with whitewash and then with a coal tar disinfectant.

This was the last killing done. The test in 1900 showed no reactions, and although an annual test with tuberculin has been made every year since, but one, no reactions have been found. Several animals have died from other causes, as they do in all herds, and a post-mortem has failed to find any evidence of tuberculosis, so I believe that the herd is entirely clear of all tuberculosis infection and has been for ten years.

I will say further that I have taken no animals into the herd for a number of years except two bulls, and these were subjected to a rigid quarantine for several months and thoroughly tested at intervals with tuberculin.

To this latter fact I owe a large part of my exemption from the disease. Tuberculosis is bought and sold to an alarming extent. Farmers are not thoroughly established in their ideas and convictions as to the nature
of the disease, and especially as to its infectious character. But they must face it squarely and resolutely. Any attempt to belittle its importance, to nurse and coddle it with the idea that it does not amount to much, or that the hue and cry raised against it is a trick of the veterinarians, will be sure to bring sore disaster. In my belief it is as infectious as smallpox among humans.

Every man should have pride and patriotism enough to wish to maintain a healthy herd. These are days of close competition, high prices of land and labor, and in my opinion every farmer should test his cattle once a year at least and take none into his herd until he is absolutely certain that they are free from all contagious diseases. Very truly yours,

W. D. Hoard.

A REASONABLE METHOD FOR THE CONTROL OF BOVINE TUBERCULOSIS.

Dr. O. E. Dyson, Chicago.

As a preface to my subject I desire to state that in my opinion before progressive steps can be taken toward the control of bovine tuberculosis it will first be necessary to render the diseased animal unprofitable to the producer. Second, that all herds which are free from tuberculosis and contagious abortion should receive official recognition from state and federal authorities in order that the owner and the animal may receive just recognition in the breeding world. Profit or loss can no doubt be made a logical solution of the problem of how to control the spread of bovine tuberculosis or any other contagious disease.

I also wish to state that as a matter of policy I do not believe in the compulsory slaughter of cattle reacting to the tuberculin test. In fact, I hold that it should be optional with the owner to decide between slaughter or perpetual quarantine.

The fundamental principle involved in the eradication or control of bovine tuberculosis will eventually be found to entirely rest upon the enactment of uniform state and federal laws specifically classifying bovine tuberculosis as a contagious disease, inimical to public health and to the best interest of live stock breeders at large. Reference is made to the need of specifically classifying tuberculosis as a contagious disease for the reason that some live stock sanitary boards and other public officials seem to have considerable difficulty in convincing themselves that tuberculosis is a contagious disease. Of equal importance to the enactment of such laws is the appropriation of funds sufficient to enable public officials to enforce them. The annual economic loss sustained as a result of the disease by those who are in no wise responsible for the increasing spread of the infection has
now reached such a magnitude as to demand, without fear or favor, the enactmen
and enforcement of equitable laws for their protection. Furthermore, at least 95 per cent
of the owners of healthy herds of cattle and hogs should be protected against the danger
of their herds also becoming infected, even though comparatively few breeders of
ruberculosis cattle will suffer an inevitable loss.

Specific Recommendations—In order to encourage a larger production
of healthy cattle throughout the United States by preventing a further
spread of the contagion of tuberculosis, laws should be enacted in every
state requiring that any one having a knowledge of the existence of tuber-
cular infection in cattle or hogs shall immediately notify the state veteri-
narian of his respective state, giving the name of the owner and location
of the premises occupied by the infected animals.

Knowledge of the existence of an animal affected with tuberculosis, as
demonstrated by clinical evidence of the disease or by a reaction resulting
from the administration of the tuberculin test, no matter by whom admin-
istered, should be considered proof of a knowledge of an infected herd and
to the infection of every animal reacting to the test.

When the contagion of tuberculosis has been demonstrated by reac-
tions resulting from the administration of the tuberculin test, by clinical
evidence of the disease, or when the owner and the premises occupied by
ruberculous cattle or hogs previous to slaughter can be identified, all cattle
and hogs remaining upon the infected premises should be placed in quaran-
tine until the owner shall file an application for an official administration
of the tuberculin test to all cattle remaining upon the premises. All hogs
found upon infected premises should be held in quarantine until sold for
slaughter, subject to post-mortem inspection.

The federal government, except as otherwise provided for under the
caption of "Free Herds Classified as A, B and C," should prohibit the im-
portation of all cattle, also the interstate transportation of all cattle for
breeding, dairy or exhibition purposes, unless from herds recognized under
the regulations of the Bureau of Animal Industry as being free from tuber-
culosi or other contagious diseases.

No herd of cattle in which tuberculosis exists should be considered
free from infection until each animal in the herd exceeding the age of one
year has passed at least two negative tuberculin tests, officially administered,
with an intervening period of not less than three months, nor more than
one year between each test.

All cattle reacting to the tuberculin test should be permanently and
conspicuously branded for the purpose of identification, preferably with a
hot iron in the form of a capital "T." Reactors which show no physical
evidence of tuberculosis should, upon request of the owner, be placed in perpetual quarantine to be utilized for breeding under the Bang system, or disposed of by slaughter under state or federal laws. All cattle showing physical evidence of tuberculosis should be condemned for immediate slaughter.

Provision should also be made under quarantine regulations to permit breeders to sell or purchase cattle which have reacted to the tuberculin test and are properly branded, and transfer them within the limits of any state for breeding purposes under the Bang system.

The owner of pure bred registered cattle and all dairy cows, slaughtered on account of reacting to the tuberculin test, should receive compensation equal to two-thirds of the appraised value thereof, which should not exceed the sum of $100.00 per head.

No compensation should be paid to the owner of animals slaughtered until after said owner has conformed to every regulation prescribed by state or federal authorities relating to the management of infected herds and premises.

The interstate shipment of milk and milk food products should be prohibited under the federal food laws: (a) unless the product has been derived from cows free from tuberculosis, as demonstrated by the tuberculin test officially administered; (b) or having been pasteurized by being subjected to a temperature of not less than 140 degrees Fahrenheit, for a period of not less than twenty minutes.

Local milk supplies should be controlled by municipal ordinances making similar provisions.

As clean milk from cows reacting to the tuberculin test, in case no physical evidence of tuberculosis is manifest, may be safely utilized for human consumption after being pasteurized, such cows might, within reasonable bounds of safety and for economic reasons be branded, placed in quarantine and regularly subjected to a competent inspection in addition to requiring a thorough pasteurization of their products under official supervision, before such products are offered for sale.

The sale, distribution or use of tuberculin for testing cattle should be prohibited except under state and federal laws providing for its use under official supervision.

Any violation of laws relating to the sale, distribution, or use of tuberculin for testing cattle, should be punishable by heavy fines or imprisonment, and by disbarment of any veterinarian from further practice upon being found guilty of violating any provision of the law.
Official tuberculin tests should only be administered to cattle upon request of the owner. All expense incidental to the administration of the test should be borne by either the state or federal government.

Provision should be made under uniform state and federal laws to assist dairymen and the owners of high grade and pure bred registered cattle to establish and maintain herds that are free from tuberculosis. This could be done by providing for the identification and official registration of all such cattle, upon request of the owner, who should be required to file an application for such assistance with the state veterinarian of the state wherein he resides, or with the chief of the United States Bureau of Animal Industry, Washington, D. C., whereby he agrees to faithfully conform to all requirements necessary to the establishment and maintenance of a free herd, according to the regulations prescribed by the United States Bureau of Animal Industry pertaining thereto.

All cattle, including calves exceeding the age of six months in a herd eligible to official registration, should be subjected to the tuberculin test officially administered, in addition to which each animal should be subjected to a thorough physical examination by a competent veterinarian. Each herd should be classified according to the result of the initial and each succeeding test, and designated as "Free Herds Belonging to Classes A, B and C."

**FREE HERDS, CLASS A.**

A free herd should consist of cattle, all of which exceeding the age of six months should successfully pass the initial tuberculin test and physical examination, each of which should be repeated annually, or by promotion from Class B. For example:

- 100 cattle tested; 100 cattle passed.

**FREE HERDS, CLASS B.**

A herd in which not to exceed 10 per cent of the animals react to the initial tuberculin test (provided all reactors are immediately removed from the herd and proper disinfection requirements complied with) should be designated as a "Free Herd, Class B," and thereby become eligible to Class A, after being subjected to and having passed an additional negative tuberculin test and physical examination within a period of not less than three or more than twelve months between the administration of the first and second test.

**FREE HERDS, CLASS C.**

A herd in which not to exceed 25 per cent of the animals react to the initial tuberculin test (provided all reactors are immediately removed from
the herd and proper disinfection requirements complied with) may be designated as a "Free Herd, Class C," and thereby become eligible to Class B under the foregoing provisions prescribed for that class.

Provision should be made for the unrestricted movement in interstate trade of cattle from "Free Herds, Class A," when accompanied by a certificate of official registration as evidence of their being free from tuberculosis. Certificates should be issued for each animal in the herd, good for one year, unless revoked for cause, such as failure to comply with prescribed regulations to govern the classification.

Provisional certificates should be issued for interstate shipment of cattle from herds designated as belonging to Classes B and C when they are to be introduced into herds of similar classification.

CONCLUSION.

My reason for presenting as near as possible in concrete form a tentative plan for the purpose of at least inhibiting the present prevailing scourge of bovine tuberculosis may be briefly summarized as follows:

For twenty years, at least, the cause, nature and means of disseminating the contagion of bovine tuberculosis has been positively known. Regardless of this fact, however, the disease has constantly spread until it now presents itself as a positive menace to a profitable production of pure bred or high grade cattle of either the beef or dairy breeds. The principal reasons to be assigned for the unprecedented spread of bovine tuberculosis are the insidious nature of the infection, a common lack of clinical evidence of disease being manifested by affected animals, and a general lack of public interest from the standpoint of public health or an economic point of view.

With these conditions in their favor, breeders who are as yet ignorant of the validity of the tuberculin test for diagnostic purposes, assisted by those who habitually utilize the test with common contempt for every known principle of equity, have so far succeeded in preventing the enactment of effective legislation based upon a common knowledge of practical ways and means of controlling the spread of any contagious disease.

The result of every effort that has been made toward the eradication of bovine tuberculosis clearly indicates that but little can be accomplished except by rendering it impossible for the owner of a diseased herd to sell diseased animals, or their products, at prices ordinarily secured for the healthy or wholesome kind. When this has been accomplished the owner for economic reasons will, with the assistance of his state, or the federal
government, voluntarily undertake to clean up his herd and thereafter keep it clean.

As bovine tuberculosis and politics go hand in hand, before a successful control of tuberculosis in any state can be secured, it will first be necessary to separate state live stock sanitary boards and the veterinary profession from politics. Every county in every state, should, if possible, be officially represented by a competent official who should qualify upon all subjects pertaining to sanitary control of live stock by means of a civil service examination, and serve under the direction of the state veterinarian, who should be free from political restraint in the performance of his sworn duties.

It is a matter of history that all stable progress made in civilized countries has been accomplished, if not preceded by the enactment and enforcement of laws based upon the principle of equity for the guidance or control of every individual subject to the law.

While it is true that various states have enacted laws intended to prevent traffic in tuberculous cattle, these laws have served little or no practical purpose, for the reason that they are easily evaded by any one having a knowledge of the manipulative properties of tuberculin and the ease with which a single tuberculin test can be invalidated, thereby causing it to become discredited through misdirected and indiscriminate use in the hands of unscrupulous veterinarians or the owners of diseased cattle.

Therefore, until laws are enacted which will afford ample protection to the purchaser of cattle for breeding or dairy purposes, there can be but little incentive on the part of many reputable owners of tuberculous cattle to clean up their herds, for the reason that no protection is assured them against reinfection through the purchase of cattle which have been "doped." This condition could easily be overcome by the enactment of laws to prevent the sale of cattle for breeding or dairy purposes except under the foregoing classification of "Free Herds." Such a law would not only be the means of eradicating tuberculosis in cattle within the confines of a single state, but would cause owners of diseased herds in other states to do likewise or lose a profitable market for their stock. While the initial loss to the owner of an infected herd in some instances would be great, the benefit to be derived by the live stock interests at large through appreciation in the market value of healthy animals would more than offset the losses of individual owners of diseased stock, who constitute an insignificant minority compared with the owners of healthy herds.

The President—The next paper is that of Dr. Ravenel.
CONTROL OF BOVINE TUBERCULOSIS BY MEANS OF VACCINATION.

DR. M. P. RAVENEL.

Dr. M. P. Ravenel—Mr. President and Gentlemen: I must preface this little talk in much the same way as Dr. Niles did, by telling you that I have nothing new to offer to-day. When the title of this paper was sent to the Secretary of the Association I was not aware that the subject had been recently reviewed by Drs. Mohler and Schroeder, otherwise I should have hesitated in announcing this discussion.

During the past summer, while in Europe, it was my good fortune to meet a number of the men who have been most actively engaged in studying the immunization of cattle against tuberculosis. Six years ago (1904), in conjunction with the late Dr. Pearson, I spent six months in Europe studying this question and in personally interviewing every man we could hear of who was engaged in this work. During the past summer some of these same men were again interviewed and I was able to get the results of their experience after years of trial, and to obtain advice and descriptions of some of the newer methods which have been tried. I therefore felt that a review of this subject would be not only of interest but of use to the members of this Association.

Efforts to vaccinate cattle against tuberculosis may be said to have had their origin with the discovery of tuberculin in 1890. This was supposed to contain the poisonous materials of the tubercle bacillus and numerous workers attempted to immunize animals with tuberculin as well as to produce a serum against tuberculosis by means of increasing doses. It is not germane to our purpose to go into further discussion of this type of immunization at the present time. Suffice it to say that the efforts were a failure. An immunity against the tuberculin was produced but not against the tubercle bacillus.

Dr. E. Trudeau, in 1892-93, was the first to announce the principle, which has since been proven absolutely true, that to produce an immunity against the tubercle bacillus living cultures must be used. His experiments were done on rabbits.

In 1894 DeSchweinitz successfully protected guinea pigs by using living cultures.

In 1901-1902 McFadyean for the first demonstrated that by injections of living cultures cattle could be strongly protected against tuberculosis.

In 1902 the articles by Von Behring appeared proposing a definite plan for the vaccination of cattle against tuberculosis. In the same year the work of Pearson and Gilliland appeared, and they were the first to
systematically vaccinate cattle, to expose them with control animals to infection and to make careful post-mortem comparison of the results. The method of Von Behring did not differ materially from that employed by Pearson and Gilliland. In both, living cultures are injected into the jugular vein of the animal to be vaccinated, but Pearson and Gilliland employ a larger number of injections than Von Behring, who limited his to two. The vaccine of Von Behring, put on the market under the name of Bovo-vaccine, was sent out dried and there was no way of telling what proportion of the organisms were killed by the drying. Pearson and Gilliland used emulsions of the tubercle bacillus containing a known weight of the germ.

Other methods similar to these two have been devised by Koch and Schutz, and by Klimmer. The latter of these has not been tried sufficiently to enable us to express an opinion which can be final. It does not seem, however, that its results can differ greatly from the other methods mentioned.

The method of Von Behring has been tried largely in Europe by men like Eber of Leipsig, Hutyra of Budapest, Vallee and Rossignol of France. It must be conceded freely that a certain amount of protection is usually produced in the vaccinated animals, but the immunity is not absolute, and when sufficiently large doses of bovine virus are subsequently introduced the animals will succumb. The duration of immunity is not sufficiently long. In the majority of cases it has disappeared at the end of the first year and always by the end of the second year. Further than this, it is extremely rare to find any animal vaccinated intravenously which does not show some injury to the tissues somewhere. Often times these changes are insignificant, but in a certain proportion of the cases,—about seven or eight out of every thousand,—the process produces a fatal disease.

The bacilli injected into the vein have been repeatedly shown to retain their life in certain organs or glands for as long as one year, and even to eighteen months. If the contention of Koch is true, namely, that the human bacilli are more dangerous for human beings than the bovine, animals treated with these vaccines must be regarded as dangerous to the human race if used for food, or if giving milk during this period of time.

The method of Pearson and Gilliland has been tried in Pennsylvania and Maryland in upwards of 10,000 animals. Its results have been quite satisfactory in many instances, but it is open to the objections which have been just detailed. The Bureau of Animal Industry in Washington has for some years past been testing out the different methods. The result of their experiments is contained in the following table:
These experiments, however, have not been conducted in the field nor on a sufficiently large scale for practical purposes. In addition Dr. Mohler and Dr. Schroeder of the B. A. I. have tried a method of their own, namely, the injection of cultures into the end of the tail of the animal. This was tried with both bovine and human cultures. It will be seen by the table above given that the human injections actually protected 80 per cent of the cattle. In some of the animals injected with bovine cultures intense local disease was produced, amputation being required in one case, and all but one animal contracted general disease as the result of the injection.

In Belgium, Professor Heymanns some years ago devised a method entirely different from any of those yet discussed. Professor Heymanns enclosed tubercle bacilli in a sack made from the lining membrane of a swamp reed. This sack permits of the passage of the juices of the body to the tubercle bacillus and of the products of the bacillus to the tissues, but is supposed not to allow the germs to escape. The prepared sack containing the dose of vaccine is enclosed in a gelatine capsule.

The process of vaccination is extremely simple and rapid. A fold of skin about some part of the back, where the animal cannot reach it, is taken up between the fingers, and with a sharp knife a small incision is made at right angles to the fold. Into the incision thus made, a large trocar and canula is thrust and pushed down in the subcutaneous cellular tissue for about two inches. The trocar is withdrawn and the gelatine capsule containing the sack is pushed through the canula, and the canula then withdrawn. The wound is closed by a small strip of steel having points at the ends. The whole operation requires less than a half a minute.

Heymanns has in the last four years vaccinated upwards of 10,000 animals by this method, and he claims very satisfactory results. He recognizes that cleanliness and hygienic measures must go along with this treatment. Eighty-five per cent of the tuberculous centers in which he has operated have been cleaned up. More than 1,000 autopsies have been done vaccinated animals, and in no case has infection taken place, except where, through some accident, the capsule has become ruptured.

In considering the method theoretically, it is difficult to understand how Heymanns gets anything more than an immunity against tuberculin. If the sack is impervious to bacilli only the poisons of the tubercle bacillus can pass out, and it is hard to see in what way these would differ from the injections of tuberculin which were early tried. However, Mohler and

| Von Behring | 66 2-3% Successful for about two years. |
| Pearson and Gilliland | 88 8-10% Successful for about two years. |
| Bovine tail injection | 12 1-2% |
| Human tail injection | 80% |
| Subcutaneous | 0% |
Schroeder have shown that these sacks allow easy passage to the anthrax bacillus, which is much larger than the tubercle bacillus. In their experiments on swine the tubercle germ also passed freely from the sack, and general infection always resulted. It must be admitted, however, that this result is not seen in cattle.

In view of the difficulties and dangers which have been pointed out as attendant on the intravenous injection of living tubercle bacilli, efforts have been made to devise other means of vaccinating cattle against tuberculosis.

Calmette was one of the first to point out the good results which could be obtained by this method. A recent publication by Vallee puts the method apparently on a firm basis. His results are so good as not only to justify, but even demand, an extensive trial of the plan. It is evident that when tubercle bacilli are fed to animals many of them will pass through the bowel and be discharged in the manure. Therefore, if a culture is used which is capable of infecting animals, a great danger is present. The stable will become rapidly infected with virulent tubercle germs. Consequently Vallee's first efforts were directed to obtaining a culture which would not produce tuberculosis in cattle, and which was so feebly virulent as to be not dangerous to the attendants of the stable. Such a culture was at hand in his laboratory. Isolated originally from a horse, this culture had lost its virulence by prolonged cultivation without any artificial means having been used. Inoculations under the skin and into the jugular vein of animals showed that it was devoid of virulence and that it was easily and rapidly absorbed. Complete absorption takes place in seven months at the most, generally in a shorter time. It was also proven that it did not regain its virulence by residence in the body of the inoculated animals. Vaccination into the jugular vein with this culture showed that it gives results directly comparable to the method of Von Behring. Vallee then gave doses of this culture to animals of the bovine species by the mouth, sometimes through a stomach tube, some times by causing them to drink fluid in which the culture was suspended. From his results he has been enabled to formulate certain rules.

First—To be effective vaccination by ingestion must be carried out on very young animals, preferably during the first weeks of life. When the animals are grown the method is ineffective.

Second—The vaccination does not protect absolutely. It enables the animals to resist for one year the most aggravated types of infection obtained under natural circumstances,—that is, exposure in the stable on both sides to animals having open tuberculosis. Even after two years of such exposure the vaccinated animals on autopsy showed only insignificant and occult lesions. Control animals subjected to the same exposure showed massive tuberculosis.
From the results of the experiments in various parts of the world we are able to formulate certain conclusions. The first of these I will take from the report of the Ninth International Congress held at the Hague in 1909:

"At the present time there is no vaccination which in itself is sufficient to combat in an efficient manner bovine tuberculosis in easily infected herds."

Second—The outlook for perfecting a method of vaccination which will greatly aid in the suppression of bovine tuberculosis is exceedingly bright.

Third—Vaccination to be effective must be carried out with living cultures.

Fourth—Vaccination under the skin or by means of killed cultures is valueless.

Fifth—Intravenous vaccination is attended with certain dangers which must be carefully guarded against.

Sixth—Vaccination by the digestive tract in the light of recent experiments appears to be not only the safest but the most efficient method yet devised.

Seventh—To be efficient the vaccination must be carried out during the first few weeks of life.

Eighth—The culture used for vaccination by the mouth must be of such feeble virulence that it will not infect other animals in the stables.

Ninth—Vaccination by intravenous methods interferes with the tuberculin test. The existence of tuberculous centers is not positively shown by the tuberculin test in these cases.

EXTENSION OF STATE CONTROL OF TUBERCULOSIS.

Dr. S. H. Ward.

In the extension of control work with tuberculosis it is assumed that, the state has already in force some law or regulation prohibiting the importation of cattle for any purpose other than immediate slaughter unless tuberculin tested and found free from tuberculosis. If no restrictive measures are in force against the introduction of the disease then it is necessary that some measure be adopted. For those states which have so far failed to guard their live stock industry from further infection, it is suggested that a legislative act be passed, making it unlawful for any transportation company to bring into the state any cattle for dairy or breeding purposes unless they have been tuberculin tested and certified to by a federal, state or deputy
state veterinarian, as being free from tuberculosis. There should be embodied in the law a clause making the transportation company liable in a civil action to any person injured for the full amount of damage that may result from the violation of the act. The penalty for violating the law should be a fine of not less than $500.

The reason why an act of legislature is necessary must be obvious to all. Nor is the necessity of placing the burden upon the transportation companies necessary to explain. All transportation companies are cognizant of the requirements governing the introduction of live stock into individual states and copies of these requirements are in the hands of all railroad agents. Assuming, therefore, that a state is protected against the introduction of tuberculosis, the problem presents itself as to what more should be done toward its control within the commonwealth.

It is recommended that as pure bred cattle are frequently tuberculous; in fact, very few of the fashionable breeds are free from the disease, that some measure be put into force to eradicate the disease from among them. As the stockman must look to the breeder of pure bred stock for his foundation or the continued upbuilding of his herd, be it of the dairy or beef type, it would appear a state's first endeavor should be to purge tuberculosis from the pure bred herds. This is necessary as the progeny, if diseased, creates new centers of infection wherever they go, and if only one breeder ships, say fifteen animals, to points within his state, that number of fresh outbreaks may be started. It is therefore logical that pure bred herds should be the first to receive attention.

To enforce the testing of pure bred herds a legislative act is necessary which should require a certificate of tuberculin test to pass with the exchange of all pure bred cattle. Opposition on the part of breeders to such a measure cannot be very pronounced, for the reason that breeders are in the position of a merchant, if the article he sells will not bear inspection his business is soon lost. In addition in order to ship animals into states requiring the tuberculin test he must submit them to the test or lose the business. Therefore every state which prohibits the importation of cattle unless tested helps to clean up tuberculosis in other states.

Having cleaned the pure bred herds the next greatest sources of danger are the creameries. Pasteurization of all creamery by-products to prevent infection of young calves and swine should be required, and to this end a legislative act is necessary and should be enforced by the State Dairy and Food Commissioner.

As a public measure for the protection of infants and invalids the city dairy herds should be brought under control. To reach them sanitary authorities must depend upon city ordinances requiring all milk sold within.
their municipalities to be from tuberculin tested cows. If an ordinance is strictly enforced the disease is quickly controlled. The problem of all city ordinances, however, lies in protecting the dairyman from buying diseased animals. To afford protection to dairymen legislative acts or ordinances must be effected. In cities where cow markets are maintained from which dairymen are in the habit of buying cows, the problem is an easy one and can be controlled by city ordinances requiring all dairy animals sold within its limits to be tuberculin tested by the city health officials, and a certificate of health given to the purchaser. The dairyman is equally entitled to protection as is the consumer. Where dairymen replace fresh cows bought at country points, the problem is harder to deal with, and no complete satisfactory solution is offered at this time.

It would seem if cities are so solicitous of the health of their people as to enact ordinances requiring the tuberculin test on their dairy cows, they should, after the herd has been officially tested and cleaned, see that all cows thereafter placed in the dairy are properly inspected. The practice of taking out one or two diseased animals and letting owner replace them with untested cattle and which, under the ordinary enforcement of a city ordinance, will not be tested for a year, is to be condemned. This slipshod method protects neither the public nor the dairyman; in fact, it is an injustice to the consumer because he believes he is being protected, and it is an injustice to the dairyman because if the fresh animals are diseased they infect his healthy cattle with an ultimate loss to him.

Many dairy cows are shipped interstate to stockyards situated at points such as St. Paul, Chicago, Omaha, Sioux City, etc., which are never inspected by reason of the fact that they are shipped for supposed slaughter, but on arrival at the yards springers and milkers are cut out and sold to dairymen without inspection. It is here the state, in co-operation with the federal government, could carry out in part the suggestion of the international committee on tuberculosis and require the tagging of all cattle shipped interstate to points of slaughter which are under government control. It would then be an easy matter to prevent the removal of dairy animals from the stockyards until such time as they have passed inspection.

It might be said if a state prohibits the importation of dairy or breeding cattle, unless tested, why not enforce the law and tagging would be unnecessary. As a matter of fact, no restrictions can very well be placed on animals consigned interstate to slaughter points. If all cattle entering stockyard centers were slaughtered there would be no need of tagging, and it is certain that tuberculosis would not have increased as it has done in the past few years.

The next step should be the compulsory notification of the existence of tuberculosis, and those who should be required to report are veterinarians.
and butchers. With the additional help of the Bureau of Animal Industry in reporting the existence of tuberculosis found at abattoirs under government supervision, the disease could be traced back and the centers of infection eliminated.

The sixth advancement can then be introduced by educating creamery organizations to require their patrons to submit evidence from state authorities that all animals in their herds have been tuberculin tested and found free from the disease. This step has already been taken in Minnesota and will grow in popularity.

Another feature in extending control work which has frequently been overlooked is the disinfection of premises in which diseased animals have been housed. This is of the utmost importance and can be accomplished with very little expense and inconvenience to owners.

A further extension of control work can be adopted similar to that in force in Minnesota. The free tuberculin testing of herds where the owner agrees.

1. To slaughter diseased animals, or, where necessary, put into practice the Bang system.
2. To disinfect as directed by the authorities.
3. To permit the permanent marking of animals.
4. To add no cattle to the herd until such time as they have passed a satisfactory test by state officials or a veterinarian acting under authority.

In order that evidence may exist that the fourth clause of the agreement is observed a certain identification mark must be placed on healthy animals.

Herds where no tuberculosis is discovered on test and no additional cattle are added, can be looked upon as requiring no further attention. Herds, however, in which the disease is found, require to be retested in a period of not more than six months.

The advantage of inducing owners to tuberculin test their cattle, whether they be pure bred or dairy stock, are that centers of healthy animals are created from which those desiring to start a herd of pure bred or purchase individual pure bred or dairy animals may be referred to.

Another step is state supervision of the distribution of tuberculin. All sales made by dealers, retail or wholesale, should be required by law to be reported to the authorities, giving name and address of purchaser.

I have so far made no reference to the reimbursement of owners for the slaughter of diseased animals. I must say here that, in the interests of
agriculture in general, compensation should be paid owners of diseased ani-
mals. As to what amount should be granted from public funds, must be
left to the wisdom of those enacting the laws of the state. While the
amount of money needed the first year in caring for diseased pure bred
herds may be quite large, as probably 15 to 30 per cent of animals will be
found diseased, the second year will see a great reduction in the percentage,
and if the work was properly done at the first test not more than 1 per cent
of reactors should be expected the second year, so that the amount of money
paid out the first year would be available for extending the work among the
dairy and grade cattle during the next year.

As a means of still further controlling the interstate shipment of tu-
berculous cattle and preventing the issuance of fictitious certificates and
adding security not only to buyers, but to transportation companies and
shippers, I would suggest the adoption by all states of a uniform certificate
of health which could be identified readily by all railroad agents. Request
the general freight agents of all railway lines to place in the hands of their
agents at every shipping point a copy of the certificate, with instructions
to place the same in a conspicuous place for future reference, and to accept
no shipments into other states of live stock intended for any purpose other
than immediate slaughter, unless accompanied by a certificate made out on
the sample form.

To prevent shippers and veterinarians from supplying themselves with
blank certificates, I would suggest a form be adopted similar to B. A. I. 24
B., having printed thereon "permission of the U. S. Dept. of Agriculture." Sanitary authorities could then issue blank forms to reputable veterinarians
as required. To guard against their indiscriminate use and to keep the
issuance of these certificates in the hands of state sanitary authorities in
control they could be copyrighted by states, thus preventing their illegal
printing.

Failure to adopt some such measure for protection against the many
fictitious certificates of health, then federal control over all interstate ship-
ments of cattle is necessary. In enforcing our law requiring dairy and
breeding cattle to be tuberculin tested and found free from tuberculosis, it
has been found that a number of shipments of cattle from other states con-
tained tubercular cattle, notwithstanding so-called records of test accom-
panied shipments. While I do not blame the veterinarians entirely for the
existence of tuberculosis in some of these shipments, yet it is partly due to
their carelessness, their inability to be honest themselves and their profession. In some instances undoubtedly the cattle were tampered with, and to pro-
vide against the disreputable methods employed by some breeders who in-
ject tuberculin for the purpose of defeating an official test, the state should
exercise supervision over the sale of tuberculin, and the Federal Govern-
ment should also place some restrictions on the interstate sale of tuberculin.
Summary.

1. Prohibit the importation of cattle for dairy or breeding purposes unless tuberculin tested by federal, state or deputy state veterinarians, or a graduate veterinarian duly authorized by officials in charge of the state to which shipment is to be made.

2. Requiring the tuberculin test on all pure bred cattle sold within the state, such tests to be made and certificate of health issued by state authorities.

3. Pasteurization of all creamery by-products.

4. The enactment of city ordinances governing their milk supply and the sale of milk cows within their jurisdiction.

5. Compulsory notification of the existence of the disease.

6. Testing of all herds from which milk is being delivered to creameries.

7. Free tuberculin tests on herds where owner agrees to certain conditions.

8. State control of the distribution of tuberculin.

9. A uniform certificate of health (which is to be copyrighted) to accompany all interstate shipments of dairy or breeding cattle certifying animals' freedom from tuberculosis.

The President—The subject of tuberculosis in general and the papers that have been read are now open to discussion.

Discussion.

Dr. Moore—Mr. Chairman: I think that we are getting every year more and more to understand the nature of this disease, and, contrary to Dr. Reynolds, I feel that we are making very rapid progress.

Cattle owners depend naturally upon us to outline methods of procedure for them, and I feel that in matters of legislation it is exceedingly important that barriers are not put in the way of owners of herds. We don't want the disease to become disseminated, but we want every inducement possible placed before the men who own cattle to have their herds tested and to get rid of the disease. We must recognize this fact, gentlemen, that tuberculosis is a disease slow to develop, and that it has been for years growing into the herds of this country. It will disappear if it is properly directed and restricted.

I had the pleasure last year of spending some time with Professor Bang in Europe, studying the methods that they had been working out.
Professor Bang told me that the method which goes by his name has great value in the fact that it educates the owners so that they come to an understanding of the nature of the disease, so that after they have once cleared the herd and have a free and sound herd they are in such a state of mind concerning it that they will not thereafter allow their herds to become re-infected. That seems to me is the secret of the whole thing. In the discussion of its control we have to consider another exceedingly important proposition, namely, that throughout this country large numbers of dairy cattle are infected. The disease is progressing somewhat slowly; many of the infected animals will respond to the tuberculin test, but they show no evidence of disease on physical examination. These animals are at the time, although infected, capable of producing revenue for their owners. Such animals constitute the main investment of a great many dairymen, and the question that we have to consider is, to determine which of these animals are spreaders of the infection, and when in the course of the disease infected animals become dangerous to others. We have a different proposition to consider from any that we have ever had before in the eradication of any communicable disease.

We have a great number of animals infected with tuberculosis. When we find a way by which we can stop its dissemination it will disappear with the existing infected animals, and secondly, we have to consider to what extent animals infected and that would react are actually dangerous to their associates. In this disease there is grave question as to where infected cattle become dangerous to their associates. Professor Ostertag has found by careful experiment and tests that if he can eliminate the clinical cases, those with pulmonary lesions, those with uterine infection, intestinal and udder lesions that are discharging the tubercule bacilli, are taken out before the virus is spread, that the herds can be cleaned up. He told me positively that by following this and repeated examinations and with care in buying, that they can get rid of the disease.

Now, I think that we have many things to consider in formulating legislative procedures. We must keep our minds centered on the slow development of the disease, and also that animals may be infected and react to tuberculin a long time before they may be actually dangerous to other animals. Usually evidence of disease may be detected by a careful physical examination before the animal becomes an agent of infection. The methods of elimination in different herds must differ according to conditions; some are valuable for breeding purposes, others for milk, and others for beef, consequently we can not, establish any one system of procedure that will fit justly and equitably with all of them. If we center our attention upon the prevention of the spread of the disease from the infected to the well and in our legislation do not prevent the cattle owners from applying the test
through their veterinarians or from securing a physical examination and segregating the reactors or exposed animals in order to gradually build up sound herds. The sound herd must be the unit.

Tuberculin is almost an infallible test when we get a positive reaction, but we have come to know from very many experiments that it does not react in many arrested cases. The negative results, therefore, cannot be so thoroughly relied upon, especially when the cattle tested have been exposed to infection in cases where they came from badly infected herds. The latent cases will very likely later develop into active ones when a re-action will be obtained if tuberculin is applied. There are well established facts in the action of tuberculin that must be taken into account in using it.

Too much stress cannot be placed on negative or non-reacting results, because we may be dealing with latent cases, or we may be dealing with cases in the period of incubation, so that the result will be disappointing. I think that the radical measures that have been enforced in the eastern part of the country in which the cattle were tested and all re-actors destroyed, and where the method was not followed up by subsequent tests, were failures. These latent cases have become active and the herds have become reinfected, so that ten years later they have been found in many instances to be in just about as bad a condition as they were in the beginning. We must guard against all the varying conditions, and see to it methods are adopted and followed that will guide the progress of this disease in such a way that it will grow out of our herds.


DR. MARSHALL—In Michigan we have made very little progress in fighting tuberculosis.

The Sanitary Live Stock Commission takes care of practically all emergency work.

A year ago I thought it would be, perhaps, desirable to devise some scheme by which we could use as our central feature, education. Looking at it from the standpoint of the veterinarian (and we grant at once that veterinarians who are capable of testing and carrying on this work should do it), we are confronted with the fact that perhaps a large percentage of them have never had anything to do with the work; and as there is a very limited number in Michigan, about 600, you can readily see that very little would be accomplished.

Therefore, we suggested to the State Veterinary Association that we take bright young men who have been trained by a four-year course of study, and give them a systematic course. The work of the tuberculin test is practical, and covers a period of two days. They actually take up the testing under the direction of the veterinarian, and the course of study con-
sists of several lectures and demonstrations with specimens, and with tuberculous animals and laboratory technique. After they have gone through this work we use them largely as field agents to do the work under our immediate supervision. We pass upon their tests. Now, of course, you can readily see that there is a chance for error. So far as we have gone we have found that laymen are much more careful in conducting the tuberculin tests than are veterinarians. Now that seems to be the actual situation. How you will explain it I shall leave to you.

However, we are not attempting to push ahead rapidly, we are looking forward ten years, twenty years, hoping that by educational methods we shall accomplish something, and little by little we shall educate these men to an appreciation of what tuberculosis is, and perhaps by that time the importance of conducting tests will not rest upon the shoulders of these young men, but actually on the veterinarians, who will be developed by that time. We now have on our list about fifty young men, besides quite a number of veterinarians, who take hold of the work with considerable interest, and I am in hopes that we may develop the veterinary side more forcibly from year to year. Dr. Lyman is interested, and is going to push the demonstration before the veterinarians and instruct them in the work.

Now you can see that there are weaknesses in this scheme, but it is not a matter of whether you or I do the work; it is a matter of whether we are going to make progress in fighting the disease. Under the circumstances it seems to be desirable that we make a start looking to permanency in the work.

I don't expect to see tuberculosis eradicated in ten years, or twenty years, but if we can get stock owners interested, I believe that in ten or twenty years we shall have reached a situation which will be more or less gratifying. I thank you.

The President—Dr. Melvin.

Dr. Melvin—The subject has been covered by several of the papers and by the report of the International Commission, and I believe there is sufficient material in these papers and that report for all of us to consider very carefully. The letter from the Honorable Mr. Hoard of Wisconsin is, I think, a very fair outline of what every owner and breeder must go through in eradicating tuberculosis from his herd. There has been too much tendency in the past to think it possible to eradicate tuberculosis quickly. I think that has been one of the great errors that has been made, that we have not considered the length of time which will be required to do it. We have been apt to think that if we tested a lot of cattle and removed the reactors and possibly disinfected, that that was about all there
was to it; but it will require several years, and unless those who have the matter in charge are in a position to continue supervision over the testing—not only of the cattle in the herd originally, but of all that are added to it—it will probably be better if they do not commence. Now I think this might be confined to individual herds, or to certain limited areas. At our last meeting I formulated a plan that I hoped some states would take up and work out for themselves, and I still think that plan is practicable, possibly on a more limited area than I indicated then. It is going to be right along those lines that we have to progress, and as different individuals clean up their herds the work will extend to others.

There has to be some stimulation to induce people to do this. If people can show cattle at expositions and other places, regardless of whether they are infected with tuberculosis or not, there isn’t much stimulation for a man to clean up his herd if he has to compete with such. Take the same conditions with a man raising beef cattle for market. He sends his cattle to market; possibly they are clean and healthy. The other man might have anywhere from 5 to 10 per cent of tuberculosis in his herd. He gets the same price for his cattle as the man with the clean herd. The slaughterer figures on a certain per cent of loss on all the cattle. The men with the healthy cattle has to stand his proportion of loss.

And another thing that has impressed me very greatly and needs closer supervision is the indiscriminate acceptance of certificates from different states. There is a large number of states that now require a tuberculin test chart before cattle can come into the state for breeding or dairy purposes. Some of these charts mean what they read and others mean absolutely nothing. Some of these charts are evidently formulated in the man’s brain and not by his thermometer, and until the state is more particular, about whose certificates it will receive and in authorizing persons to make the tests this will continue. Recently there was a shipper going from the east to the western states. He was held up twice enroute. He didn’t get a chart; he thought he was getting what was sufficient from some veterinarian and went on with them. He was stopped in another state and there had to lay on a sidetrack until his cattle were tested. These things are all discouraging, and I think that all state officials ought to carefully consider that proposition.

Dr. De Vine—Dr. Moore has said rightfully that at least in our state the work to control tuberculosis seems to be progressing, and since my work and association with the state is entirely executive, doing no laboratory work whatever, I would simply enumerate some of the details in the workings of our laws with the hope that it may be of some interest to the states having no laws.
We expect a signed contract from those requesting state aid. In that contract they agree to improve any faulty sanitary condition, and also agree not to introduce into their herds any animal that has not been satisfactorily tuberculin tested. We have another ruling on our statute books that is a little different perhaps from some states. While we have some veterinarians we term “Department veterinarians” (they are so made by civil service), the Commissioner of Agriculture is allowed to recognize tests of other than Department veterinarians if the tests of such can be proved. Supposing such tests are made, it is then in his power to prove those tests and apply indemnity just as if the State Department veterinarian has made the test.

Applicants for the test must sign a contract which prohibits the introduction of any animals into their herds which are not satisfactorily tuberculin tested. We also allow indemnity to people whose herds are uncontaminated, as appears on the post-mortem findings. We also allow animals that are too good to be killed to remain upon the farm, and allow for them a percentage of the indemnity. The law also requires that all animals where tuberculosis is clearly diagnosed by the tuberculin test or physical examination, shall be branded. There is also a provision in the law that such animals, after branding, may be kept for breeding or dairy purposes, providing they are suitably described, and such records filed with our department.

Our law also required that all tests made within our state must be reported to our department. In that way we have in a measure control over the selling and moving of animals which the owner would like to consider simply as suspicious. We also specify upon our tuberculin test chart what is considered a satisfactory tuberculin test. Those are the federal rules, the same as those agreed upon at the last session of the Eastern Live Stock Sanitary Association. The law provided for the reporting of all stock sold in our state and in that way we can find out whether animals have been disposed of in case they have given clear tuberculin re-action. We don’t recognize tests made with tuberculin other than that prepared under the supervision of the federal and state authorities. I think it is a fact that many veterinarians have been condemned owing to faulty tuberculin. At the present time we are considering a law requiring the inspection of all by-products of dairies. We think that this will have a good influence in controlling the situation and getting a solution of the things that are conducive to disease.

Meeting adjourned until 9 a. m. November 7.
WEDNESDAY, DECEMBER 7, 1910.

Convention called to order by President Cotton at 10 o'clock a. m.

PRESIDENT COTTON—I understand that there are representatives of the sanitary boards and state veterinarians of twenty-seven states present. We ought to congratulate ourselves on this attendance.

The first paper on the program is "Sanitary Milk from the Producer's Standpoint," by Professor Fraser. Professor Fraser, being unable to be present, has sent Mr. Brand, from the Experiment Station, as his representative.

SANITARY MILK FROM THE PRODUCER'S STANDPOINT

Prof. W. J. Fraser.

The question of sanitary milk is to-day a momentous problem worthy of the deepest thought and consideration. No other article of food is so generally used by all classes of people. About one-third of all the milk produced by the 17,000,000 cows in the United States is sold for direct consumption, and much of it is consumed in its raw state.

Many infants and invalids subsist almost, if not entirely, upon milk; it is reported on good authority that 65 per cent of the babies are brought up on the bottle. It is, therefore, of vital importance that milk be as pure and free from harmful bacteria as possible. No other food is more healthful and economical than milk when pure, and none is more dangerous to health when carelessly handled. The methods commonly employed in the production of milk are faulty, and the evils resulting from the use of impure milk are so numerous and of such a serious nature, that every one interested in the public welfare should be anxious to bring about an improvement.

The public in many cases are rightly demanding from the sanitary standpoint a better grade of milk than the average dairymen, not only in Illinois but in all parts of the United States and, in fact, in all countries of the world, are supplying.

Under existing conditions it is, in many places, almost, if not quite impossible, to obtain on the open market any really good milk that is produced in such a manner as to make it a safe and wholesome food for infants and invalids, if indeed for healthy adults. When milk is ordered even at our best hotels and restaurants, dirt is frequently found at the bottom if it is allowed to stand for a short time. This is not appetizing to say the least, and many persons who like milk now use as little as possible on account of the careless manner in which it is produced, and the fear that it may contain dirt, if not disease germs.
To bring about an improvement in these conditions and to accomplish the desired end, the producers and handlers of the product must understand the importance of the milk supply as a factor in public health—that milk is an ideal medium for the growth of germs, and that because of this fact it is especially important that it should be handled with the greatest care so that no disease germs may be allowed to gain access to it, as but a slight infection may be the means of creating quite a general epidemic. Milk being an opaque liquid, even its quality and cleanly condition cannot be easily detected by its appearance. If milk were transparent like water so that every one could easily see any visible contamination, dairymen would be much more careful about its production. In many cities and towns of the state, large sums of money are expended in obtaining good and pure water; yet in most cities little or no attention is given to the quality of milk furnished, which to many, especially to children, is of even greater moment than the water supply. In but few cities of the state is it possible to get a regular supply of milk that has been produced under really clean conditions, thoroughly cooled and bottled in a proper manner, and which parents feel sure is safe for infant feeding.

If its true food value were more fully appreciated, milk would be used much more freely than it now is, to the advantage of both the health and economical sustenance of the people. A quart of three per cent milk, costing seven cents, will furnish about the same amount of nutrition as three-fourths of a pound of meat, costing fourteen cents; yet people invariably consider milk something of a luxury, and think they are economizing by restricting its use as much as possible, altho they buy meat freely, considering it one of the necessities of life. Few people realize that the elements needed to nourish the body may be obtained from milk more cheaply than from meat, and that milk takes the place of other foods, thus diminishing the quantity of other food needed.

The great importance of cleanliness in milk production from the economical standpoint is that clean milk is worth more than dirty milk, if sold on the proper market, while it has in reality cost no more for the cows that produced it, the feed the consumed, and but slightly more for the barn in which they were housed and the labor of milking. The only added expense is a little extra labor in keeping the barn and cows clean and observe cleanly methods of milking, care for the utensils, and properly cooling the milk. As a striking illustration of the importance of having clean milk properly cooled, some dairymen supplying milk to our home town have to deliver it twice a day to the same customer during hot weather so that the customer may have a continuous supply of sweet milk, as it will not keep twenty-four hours. In striking contrast to this Mr. H. P. Guerber shipped milk from his farm in northern Illinois to the Paris Exposition, and it remained sweet for two weeks after reaching its
destination. Milk from Mr. Barton's farm at Hinsdale has been taken to Japan and return and was still sweet and in good condition, which means a distance traveled of practically around the world. In both cases the milk was not pasteurized or sterilized, and no preservative of any kind added. This shows what it is possible to accomplish if all of the conditions under which the milk is produced are correct.

The commercial value of milk is determined very largely by the flavor and odor. It is usually judged by the smell, as it absorbs odors so readily that it takes but an exceedingly small amount of a substance giving off a bad odor to make the product of low or inferior quality. No food is more susceptible to defects or more subject to contamination than milk, and yet the protection of its purity until it reaches the consumer, is nothing more nor less than cleanliness. This would seem to be a simple matter, yet it is one greatly neglected.

Many people when handling milk seem to forget that they are dealing with a food product. There is a tendency for certain unfortunate practices to invade the dairy business. If filth is allowed to get into milk or it becomes tainted at any point of its production, no amount of care, either before or after, can make amends for the difficulty. A man may be careful and correct in all of his dairy operations but one, and yet this one be the cause of his producing a low-grade product. This one mistake not only injures his product but the dairy market as well. This being true, it is clear that the greatest care should be exercised in every step of production, and delivery of milk to the consumer. Only those dairymen who exercise such care can hope to secure the trade of people who desire a product of superior quality and are willing to pay an advanced price.

A large amount of sickness and suffering is caused to the general public and a great financial loss each year to the dairyman by having dairy products of inferior quality produced and placed on the market. This usually comes from unsanitary conditions in the production or improper cooling of the milk. The majority of dairymen consider milk one commodity when it is in the barn and an entirely different thing when it reaches the house or table. Many dairymen will practice filthy methods in milking that they would not tolerate in regard to another article of their diet. Many think they are clean when in reality they are far from it. The greatest difficulty in having clean milk produced is the low standard of cleanliness among the average dairymen. There are all degrees of cleanliness according to the standard of the person using the term and the particular condition to which it is applied. Many men say the stable is clean when they have simply pitched the manure out with a fork; others, when the floor has been swept with a broom, and still others, when in addition to this, the floor has been thoroughly scrubbed with a good supply of water and a brush. The housewife considers her dishes
clean when they have been washed, while the chemist does not consider them clean until they have been also rinsed with distilled water and the bacteriologist does not consider his dishes clean until in addition to these, they have been sterilized.

The real foundation of the whole dairy business lies in the milk producer. The chief necessity then in improving the dairy conditions is to give the producer such a knowledge of the right methods of handling and caring for milk that he will not only see the necessity for such methods but may also know how best to accomplish this purpose. Since the production of milk is a confining occupation and means endless care and attention to a large number of important details twice each day, Sundays and holidays included, from one year's end to another, we should not expect too much from the milk producers until they are shown the great necessity of cleaner methods and then paid for the extra work of producing clean, safe milk.

The price of milk has not increased with the price of other commodities, and laws and public sentiment have caused the sanitary requirements under which milk is produced to be improved which calls for an outlay of money by the producer.

A high price does not necessarily mean clean milk, but clean milk means an increased cost of production, and it is certain that clean milk is after all the best to purchase at any price. Unfortunately the general public is not earnestly interested in the milk problem farther than the price is concerned. The question of quality is not considered seriously enough by most consumers to cause them to look into the source of their supply and if the consumers are not interested in the manner in which their milk is produced, why should the producer be? Clean milk reaches the pocketbook of the consumer who is really the one most to blame for the existing conditions. States may pass laws and cities adopt regulations concerning the way milk should be produced, but until the public demands clean milk and is willing to pay for it, this kind of milk will not be produced in any large way. I do not wish to be understood as being opposed to milk laws and ordinances, but these can at best only partially solve the problem and beyond this we must look to education to perfect this important work. Milk producers may be legislated out of business but they cannot be compelled to produce clean milk at a loss and this is just what will happen if too stringent requirements are placed upon the producer without proper compensation for the extra expense.

The producers should be consulted in regard to new regulations in the production of milk. Many times this has not been done and regulations have been enacted quite arbitrarily by those who happen to be in authority. This enforcing of regulations upon unwilling dairymen in many cases blocked progress. The majority of dairymen are reasonable, if approached
in the proper way and while the enforcement of regulations is necessary, most dairymen are more successfully dealt with by encouragement and instruction than by force.

Committees on milk improvement should include leading producers who are in touch with the practical difficulties of the business. This will aid in making the action of the committee sound and gain the confidence of other producers in the movement.

The public has long been defrauded by some dishonest and unscrupulous milk producers and distributors and has suffered from the slovenly methods of the careless dairymen. The honest dairymen who furnish clean milk have been and are still having a hard fight with dishonest competition and the indifference of the public. The most effective remedy for this difficulty is for the public to patronize those only who furnish a good grade of milk, and are willing to guarantee it.

One of the weak points in dairying is in not having milk properly graded before it is sold. Milk is placed upon the market and sold as milk, the purchaser having not the slightest idea when or under what conditions it was produced. The result is that quality does not count for what it should and clean milk helps to sell the dirty milk. These conditions do not encourage the production of clean milk and until the public demands clean milk and is willing to pay for it, certainly the general supplies of this type of milk will not be obtainable. The dairymen cannot be blamed for not furnishing what the public will not appreciate or pay for.

Professor Jordan, formerly of Boston, aptly says, "Is not milk one commodity where price should not be regulated by supply and demand? Are not quality and cleanliness the prime factors for fixing prices for this class of food?"

Many a careful producer of clean milk has been crowded out of business by a man producing a cheap and unsanitary grade of milk and selling it at a slightly lower price. It should not be expected that milk produced under sanitary conditions should sell for the same price as that produced in a filthy, slovenly manner, and no fair minded consumer would refuse the clean milk at a slightly advanced price after giving the matter careful consideration. The consumer is to derive the benefit; let him bear his share of the extra expense.

The price of farm products, in general, and the very feed which dairymen turn into milk has been steadily advancing during the past fifteen years and no one has raised any objection, but just as soon as the price of milk is raised to equal the actual increase in the cost of production, there is a general cry of robbery or combine set up by the public and the daily press. Much injustice has been done right here in the city of Chicago.
in this respect, and the same thing is true in the large cities of the East. After some of the large companies have built fine plants for handling the milk in the best possible manner and are handling it in a sanitary way that is actually surprising, considering the price received for it, and have a system of inspection on the farms which is constantly improving the conditions under which it is produced, I say they put on the market a general supply of milk that is not equaled any place in the world for quality and sanitary conditions under which it is handled considering the price received. Yet what appreciation have these people received? A good cussing by the general press that knows no more about dairying than to call a fine quality of skimmed milk to which tartar has been added to make buttermilk nothing but hog feed and unfit for human consumption. Such ignorance is inexcusable, if not actually criminal.

When a milk ordinance is proposed for some of our smaller cities, the press will ridicule it in a most detrimental kind of way. With all these things as they are, how can we expect to have the average dairyman producing milk under sanitary conditions of a high order? The conditions under which milk is produced vary so much on different farms that each dairyman must do a large amount of clean, intensive thinking for himself, and the more efficient brain he has and the better it has been prepared by training, the better he is able to solve this problem in an intelligent and correct manner. The greatest difficulty of all with the producers is their low grade of intelligence. The crying need for the production of sanitary milk is a campaign of education not only among the milk producers, but among the consumers, who are the general public. The education of the masses is a tremendous undertaking, but it must in some way be accomplished. It must not be forgotten that it is only the short space of about twenty years that even the best scientists have known anything about bacteria and it is not to be wondered that dairymen in general do not appreciate all the sources of contamination and the great importance of preventing cleanly methods.

In conclusion, I should like to repeat that it is the help of sound practical instruction along the lines of economical sanitary methods that producers seek. They will follow the instruction of one in whom they have confidence, and it is encouragement more than blame that helps men to do their best.

The President—The next paper in this series is one by Dr. Claude D. Morris, on "Sanitary Handling of Commercial Milk."

Dr. Morris—Mr. President and Gentlemen: May I be permitted to preface my paper by saying that while listening to the very able papers here yesterday, especially the one that has just preceded me, I see there is a difference on some things and they are essential, but out of the congre-
Gathering of men’s minds comes the truth, and if you will bear with me in this matter, I think we will get some understanding on the question of dairying, which is extremely vital.

**SANITARY HANDLING OF COMMERCIAL MILK**

Claude D. Morris, V. S.,
Binghamton, N. Y.

Gentlemen, the subject that I have been asked to discuss by your Secretary before this Association is one that has been before the public for many months in one phase or another. The question of a sanitary milk for human food has engaged the attention of kindred bodies, agricultural associations and medical societies in an effort to approach a practical method in the production and distribution of a safe commercial milk.

This question has been discussed from many points of view. Some good ideas have been brought forth, together with many that are purely theoretical as some well meaning people have undertaken to advise the public as to the safety or unwholesomeness of milk as food, and prescribe methods of production and discuss diseases of the cow, etc.

However, all these agencies working toward a common end have been educational, and the result so far is that a better understanding exists all along the line, and therefore a better condition exists throughout the country, embracing as it does all phases of dairying, except in so far as the question has been infected with theories and fads that have no practical bearing on the issue, yet there is need among dairymen and with a great number of distributors of milk to understand more fully the importance of three cardinal principles in the control of a safe milk supply, Health, Temperature, and Cleanliness.

Health of the producing animals and of the person who handles the milk, a proper temperature in which to detain or store raw milk from the moment it is withdrawn from the cow until it is ready for consumption, and no less important, positive cleanliness practiced in every step through the same route. To produce a safe commercial milk does not require the extraneous effort or expensive methods. It needs no radical readjustment of common sense doings with equipage under management of intelligent farmers. The problem is simplified when it is reduced to systematic method of daily procedure. It is merely finding the base on which to work and to proceed daily along that line. Without going into details of dairying I would state the general principle to be applied as the first step in handling commercial milk.
First, the cows must be healthy, that is healthy from the standpoint of the farm, under conditions we find on the farms as to shelter, feed stuffs, water and general care under intelligent management, and I assume that dairymen as a class are quite as intelligent as other commercial classes of the country, each working in their own sphere. The health of the animal to be determined by competent veterinary examination, and all animals found to be suffering with any form of udder disease or any constitutional chronic disease to be segregated from the milking herd, and treated, quarantined or destroyed according to the nature of the case. The health of the dairy people who have anything to do with milking of cows or handling the milk in any form should be free from infectious or contagious disease or in contact with diseases of such nature, and it should be the duty of the company or individuals who buy milk from the farm to distribute to the consumer, to supervise matters of this nature by frequent sanitary inspection of the dairy and its surroundings, together with careful examination of the cattle and this to be done by trustworthy, competent men.

The milk should be drawn from the cows at regular intervals into clean utensils, and immediately put into receptacles that can be closed up tight and not disturbed and placed in tanks of cold water at a temperature not above 50 degrees Fahrenheit, and delivered to the country receiving factory each morning, where it is bottled for city delivery, or to the condensery, where milk is made up into preserved products.

Clean milk can be obtained if the cows are clean and kept in clean surroundings and all persons that work at dairying to be clean in their personal habits. This implies careful detail. The cow stables to be properly lighted, ventilated and whitewashed, to have tight, sound floors and gutters, constructed of non-absorbing material, the stables to be cleaned of manure and swept out daily, and during the months the cattle are housed they should be brushed off and cleaned every day. This matter of cleaning the cow is greatly facilitated by clipping the hair of the hind quarters, including the udder, dressing up the tail and trimming the brush, lessens the danger of dirt dropping into the pail during the act of milking. The covered pail should be used, and the milker should have clean hands and wear a clean outer garment, specially used when milking. The importance of treating milk as a sensitive food should control in all methods of dairying.

The day has passed when dairymen can produce market milk without the use of ice. Deep wells and cold springs where the water is available at a temperature of 50 degrees F. and used in liberal quantities so that the standing water in which milk is cooled does not rise above 55 degrees F. is safe for the first few hours during the period of germicidal action that takes place in freshly drawn milk. It is important to cool milk im-
mediately after it is withdrawn from the cow, and also to protect the milk from contamination, aerial, mechanical or otherwise. Milk should not be aeriated during the process of cooling, but should on the other hand be kept in a closed receptacle during the time of its detention on the farm, and in such condition delivered to the distributor, who in like manner should handle the milk with clean hands and in clean utensils, unexposed to air.

Factory methods for handling milk in a sanitary manner should provide for abundance of pure water and live steam to be used in liberal quantities for cleansing and sterilizing all milk utensils, which should be none other than metal or glass receptacles.

Taking the daily routine work of a Borden country bottle plant, it includes receiving the milk from the dairymen under physical inspection as to odor, appearance of the fluid and temperature. After the milk is emptied from the farmer's cans they are rinsed in clear water, washed, re-rinsed and steamed inside with live steam under 80 pounds pressure and returned to the farmer, and he is to treat this receptacle as a dish in which food is to be kept. The milk continues from the covered weighing tank through tin lined pipe to filter, sterilizer and bottling machine, where sterile one quart glass bottles are filled and capped, and are then packed in cases holding twelve bottles each, allowing ample space for icing before loading into refrigerator cars for transportation to the city.

The country bottling factory should be so constructed to admit of separate rooms for certain features of the work. A room for receiving milk from the dairyman, washing and sterilizing his cans, a room for clarifying and bottling the milk, a room for washing and sterilizing bottles, a room for washing cases in which the milk is transported to the market and suitable provisions made for storing bottles returned from the consumer in waiting to be cleansed, and the engine and boiler room should be separate and apart from the working rooms of the factory, and no country bottling plant is complete or pardonably so that is not provided with a liberal supply of safe ice to be used in crushed form and packed about the milk in transit from the country to the consumers' doors, and all milk utensils in the country factory should be made of metal material with a smooth polished surface to facilitate cleaning, and to be thoroughly cleaned and scalded daily.

It has long been recognized that the only safe manner of serving the consumer with milk is in the original sealed package, bottled in the country, fresh from the dairy, and under conditions properly organized that cannot be duplicated in a densely populated city. There can be no more unfit, dangerous and disgusting methods of serving the public with milk than that
of dipping it on the street, exposed to street air, flies and other accidental, vicious forms of contamination. Plain decency in methods of handling milk for human food fully justifies complete abolishment of such methods. The importance of clean milk bottles in the distribution of milk to the public is far reaching. The bottles should be thoroughly washed and rinsed in pure, clean water and packed in metal retainers so constructed as will close tight, and thus be sterilized with live steam and kept in such retainer until needed to be refilled with milk. To the consumer this feature should be vital. Greater dangers lurk in dirty bottles than in dirty milk. The conditions that produce dirty milk bottles is widespread and serious in our large cities. Too often the consumer does not appreciate the importance of treating his milk bottle as a food dish, a utensil that contains a sensitive and delicate article of food, and too frequently uses it for domestic purposes altogether unfit for his milk bottle.

Let us consider for a moment the consumer's part in the role of sanitary handling of commercial milk, he has a part to perform, a duty to his family, the protection of the health and lives of the children of his household. His duty begins when the bottle of milk reaches his doorstep. It should then at once be taken into proper custody, put into a clean place and kept cool, keeping the bottle securely capped during the time milk is retained in it, and as soon as the bottle is emptied it should be washed in clean, cold water with the addition of a little soda and not used for any purpose whatever about the house, but returned clean to the distributor.

The State and City authorities are aware of the importance of clean bottles in a pure milk supply, and have enacted laws and regulations providing for the washing of containers before they are returned to the distributor.

It is proper that every city should adopt practical, prudent methods in an effort to protect its food supply, with due regard to all parties, whether it be the grower of meats, or the producer of dairy products, or the manufacturer of any edible product, and the authorities should not overlook the importance of safeguarding the producer's end from the transmission of unclean containers to the sources of supply, but should consider in the reckoning on the problem of its magnitude and intricacy, that dairymen are not always responsible for some of the troubles that are said to be brought to the home in milk, and, together with the co-operation of the consumer can make complete and strong this daily endless chain in the sanitary handling of commercial milk.

By the aid of chemistry we are able to dissect a given volume of milk and to learn definitely its component parts, likewise along similar lines by the aid in bacteriology it discloses the foreign elements that invade milk, and enlightens the investigator as to the nature of the content of the fluid.
Today we are face to face with the revelations of science on the one hand, and the workings of nature on the other. To scientific pursuit the laboratory offers limitless possibilities with here and there a field for demonstration, and one of its most promising fields is in agriculture. Applied chemistry and bacteriology in the field of agriculture is the open gate to higher education and a broader knowledge of the secret of nature's boundless wealth, and the only possible pitfall on the highway to a complete revelation will be in a misguided enthusiasm, or a zeal for superiority that outruns reason in the heart of its earnest workers.

Grounds for a belief or an opinion that has come as the result of long study and experiment in the laboratory is too profound to expect a farmer to absorb and accept on first reading. At least the findings are so wide from his point of observation that he is inclined to reject it altogether, and this applies to the whole question of agricultural tuberculosis. We should first get the farmer to see these fine points as you and I see them, before attempting by legislation to force our views on this question.

No one who is familiar with the country end of the business of dairying can dislodge the fact that the farm is not only the source but the dictator in matters regarding the products of the soil, and milk is one of those products. The farming class is a quiet, unassuming people, they do not pose as philosopher, scientist or politician, neither are they disturbed by illuminated headlines in city newspapers exploiting the theory that their herds and the products of the herds is diseased and unfit for human food. They have read so often the imaginary tales that the story which does contain some facts, and should be taken seriously, has in consequence of so much exaggeration lost its influence.

Does the agitator stop to realize that the dairymen are not compelled to produce milk simply to meet the needs of the consumer, nor is the distributor compelled to serve the public with milk because their daily needs demand it. As a large dairyman in New York state remarked not long ago, in discussing the question from a general standpoint, said that "no product of the soil or farm had met with so much misleading and unwarranted statements in the seeming efforts of the writers to poison the public mind and ruin a business, as that of the dairy industry."

In connection with this statement the consumer in New York City has another fact to consider, that during the past ten years the production of milk within a radius of one hundred miles of New York has decreased fifty per cent in consequence of other uses being made of farm lands and municipal regulation as applied to dairying, and the unwarranted exaggerated agitation of the milk question by writers who are unacquainted with basic commercial facts that must be considered in a discussion on the problem of a pure, safe milk supply.
This in the end means that New York must go further back into the country for its supply, and that means additional cost to the distributor and consumer without a corresponding sanitary improvement at the dairy end.

The Department of Agriculture of the State of New York, is seriously considering the question of state-wide inspection of dairying as a means of meeting the public need on the one hand, and on the other to proceed along lines of sanitary control with methods that would be agreeable and not irritating to dairymen.

All who are interested in the accomplishment of a safe commercial milk have two factors to study; first, we must learn to live with a general condition as it exists under influences that are more or less fixed as a result of habit and market conditions, and second, whatever feature needs correction bring it about step by step in patient growth, rather than to undertake work of this nature with police power.

The question of a safe, pure milk for New York or Chicago, should include an understanding of the commercial feature of the question quite as much as to lay all stress on the sanitary feature. Much as we all agree on the importance of a clean milk, we cannot overlook the fact that there is a producer and a distributor in the reckoning.

A dairyman cannot produce milk for Borden's except at extra expense to meet the high standard they require. Their method of dairy inspection, factory equipment, bottling milk in the country, handling and distribution to the consumer cost more than no dairy inspection, indifferent, careless factory methods, bottling milk in the city or dipping it loose on the street.

On an occasion like this we are not here to exploit the merits of any milk company, or to draw unfavorable comparisons of other dealers, but as an illustration between prudent and careless methods, I merely mention such features as one of the facts alluded to that must be considered.

Your efforts and mine in our professional work is for bettering conditions that need correction, even though we may differ on some points, our object is to improve the milk supply, which is the main thing, and one we hold in common, which can be accomplished if all agencies at work on the problem will look at it broadly through a friendly understanding, and in co-operation.
AFTERNOON SESSION, NOV. 7

THE PRESIDENT—Gentlemen, in order to suit the convenience of one of the speakers this morning, I have changed the order of the program, and I will call on Dr. Black for his paper on

A SANITARY MILK SUPPLY FOR CITIES FROM A MEDICAL STANDPOINT.

By DR. ROBERT A. BLACK,
Member Chicago Milk Commission.

To the layman the Medical Profession may seem idealistic demanding things that are not practical, yet we are on the firing line and certainly see the damage resulting, and can usually figure up the ultimate cost of carelessness.

We have seen wonderful results in the saving of life by the use of Antiseptics, still greater result from the use of Asepsis, and although to us, the time, labor and expense has been great, we have met the difficulty.

In the demands we make on the dairyman we feel that we are not asking more than we have already done.

That there will be an increase in the cost of milk we know. We also know that there can be an increase in the cost of almost any other commodity, without serious remonstrance, yet, there are loud, wild outcries of Trust the moment a progressive dairyman declares that his production of pure, clean milk means an increase in cost of one or two cents per quart.

If, however, the consumer was told plainly that cheaper milk means disease germs and dirt, I do not think there would be any complaint about the increased cost, which should be cheerfully borne by the consumer.

From a medical standpoint we ask: First, that there be clean milk with an absence of large numbers of germs and entire freedom from pathological germs, or the germs which produce disease.

Second, a constant nutritive value of known chemical composition with a uniform relation between the fats, sugars and albumens.
Third, an unvarying resistance to early fermentative changes, so that it may be kept without extraordinary care.

In our first requirement I say absence of large numbers of bacteria, because aseptic milk is practically impossible and would add a needless expense to the dairyman. Also it would appear from experiments that certain germs are comparatively harmless in small numbers and may be even beneficial.

According to Heinemann's experiments, the most common germ is the *streptococci lactisun*, and while (from their method of growing) these germs are indistinguishable from streplococci germs that produce disease, they have to be passed through several animals before they will produce disease in the human body. This germ is largely concerned in the production of lactic acid.

Seiffer further contends that this germ with some of the staphlococci group and some of the colon bacilli group are responsible for lactic acid which prevents a neutral or alkaline reaction taking place, which is so essential for the growth of many disease producing germs.

That it is practical can be shown by a summary of our city clarified milk which I have taken from four farms. These samples were all taken on delivery to the consumer when the milk was twenty-four to thirty-six hours old.

Farm No. 1 showed in 51 samples with average of 5,612 germs in each 15 drops.

Farm No. 2 showed in 60 samples with average of 4,078 germs in each 15 drops.

Farm No. 3 showed in 43 samples with average of 6,502 germs in each 15 drops.

Farm No. 4 showed in 17 samples with average of 2,553 germs in each 15 drops.

A total of 171 consecutive examinations with an average 4,686 germs in each fifteen drops. It might be interesting to add that one of these farms, and not the one producing the highest count, was equipped for producing this clean milk at an expenditure of $1,600.00.

That milk should be entirely free from disease producing germs is shown conclusively by a summary of epidemics prepared by Busey and
Kober of which I only cite a few to show the most intense need of this requirement.

A typhoid epidemic in Clifton, England, showed 244 cases of which 230 came from one dairy.

A scarlet fever epidemic in Boston in 1907 produced 227 cases, of these 195 came from the same dairy and occurred in four days' time.

A diphtheria epidemic occurred in Ashtabula of 111 cases with 23 deaths, 100 cases came from families that used milk from one dairy.

Hart has collected a series of milk-born diphtheria epidemics which total 1,051 cases with 214 deaths. Surely with a life toll of this character there should be no hesitancy in drying no disease producing germ if any expense can avoid it.

Statistics on tubercular infections directly transmitted are harder to find, yet we can be on the safe side by taking the conclusions of several able workers who have recently gathered proof.

Anderson in 223 samples of milk showed that 6.72 per cent of the samples contained tubercular germs virulent to Guinea pigs.

Trosh examined 7,097 samples of market milk and found tubercular germs in 594.

Schroeder says whatever chances we ourselves may take as adults, yet we have no right to neglect our duty to children. When we examine the reports of a host of investigators, we find though there may be two morphologically distinct types of the tubercular bacillus, that they are connected by transition forms, and if the two commoner types (human and bovine, but neither restricted to man or cattle) really differ in an important way it is that the type commoner in cattle is of much higher disease producing virulence than that common to man.

Dr. Parks with twenty cases of general tubercular infection found the human type of bacilli was causative in fourteen cases and the bovine type in six. In one case of abdominal tuberculosis of bovine type he was able to obtain milk from the farm which supplied the child's milk, and both samples showed tubercular bacilli which produced fatal tuberculosis in Guinea pigs.
Besides these twenty cases he reports thirty-five surgical cases of tuberculosi
s of which twenty-nine were swollen glands. Twenty of these were due to the hu
man type, while nine were of bovine origin.

These figures certainly show why milk should be produced only from tubercu
lin tested cows, and the more so since Salmon, after a careful study of all facts i
regard to the tuberculin reaction on cattle, says: "It is an accurate method of de
termining whether the animal has tuberculosis."

That by its use the diseased animal is detected and removed from the herd, th
ereby protecting other cattle.

That tuberculin has no ill effect on the healthy animal.

Already we see the progressive dairyman taking advantage of this test. Let u
help him along by demanding it for all our milk cows.

That milk must have a constant nutritive value and definite chemical com
position is already recognized by law, for protecting the consumer from fra
ud and dangerous dilutants and preservatives, and also for the use of in
fants. Without a definite standard it would be impossible to correctly modify milk.

The Certified Milk Commission has adopted a standard of 3.50 per cent pro
teins, 3.50 to 4.50 per cent fats and 4 per cent sugar. Should milk for dr
inking purposes show a higher per cent fat than this, it should be so labeled, or e
ough milk of lower composition should be introduced to bring the food value d
own.

To obtain the ideal milk for infant feeding, we should take one step fur
ther and demand that the dairyman use cows which produce a small size fat globule i
their milk.

Our third requirement—an unvarying resistance to early fermentative c
anges, demands as little handling as possible.

Rosenau experimentally shows that clumping or clustering is one of the fac
tors that cause an apparent decrease in number of germs. Milk that is shaken or sti
red vigorously shows more germs growing on Culture Media.

The next reason for fewer handlings is that each handling only adds another s
ource of infection.
Milk should be subjected to a steady, cool temperature, apparently best around 40 degrees Fahrenheit.

Rosenau found that freezing milk for ten minutes had no effect on the germ destroying power, that freezing for twenty-four hours before inocculating with bacillus typhosus had no influence on its restraining power as far as the bacillus was concerned, but apparently lessens this power for the bacillus forming lactic acid.

Yet freezing does produce changes in milk, for each winter we see cases of food poisoning in infants which can be attributed to thawed frozen milk, hence, doctors usually warn mothers against permitting babies to have such milk.

That it should not be allowed to stay at a temperature much higher is shown by Frendenreich, who subjected a sample of milk containing 153,000 germs to the cubic inch to a temperature of 59 degrees Fahrenheit, and one hour later found it to contain 539,750 germs, and at the end of twenty-five hours to contain 85,000,000 germs.

The effects on milk of higher degrees of heat sufficient to kill bacteria (which is conceded to be with very few exceptions around 140 to 165 degrees Fahrenheit) is still the subject of much controversy.

It is generally agreed that milk has a germicidal action, and that this action is present only in raw milk, and continues according to Heinemann for eight to ten hours.

Boiling or heating to about 80 degrees Centigrade destroys this action, lesser degrees of heat vary with the micro-organism to be destroyed.

The effects of heat 140 to 165 degrees Fahrenheit on the various ferments is also a subject of controversy, and the bulk of the evidence seems to be that Pasteurization done in scientific laboratories and by ultra scientific men is not in the least injurious, yet in my opinion commercial Pasteurization of a dirty milk supply is to be condemned as is the dirty milk supply.

Mildly stating it, it is far from the ideal method and I think is positively harmful in the manner in which it is now commercially carried on.

With the amount of advertising that Pasteurized milk has received, expended on demanding clean milk we certainly would be closer to our goal, which is clean, pure milk.
Many times do I hear, when baby is taken ill with enteritis, and the milk is investigated, the mother reply—'Oh it cannot be from the milk, because the label says 'Pasteurized.'” Such is the false sense of security which is now developed that the mother is often absolutely careless with her part of feeding pure milk to the babe. And it is only too late when she realizes the real import of commercially Pasteurized milk. Why have we not taught her in the beginning to demand pure milk?

Having a desire to see what was the condition of this Pasteurized milk when it reached the babe, I had my assistant, Dr. W. P. Curtis, collect samples. These samples were taken directly from the baby's bottle, with the exception of three taken from hospital, and taken during the past month when the weather has been ideal to keep down germ growth, you can imagine what they might be during the warm summer months.

For a three low count we found 3,440; 7,140; 22,540.

For a three high count 2,580,330; 426,520; 864,640.

Such a varying of counts certainly fail to impress us with the efficiency of commercial pasteurization.

They show one infection with a germ growing a green colony, which certainly is foreign to the germs found in milk and often causes the green bowel movement so common in summertime, we are lead to assume that if commercial pasteurization does one thing, it diminishes the growth of the streptococci lactus, which is so often a protection to milk. The greater number of these are killed, although it has been recently shown that a few strains of streplo will stand as high as 170 degrees, which accounts for the eventual souring of this milk.

Stoakley says, that sour milk is rarely the cause of ptomaine poisoning. And from our experience with infants, we have found it to be a life saving food under some conditions. How often souring is delayed by incomplete pasteurization, so that the mother tasting the milk finds it sweet and gives her babe the most violent of poisons, which, according to Vaughan, may be due to tyrotoxin or a similar compound and according to Novy to toxines set free by poisoning peptonizing bacteria which he proved to be capable of producing death in Guinea pigs and puppies by diarrhoea in four or five days.

In talking to the manager of one of our larger pasteurizing plants, he gave the following description of their method:
“Our milk is first run through the separator to remove any sediment. Imagine what the sediment of milk may be, imagine our permitting any sediment of manure, dead flies and hair in any other articles of food. Does this straining out of sediment and pasteurizing not tend to make the dairyman careless?

“Then when the milk enters the Pasteurizer it has a temperature of about 60 degrees. Just the temperature that Frendenreich showed to produce 85,000,000, then heated to a temperature of 165 degrees for one and one-half minutes or two minutes, then run through a water cooler at fifty. Rogers has recently shown that a temperature of 185 degrees is the lowest at which this flash pasteurizing can be effective, yet, I know from talking to various dairymen that they consider 165 degrees sufficient. Of course, they have to for a higher temperature would destroy their cream line and make their milk a marked, disgraced dirty milk and place it where it really belongs.”

Does that sound like a method warranting us physicians in recommending pasteurized milk, or does it not sound more like a commercial way of keeping milk sweet till it can have a chance to kill some babe?

Dr. Freeman of New York, after a careful study of milk from a medical standpoint, concludes that while milk is in no way changed by pasteurization for 40 minutes at 140 degrees, yet commercial pasteurization is to be condemned.

Dr. Evans of Philadelphia, in an examination of five large pasteurizing plants during the month of May found two plants using the Flash Method of pasteurizing averaged about 750,000 and the three using the Holding Method averaged about 575,000 germs.

This certainly leaves a most dangerous milk when we consider how from various experiments it has been shown that the lactic acid germ is one of the easier killed although a few hardy strains remain.

Dr. Koller’s work at Rochester certainly speaks for itself, and if I have his figures right, they certainly show a reduction in infant mortality far in excess of any figures yet shown by commercial pasteurization of a dirty milk, so that instead of contending and temporizing with improper pasteurization, or pasteurization of improperly procured milk, or improper care of pasteurized milk, let us demand and work for pure, clean milk.

Work with the dairyman to have him produce it, work with the general public to keep it so after receiving it, and last, but not least, occasionally remind my own profession of the important place they have in this battle.
SANITARY MILK SUPPLY FOR CITIES AND TOWNS
FROM A HEALTH COMMISSIONER'S STANDPOINT.

DR. W. A. EVANS,
Health Commissioner, Chicago.

Mr. President and Gentlemen—Milk which is harmful falls into six
categories:

1st—Spoiled milk. Milk which is dirty or old or has
   has been kept warm, or any of these in combination.

2nd—Typhoid infected milk.

3rd—Tuberculosis infected milk.

4th—Scarlet fever infected milk.

5th—Diphtheria infected milk.

6th—Milk causing miscellaneous conditions.

These are stated in the order of their importance. Very much the
most important from the standpoint of sickness and death is spoiled milk; milk which as the result of dirt, heat or age is so changed in its chemistry or its bacteriology or both that it poisons the infants who take it or fails

to nourish as was expected.

We read so much of the opposition of the farmers to the tuberculin test,
and it is great, but it is no greater than is their opposition to such inter-
ference as is needed to get clean milk, cold and fresh. Our city ordinances
requiring tuberculin testing and pasteurizing have been less opposed than the
one requiring a low temperature. Spoiled milk causes summer complaint

In a city with a typhoid death rate of 12 per 100,000 or less, water
is not of much consequence in the spread of the disease. Milk is probably
the most important conveyor; with us we charge each case of typhoid against
the milk supply.

In order that conclusions may be of value, it is necessary to take into
account the number of cans which a dealer sells each day. We work out
a "can factor." A dealer is entitled to so many cases of typhoid per can.
If the rate amongst his customers is less than that we say that they are
getting their typhoid from contact, flies, water or vegetables—the milk is
not spreading it. If the number of cases passes this factor rate, we investi-
gate the milk supply. The protecting of milk against typhoid is not an easy matter. The farmer resents any interference. He cannot understand the necessity for proper precautions where there are developed cases of typhoid, and the importance of typhoid "carriers" seems to him utterly foolish.

The same method of watching against scarlet fever and diphtheria as that for typhoid is employed. There is a "can factor." This varies with the season of the year. The situation presents the same difficulties as typhoid. The farmer does not want to be interfered with. He has his own ideas as to the possibilities of the spread of contagion through milk. Especially is he upset by restrictions in mild, atypical or "carrier" cases.

In fact it is seriously open to question whether contagion can even be kept out of milk made by 10,000 miscellaneous farmers widely scattered and shipping to 3,000 miscellaneous city dealers, and probably we must supplement our inspection methods by pasteurization.

And now for that division of my subject in which you are most interested, milk-borne tuberculosis. It ranks third in the disease and death which it causes. It ranks first in general importance. We have been a good deal at sea on this question. An illuminating article has recently been published by Park and Krumweide in the Journal of Experimental Medicine. They made autopsies and bacteriological studies on a large number of infants dying of tuberculosis in hospitals in New York City. Of those babies who were milk-fed and who died of tuberculosis, more than fifty per cent had lesions due to the bovine bacillus. Lumping tuberculosis deaths among breast fed and milk fed children, they found that fifteen per cent of the deaths were due to bovine bacilli. They conclude that bovine tubercle bacilli are responsible for two to three per cent of all the human deaths from tuberculosis at all age periods. These figures refer to the fatal tuberculosis. Tuberculosis in infants is quite fatal; in children and in youths it is slightly fatal; in adults it is usually fatal. The large number of non-fatal infections in children and in youths usually due to bovine bacilli and some of the non-fatal tuberculosis in adults and infants should be added to the figures for the bovine bacillus.

Another point is this. Some of the human bacillus tuberculosis is milk-borne. These cases should be added to the list of milk-borne tuberculosis. Therefore, milk-borne tuberculosis is of great importance. Says Theobald Smith: "From five to seven per cent of all human tuberculosis is ascribable to it (bovine tuberculosis). Though it does not appear to play any part in tuberculosis of the lungs—the commonest type of this disease in man—yet it probably causes one-fifth of the tuberculosis of infancy and childhood."
One thing is certain; tuberculosis is due to the tubercle bacilli. This every health department knows. There are those who think health departments should cease fighting milk-borne tubercle bacilli, because some differences have been shown between human and bovine bacilli. It seems to me that tubercle bacilli stand proven guilty. It is up to the other side to prove the innocence of the bovine bacillus. This they have not done. Health departments are not justified in relaxing their efforts.

Much of the importance of this subject arises from economic factors. Tubercular cows average a short life of profitable milk production, therefore they soon become boarders in the dairy herd. Thus indirectly, tubercular cows are increasing the cost of milk to the consumer without increasing the profits to the producer. Melvin estimates the loss in this direction as fourteen million dollars a year. Tubercular milk cows infect other cows and hogs. The condemnations cause a loss of $1,400,000 a year, according to Melvin. In this way tuberculosis is raising the price of milk. The consumer pays more, but the producer does not get more. What is to be the remedy?

I was in New York attending a meeting of the milk committee last week. I heard Professor Veranus Moore tell of a plan. It was to substitute physical examination for tuberculin testing. The basis was this: Not all reacting cows excrete tubercle bacilli. A very careful physical examination will discover all of the animals with tuberculosis so far advanced that they are actively contagious. There are not enough competent veterinarians to test all of the dairy cows once a year. If all reactors were killed, there would be a milk famine.

I do not believe in the plan for the following reasons:

More technical skill is required to make a reliable physical examination than is required to make a reliable tuberculin test, therefore the number of qualified veterinarians if too small for tuberculin testing would be utterly insufficient for physical examination. A physical examination requirement would multiply fraud enormously. A physical examination would fail to show tuberculosis in many animals which are in a highly contagious stage. Would it not be wiser to apply the simple procedure, the tuberculin test, to all the cows once a year? Then do not condemn the reactors, hold them for close study and physical examination by these expert diagnosticians, and kill those found to be actively contagious.

What is the Chicago plan? Tuberculin test the cows; hold the reactors for closer study; kill the contagious and the unprofitable; pasteurize the milk until all tuberculosis is eliminated.
Cows give milk profitably for about five years. Tubercular cows are profitable for a shorter period. Keep pigs away from tubercular cows. Ventilate the barns. Change the habits of the cow. If the cow changes hands she should do so as a tubercular cow. If a Wisconsin farmer finds a tubercular cow he may sell her for half the normal price to an Illinois cattle dealer. He sells her to an Illinois farmer at the full price of a non-infected cow. The dealer knew that there was some reason why the cow was offered him at such a bargain. Is it fair? This plan is permissible if pasteurization can be made safe.

If you will read bulletin 126, just issued by the Department of Agriculture, you will see that most of the statements which you have read of pasteurization are incorrect. Such control of pasteurization as is within the easy limits of administration are:

1st—Material decrease of the bacterial content of the milk as it comes to the consumer.

2nd—Decrease in the putrefaction products in milk.

3rd—Protection against milk-borne typhoid, tuberculosis, scarlet fever and diphtheria.

As for certified milk: It is made by high class men, is sold in original packages and is inspected by commissions. In spite of all this, it is occasionally dirty, occasionally has a high bacterial count, and occasionally spreads contagion. Nevertheless it is much the best milk which we have. Health departments are glad to see its use. Nevertheless it is made by the rich and for the rich.

There are 32,000 cans of milk sold in Chicago each day. There are 110 cans of certified milk sold in Chicago each day; this after many years of pushing by high grade men, most of whom are good merchants.

The problem of the milk supply of two million people of mixed kinds, many of them living in poor homes and on small wages—such a problem is a man's job. It is foolish to think of certified milk as a solution for it.

It is nice to idealize, to theorize, to speculate, but the job of getting 30,000 cans of milk a day somewhat cleaner than it would otherwise be—of getting it for a people many of whom are much more interested in cheap milk than they are in clean milk—such is a man's job; and I can see no hope of material help from certified milk.
Dr. Moore (of Cornell University)—At the request of the Chairman yesterday, I gave vent to some of my inner feelings based on definite results so far as I understand them, with regard to the means by which tuberculosis in cattle is spread. I hope I made myself clear at the time, and I hope, Dr. Evans, I made myself clear in New York, but I evidently did not quite, to you. Now I think we are dealing with an exceedingly vital question, one in which a large number of men, and most every man in this room, is interested. The question at issue is, to eliminate tuberculosis in men and in cattle. Now then, how is that going to be accomplished? The vital principle of the elimination of any infectious disease whatever is the prevention of the spread of the germ that produces it. That is the secret, it is the cruz of the whole situation. If you can prevent the virus in the infected individual from escaping and getting into the bodies of the healthy individuals, that disease will disappear with the life of the present infected individuals. The question with tuberculosis is, and this is the point which I tried to emphasize in the talk that I gave at New York last Friday, that we must try to eliminate the cattle that are spreading tubercle bacilli. That is the first and most important point. Now we have lived under the delusion, I say delusion, under the misunderstanding at least, that all animals infected with tuberculosis were setting free tubercle germs. That is the supposition that has been at the bottom of a great deal of the action with regard to bovine tuberculosis. It was that feeling that prompted the radical movement to be put into force in the eastern part of this country years ago that caused the compulsory testing of thousands of cattle and the slaughter of large numbers of them, and yet the disease has continued to spread because the method was not properly followed up. We, in New York, are not entirely proud of the result or of the present situation. We are proud in certain respects of the law that we have, but the people will not submit to it. When we come to the use of tuberculin we can not apply it to all of the cattle in the State. There are not qualified men enough to do it in a long, long time. I wonder, Dr. Evans, if you have figured on how long it is going to take to test the cattle in New York state, for instance, with the available force of properly trained men in that State to apply it? It would take many times the life of a single cow. You can figure it out for yourself; there are nearly 2,000,000 milch cows, and, including the young stock, nearly two and a half million. The movement to test the herds and slaughter the infected animals has been honest and it has been sincere, but after all these years have lapsed we have many of these same herds extensively infected. And secondly, now that we have a good law for the elimination of this disease and for preventing its spread, the people do not take kindly to it because they have the unsatisfactory results of previous action in their minds. The people are not with us in this effort, I am sorry to say, for I believe we
have not much less tuberculosis in the eastern and middle states now than we had ten or fifteen years ago; I fear we have more of it and that it is steadily increasing, because the use of a delicate scientific test for detecting it and the removal of the infected can not be generally applied. The point I wish to discuss is simply the question of the spread of the disease. How is this disease spread? Simply by the germs escaping from the infected cow and getting into the body of the next cow. The supposition was in the beginning that all of the infected animals were spreading the bacilli. The results of the study in this country, together with those obtained in Denmark and in Germany, we have come to look at this question more carefully and it has come to be recognized, I think, by all pathologists, that tubercle bacilli are not being eliminated from animals excepting in what are known as open cases, cases of tuberculosis in which the tuberculous foci are discharging their contents containing the tubercle bacilli into some channel of excretions. This may be the digestive tract, the urinary tract, the bronchi or the udder. We have found that it is generally believed by those who are working on this subject today that tubercle bacilli do not escape from the udders of tubercular cows unless the udder is involved, and they have found from post mortem examinations that a very small percentage of animals that have tuberculosis and that respond to the test have tuberculous udders. The numbers vary in different experiences. Some will find the number of cases to be larger, some smaller, and some have not found them at all. Professor Bang says in Denmark they have found a good deal of tuberculosis of the uterus, and the uterine discharges from these cases contain the specific germs. What I said in New York was that if we could eliminate the animals that are spreading the bacilli, which could be done by a physical examination, in most cases, that we would minimize the spread of the disease, if we didn't get out but three or four per cent or even less of the cattle actually infected. We would get out the dangerous animals and the animals that are spreading the bacilli to others, and consequently to people who consume the milk. I don't believe that the physical examination is a panacea for this at all, nothing of the kind. I have not intended to in any way infer that, but I have made a careful study extending over more than three years of the milk and feces of tuberculin re-acting cattle, and we have not found a single case where evidence of disease could not be determined on physical examination in which the bacillus could be found in the milk or the feces. I don't say that they don't occur, I believe that they sometimes may. We are dealing with such a subtle thing and with such a long drawn out, slow process that it is impossible to be absolutely positive, but I do believe that Professor Ostertag is getting at the solution of this problem, and that when we follow up his method, we are going to check the spread of the disease. We have at our Veterinary Experiment Station tuberculous cattle, i. e. re-acting cows.
without symptoms and thus far we have failed to find tubercle bacteria in their milk or excretia. We have other animals that have a few tuberculous lesions and they are spreading the bacilli, there is no question about it. Dr. Evans, I want to be clearly understood that it is the animals with open lesions that are doing the damage, and that the physical examination will detect the great majority of them and if they are removed promptly the spread of the disease and the danger to man from this milk will be greatly reduced. I don’t think that the physical examinations will take out five per cent of the infected cattle, I never said that it would. I do not think the man is living or ever will live, who will be able on a physical examination to pick out the slightly infected animals, but he can pick out the ones, at least a large percentage of them, that are spreading the bacilli, and I have simply come to feel that this much can be done by a large number of veterinarians and men who own cattle will be willing to have it done and to get rid of the clinical cases. Many of them will follow it up just as fast as possible with the tuberculin test and by the segregation of the re-acting animals, and by the building up of the sound herd according to the Bang and Ostertag methods. If we take either one of these methods and depend upon it alone we will get into trouble. I know of a large herd that is supplying milk to New York City, that has been undergoing tuberculin tests at frequent intervals. It was a very heavily infected herd in the beginning. The infected, but clinically sound animals were treated according to the Bang method and it was thought after a few years that the herd was free from the disease. Now what happened? At the end of three months, after a test at which less than one per cent re-acted, at my suggestion the entire herd was retested, and over twenty per cent of them re-acted and what was found? That there were two animals that had passed the regular tuberculin tests for over four years that had developed into acute clinical cases in which the lesions were discharging in the lungs, and they had spread the bacilli to his large number of cattle. Now then, a two-weeks’ examination or a monthly examination would have detected those animals before the loss would have been sustained by that herd or before the milk would have been infected from it, so I say, Dr. Evans, that the tuberculin test which is almost invaluable with positive re-actions, doesn’t always give us the clew, when the re-action is negative. We can not depend upon all of these, and while I am as strong a believer in the tuberculin test as I ever was after years of careful work and study, I have seen with the five or six hundred animals, that I have been carefully watching and testing repeatedly, constantly occurring acute clinical cases in the cattle that have tested and retested. The post mortems have shown lesions from the size of a walnut to the size of one's fist walled off, but new lesions starting up from them. We have over-estimated our powers in certain lines, I am afraid, and if we are going to get any good out of this
work we are going to cut out as many of the herds as possible the spreaders of the virus and then follow this up as fast as we can by tuberculin testing and segregating the possibly arrested cases with all of the re-actors or occult cases. It is a difficult question with all of the things that come in to change and modify the condition and get a practical outline and policy of action that will be generally effective and can be applied. I think if we take the reports of the International Commission on the control of Bovine Tuberculosis in which all of these phases have been carefully studied and follow it up we will get rid of this disease. There is no reason why we should not. I believe we are making progress in this because the people are becoming interested in it, studying its means of dissemination and generally coming to deal with tuberculosis in a rational way. The germ goes out from the infected individual in which the lesions are discharging into channels of excretion, and if we are going to stop it we must catch the individuals that are spreading the virus and eliminate them.

I think that is all I have to say on this subject and I hope I have made myself clear, Mr. President. I am very glad to be heard and to hear this exposition from Dr. Evans. I think he wants the right thing; we all want the right thing, but we have got to be careful, to deal with facts and not dreams with regard to methods, if we want to make proper progress, getting rid of this disease.

Adjourned.

Dr. Ward—I just wanted to say a word in connection with the national feature. One of the greatest factors in connection with pure milk supply is inspection. In the work of the Milk Commissioners, they who come in contact with the producer, and it is through them information is brought where it will do most good, for this reason it is essential that you put nothing but practical, experienced inspectors in the field. We have to educate a great many, but the producer must understand our standpoint in protection, before he will produce pure milk. For this reason Health Commissions and Board of Health and medical milk commissions probably have a great influence for the production of a sanitary product.

The President—Gentlemen, we would like to hear from anyone interested in this subject. So far the discussion has been very interesting.

Dr. Clark—We have a number of cities in Wisconsin with milk ordinances, and it is the duty of the local health officer to see that they are enforced. The best ordinance in our State is in Superior. That ordinance has been in effect for four years. The first year that the cattle were
tested there was a little over five per cent condemned. These cattle have been retested every year. Last year we killed two cows. The report of the health officer of Superior last year shows that since the ordinance went into effect, the mortality in children has decreased fifty per cent. This is the only ordinance in our State which provides for a veterinary inspection. It not only requires the tuberculin test, but it requires that a veterinarian look after the sanitary condition of the barns, inspect milk wagons, and look after the cleanliness of the utensils used. On the farm where we condemned the two cows last year was a tenant and a very poor barn (the first year we got fifty per cent of the cattle from that place). The owner would not fix up the barn and the tenant couldn't. The next year we got about a third of the cattle, and the next year I think we got three or four cattle, and last year it was the only farm that supplied milk to the City of Superior where we obtained any reactions.

DR. LUCKEY—I was glad to hear from Dr. Moore. I had the impression that about one-third of the dairy cattle in the State of New York are tuberculous. Is that too high?

DR. MOORE—that is too high. That will apply to certain cities but not to the State as a whole.

DR. LUCKEY—Then that applies to the dairy cattle around some of the cities. I do not believe that you will accomplish a thing by a physical examination. I have seen farmers buy high-priced, healthy looking animals that would show no signs of disease to any one on earth by a physical examination, add such an animal to a herd, and, as a result, have tuberculosis spread in a herd rapidly. We had two such cows added to the dairy herd of one of the state hospitals and as a result lost sixteen other good cows. I know of another case where five healthy looking cows were added to a private dairy herd. I do not believe that any veterinarian could have detected a sign of tuberculosis in any of them. Yet these five cows, within six months, spread tuberculosis to fifty-one other cows. I do not believe that any man on earth could have told that there was anything wrong with these cows. I believe it is a dangerous policy for as eminent an authority as Dr. Moore, whose opinions are highly respected, to advocate the physical examination for the prevention of the spread of tuberculosis. Using the physical examination and all forms of the tuberculin test—the eye test, the intradermal test and the hypodermic test—combining all of these with the physical examination I find it difficult enough to detect all of the animals that are capable of spreading tuberculosis. I do not believe that we ought to leave out a thing on earth in making an accurate diagnosis. I do not believe that sanitarians ought to split hairs on the methods of diagnosis. What we want today is to diagnose accur-
ately. I believe that combining all of the methods of diagnosises we will still make a few errors. We will leave a tuberculous cow now and then and we will condemn one now and then which will not show lesions on post mortem. In the work in the state of Missouri I am openly acknowledging these errors in advance. We do not claim to be infallible and we do not expect to let critics, who dwell upon minor errors and magnify them into an argument, stop a great work.

One gentleman finds fault because the papers sometimes note the filthy conditions of dairies and the diseased conditions of the cows. His comment was that no agitation in papers would be of real value. It is my opinion that you cannot say too many things in newspapers about milk that is really harmful. I do not believe the writer exists who has descriptive powers sufficient to adequately describe the filthiness, dirtiness and dangerous condition of the average city market milk. A description of the present filthiness cannot be overdrawn. If dairymen do not want attention called to the dirt and germs in their milk, let them leave the dirt and germs out.

A large proportion of the dairymen have been so accustomed to filthiness in handling milk that they have come to think it a part of their inalienable right to be that way. When we first come to a dirty dairyman and ask him for clean milk from healthy cows, it appears to him like it would appear to the African if we should ask him to wear clothes. Some of the dairymen who have lived in filth so long are about as difficult to clean up as it would be to clothe the African.

All over this country today sentiment is developing, and is almost ripe, which will require dairymen to furnish clean milk from healthy cows. If the objections and opposition to reasonable reform does not become more rational some of the laws that are going to be passed will be drastic. The public is in no humor today to split hairs as to just how milk could be gotten clean and from healthy cows. The public is wanting clean milk and there are many good reasons for their wanting it. It must come. I hope that in looking at the task before us, we will not be seized with the fear that has been more or less apparent in all of the papers read before this association. There has been an undercurrent of an expression of fear that the task of eradicating tuberculosis among cattle cannot be accomplished. It is a great task, there is no question about it, but the fact that tuberculosis can be eradicated from among the dairy cattle is a foregone conclusion. If we can eradicate tuberculosis from one herd of cattle we can eradicate it from all herds of cattle.
THE RUSSIAN DIAGNOSTIC TEST FOR GLANDERS.

JOHN R. MOHLER, V. M. D.

Since the discovery of the glanders bacillus in 1883 by Loeffler and Schutz great progress has been made in the determination of glanders. The greatest difficulty in the recognition of this disease lies in the fact that many glandered horses do not show positive symptoms until the later stages of the disease. Such horses affected with occult or latent glanders which are apparently not even suspicious cases must be considered as the principal distributing agents of the infection. The early diagnosis of glanders is therefore one of its most important phases to the practicing veterinarian, and with this definitely established in a stable of horses, subsequent action is clear as to the measures which should be taken to protect the owner from further loss and personal danger. Our knowledge, methods and resources in coming to the conclusion that a given horse is or is not affected with glanders has gradually broadened until today there are at least eight distinct methods by which the diagnosis of glanders may be made, namely:

1. Physical examination.
2. Postmortem examination.
3. Auto-inoculation.
4. Extirpation of the submaxillary gland.
5. Guinea pig inoculations.
7. Serum agglutination reaction, or this reaction combined with the diversion of the complement.
8. The precipitation test of Konew.

As all of the first seven methods have been fully treated and discussed by various writers, attention will be directed in this paper only to the precipitation reaction.

This method for the diagnosis of glanders was recently brought to the notice of the Bureau in a preliminary report submitted by Dr. D. Konew, Director of the Bacteriological Laboratory in the Veterinary Institute of Charkow, Russia. It is based upon the fact that the precipitins are formed in the bodies of infected animals from the time the infection first occurs and probably at an earlier period than the other antibodies such as the agglutins, opsonins, etc. However, our knowledge of the development of all these antibodies is extremely meager, owing to the difficulty of discovering them and to the further fact that they exist in minute quantities and are diffused throughout the tissues of the entire body.

Even when the smallest traces of these precipitins are present in the blood serum of glandered horses, Konew states that with a concentrated solution of glanders bacilli he is able to bind even these slight traces and thereby obtain a positive reaction to his test. This solution of the glanders micro-organism is prepared by dissolving the growth which occurs on a two-day-old agar culture with an 8 per cent antiformin solution by using about 10 cc. of the latter to each agar culture. Antiformin is the patented name of a disinfectant, made by adding sodium hydrate to a solution of sodium hypochloride and is on the market at 60 cents a pint. Its activity seems to be due to an intense oxydation. This solution of antiformin has recently been attracting the attention of those bacteriologists who are interested in sputa examinations, on account of its ability to dissolve various forms of bacteria generally found in the sputum without affecting in any way the bacillus of tuberculosis, thereby permitting the latter to be more readily detected on microscopic examination. It has this same ability to dissolve the bacillus mallei and in two hours at room temperature, the washed culture previously referred to is completely dissolved by the solution of antiformin. If the culture dissolves quite rapidly Konew adds to this solution another washed culture of greater density in order to obtain as a final result a saturated or concentrated antiformin solution of glanders bacilli. This solution is at first strongly alkaline but is neutralized by means of a 5 per cent solution of sulphuric acid. The solution is then
filtered, first by ordinary filter paper, and later by the Berkefeld filter, in order that the fluid will be homogeneous without any undissolved bacilli being present. This fluid constitutes the one component part of the precipitation reaction, and as a name to distinguish it from the other soluble albumens Konew has termed it "malleasa," which is analogous to the terms tuberculase, pyocyanase, etc. In order to apply it economically and at the same time reduce the possibility of contamination to a minimum, it is advisable to distribute the malleasa in small bottles containing 5, 10, and 20 cc. respectively of the fluid.

According to its discoverer the precipitation reaction is carried out in the following manner: "The blood from the jugular of the horse to be examined is collected in a glass container and then allowed to remain at room or incubator temperature. The separated serum which is thus obtained serves as the second necessary fluid for the precipitation reaction. In order to produce the reaction 1 ccm. of the malleasa is poured into a glass test tube of 3 to 4 mm. in diameter and 15 cm. long, so that the liquid in the tube is about 3 cm. in height. Then about the same quantity of the blood serum from the suspected horse is taken in a Pasteur pipette which is introduced into the tube containing the malleasa in such a manner that the point of the Pasteur pipette reaches the bottom of the tube. Not until then is the serum allowed to pour very slowly under the malleasa. Inasmuch as the serum has a higher specific gravity it remains on the bottom, while the malleasa is forced up. The free end of the pipette is then covered with the finger and the pipette is carefully taken out, so that the serum is not mixed with the malleasa. Such a mixing should also be avoided during the introduction of the pipette into the serum. The two solutions must only come in contact at one point and then the reaction will be very marked.

"In case of a positive reaction, that is when the serum is obtained from a horse affected with glanders, a ring of white cloudiness develops at the point of contact of the two clear solutions, as a result of the precipitin formation, which is particularly marked in good daylight when the tube is placed in front of a window against some dark object. According to the duration of the disease, the white ring develops at various times and in varying intensity. In severe and chronic cases of glanders the serum produces the ring immediately; in slight affections, when the lesions are not very marked in the animal, the precipitation reaction appears in about 15 minutes." In our experiments the cloudy ring at the point of contact of the two fluids was made to appear more distinct by adding to the malleasa several drops of an aqueous solution of methylene blue for the color contrast. This white, cloudy zone is somewhat suggestive of the white ring formed by the presence of albumen in the nitric acid test of urine. (See Plate 1.) After the union of the receptors in the blood
serum with the products of bacterial disintegration, further change takes place, which results in a precipitation brought about by a kind of fermentative action. This may be explained in accordance with Ehrlich's theory of the receptors of the second order. Such receptors possess, in addition to the haptophore group, a ferment-producing group called the zymophore group. The receptor seizes the food substance in the bacterial extract with the haptophore group and produces precipitation, manifested by cloudiness, with its ferment-producing group.

The two important factors which make this test a practical one are (1) the very simple technique required and (2) the fluids used in securing the reaction are without danger to the operator, a very great advantage in such diseases as glanders in which the veterinarian in his examination is always subject to the dangers of infection. Konew has applied the test to 150 horses which were simultaneously tested by the agglutination reaction and with mallein. While in most cases the results of the precipitation reaction corresponded with those of the mallein and agglutination tests, at the same time the precipitation reaction had the preference in that it did not give doubtful results; that is, in the cases in which the agglutination reaction appeared in dilutions of 1 to 400 and 1 to 500, the precipitation test gave negative results. On the other hand, the precipitation reaction gave clear and positive results in certain cases of glanders in which the lungs and mediastinal glands showed only two or three nodules without involvement of other tissues. As controls on these results he used the serum of horses which were suffering with surgical diseases, some with high temperatures; also of horses which had been injected with anthrax, erysipelas and hog cholera vaccines. In no case was a precipitation reaction obtained, but at the point of contact of the two clear fluids the optical border could be distinctly seen without any cloudiness. Based on these results, Konew drew the following conclusions:

1. By using the concentrated solution of glanders bacilli (malleasa), the precipitation reaction can be applied as a diagnostic method even in the earliest stages of glanders.

2. As a result of the simple technique and the short time required for examination (about one hour), the precipitation reaction should be preferred to any other method of diagnosis.

3. Blood from the horses to be examined should be taken before the injection of mallein.

4. The solution of malleasa must be titrated in accordance with other standard serums before they are given out in practice, and therefore they should only be prepared in bacteriological laboratories.
Unfortunately the time has been so short since this method for the diagnosis of glanders was first presented that a sufficient opportunity for the careful consideration of its merits has not been presented. However, a number of interesting experiments have been conducted by the Bureau with malleasa, although it is not desired to draw any definite or general conclusions from the results.

Recently two cases of farcy came under observation to which the precipitation test was applied and in each case the white, cloudy ring was quickly apparent, thereby confirming the diagnosis reached by physical examination. As one of these cases originated in a contractor's stable the twenty-one horses therein were at once quarantined and subjected to both the mallein test and the precipitation reaction. The latter was made first with the result that the serum of only one horse (Jerry) in the stable gave the white cloudy ring reaction. This horse happened to be the mate to the horse showing lesions of farcy and stood in the stall adjacent to the latter. The following day the mallein test was applied to all the horses, and no reaction occurred, with the possible exception of the horse Jerry, which developed a rather atypical local reaction. This animal showed a preliminary temperature of 103.5 degrees and would not have ordinarily been injected owing to the difficulty of interpreting the after temperature in such cases, had it not been desirable for the purpose of controlling the precipitation test. The autopsy on this horse showed four bean-sized nodules of glanders in both lungs, thus confirming the precipitation test. In another instance where nine horses were purchased by the Bureau at a sales stable for a different series of experiments, both the mallein and precipitation tests were applied with the result that one horse reacted to the precipitation test but showed only a thermal reaction of 102.4 degrees F. without any swelling, following the mallein injection. This horse likewise showed a few glandered nodules in the lungs and bronchial lymph glands at autopsy. During my visit in the West last summer, the occasion presented itself in a number of instances to apply this test to exposed or suspected cases of glanders. In all, I have made thirty-three tests with this method, both in the field and at the laboratory, and up to this time there has not been an indefinite result recorded. Of these thirty-three animals, six were clinical cases of glanders, two were suspected of being so diseased, three were occult cases proved by post mortem to be glandered, while the remaining twenty-two were apparently normal.

From the information herein presented, it seems probable that the precipitation reaction will be found to be a satisfactory diagnostic agent for glanders, qualified to do all that has been claimed for it, but the experiments thus far conducted are so few that definite conclusions along this line are withheld pending further investigation of sufficient cases to make a very thorough test.
Figure 1. Precipitation Reaction for Glanders.

a. Negative reaction; control test made with blood serum of healthy horse.

b. Positive reaction; serum obtained from an occult case of glanders. Note the cloudy ring at the point of contact of the two fluids.

c. Positive reaction; blood serum obtained from case of nasal glanders.

d. Precipitation reaction with serum from horse with chronic farcy.
My sole object in presenting this new method for the diagnosis of glanders to this association is for the purpose of having the test tried out by those veterinarians who have the necessary facilities for making this quite easily applied diagnostic agent. In order to determine what constitutes a reaction, it might be desirable at the beginning at least, to titrate each preparation of malleasa by combining it with the serum of a known clinical case of glanders, using for a control the serum of a healthy horse. Only a few tests of this character will be necessary before the information required for making a definite diagnosis will be obtained. My co-worker, Dr. Stafford, has also been working on this test and is at present in Montana comparing the precipitation reaction with the mallein test in horses quarantined for glanders. In all he has tested a total of forty-one horses. Of these, seventeen gave positive reactions to the precipitation test, twelve being clinical and five occult cases of glanders, as shown by post-mortem examination.

DR. MOHLER—I have with me here a sample of the malleasa, which, as I stated in the paper, is prepared by adding a 8 per cent solution of antiformin to a 48-hour agar culture of the glanders bacillus. It is made more quickly than mallein could be prepared and in its application all that is necessary is to pour out a small quantity of this malleasa into a test tube, take the bottle containing the blood of the horse that is under suspicion, draw up the serum in a pipette and add it to the quantity of malleasa in the test tube. I will go through the technique of this operation and show you how simple it is. The malleasa, of course, is prepared in the laboratory; if the test ever amounts to anything it will be put on the market by commercial houses in the same way as mallein is put on the market today. I have with me today a small vial of serum that was taken from a glandered horse about six weeks ago. We have not found out by this test how long such a serum will retain its precipitins and give these reactions, and of course it is not a very fair test because the serum has been drawn such a long time. However, merely for the purpose of demonstration, I will add this serum to the malleasa, to show you how easily the test is carried out. The sole precaution necessary in making this test is to allow the serum to run out of the pipette very gradually and under the malleasa, thereby allowing the point of contact between the two fluids to remain on the horizontal. You see the time consumed is very, very much less than that required for making a mallein test. The whole question now is merely one of efficiency and if this test should go along in the future as I have recorded, it will be a vast improvement over the mallein test, both as a diagnostic agent and in the time consumed. You can see that the point of contact is very even (indicating). The tube is now placed aside for some fifteen or twenty minutes in order to see if the precipitation reaction takes place. I will leave this test tube in the tumbler to be observed by anyone who wishes to see it later on.
In response to a question as to how much is needed to incubate, Dr. Mohler replied:

DR. MOHLER—Not at all, just allow it to remain in the room. There may be some who object to use the mouth in drawing the serum up into the pipette. If so, there is an apparatus of this kind with a small bulb attached to the pipette and in order to have control of the suction this little spring clamp is used. However, if you have drawn it up several times with the mouth you will never use this cumbersome method with the bulb.

DR. WILSON—I would like to ask Dr. Mohler if you get the same results from pouring in the serum first and the malleasa on top?

DR. MOHLER—Yes, it could be accomplished if you had a steady hand, but it is much easier to apply as I have described, by the average person who has not had considerable work in laboratory technique. You don't have to be so careful in using the method I have described to prevent the admixture of the two fluids, which of course breaks the line of contact.

DR. MOORE—I would like to ask Dr. Mohler if he finds any effect of mallein; that is in a horse that is not glandered but is tested with mallein and the serum of the horse if it has just previously been tested with mallein would give this reaction in case glanders did not exist? That was a statement that was made concerning the agglutination test. We have not been able to confirm that mallein would give the reaction that had been given to the horse previous to drawing blood.

DR. MOHLER—I think I have answered that question in the paper. We have tried to conduct that experiment on a healthy horse, by injecting the mallein and two days later testing the blood serum with malleasa. The result was that the injected mallein caused reaction to this precipitation test, so I advise you not to give the precipitation test immediately after the mallein test has been applied, since the injection of a healthy horse with mallein would nullify this precipitation test.

DR. HADLEY—How long would you have to wait before it would be safe to administer or try this test after the injection of the horse with mallein?

DR. MOHLER—I have never studied that feature enough to state accurately, but personally I think ten days or two weeks would be sufficient. We have tried this on one test animal to find out if the mallein injection of a healthy horse would cause the blood to give us this precipitation reaction, and it does within forty-eight hours, but we have not gone further with this experiment as yet, to determine how long this mallein injection will affect this particular test.
I might say in addition that since the September meeting I have received a letter from Dr. Griffin, of the army at Fort Leavenworth. He has tried the test on a few cases and his report is similar to the one I have just made.

**THE PRESIDENT**—Gentlemen, we have with us Mr. Manss, one of the representatives of the railroads that are interested in the transportation of live stock, he will present his paper on

**REASONABLE SANITARY MEASURES IN LIVE STOCK TRANSPORTATION.**

**MR. W. H. MANSS,**


Mr. President and gentlemen: The railroads deem it an honor and privilege to be represented on your program at this, your annual meeting. More problems can be solved by co-operation than by litigation. Co-operation implies the elimination of personalities and emphasizing of principles. Temperaments differ; our viewpoints are narrowed or broadened by our experiences—we all magnify our selfish interests and regard the subject from an *ex parte* view-point. So, in behalf of the railroads, I bring you a message of appreciation for being allowed to discuss with you the problem of reasonable sanitary regulations in the transportation of live stock.

The railroads are not authorized to select for transportation that class of tonnage which is most remunerative. The problem of satisfactory and reasonable service in live stock transportation is difficult of solution, as too often the movement of live stock demands special equipment and expedition. The shrinkage in weight, increased claims, just or otherwise, because of damage or injury, require specially constructed cars, unfitted for other commodities, and a time schedule which will deliver the live stock to the packing centers in time for the good markets. Under these conditions, live stock traffic cannot be regarded as the most remunerative commodity offered to a railroad. Live stock cars must be returned to loading points as quickly as possible, and this involves a long haul of empty cars, for which the railroads receive no revenue.

The problem of reasonable service in the transportation of live stock may be willfully misunderstood. The attention of live stock shippers is so intently fixed on a freight rate reduction that they lose sight of equipment and service rendered. No reasonable man will ask something for nothing. Experience teaches that that which is obtained for nothing is finally paid for at the highest price. A decreased freight rate results in poor equipment and service, just as low prices in live stock today means
poor cattle. A passenger service can be maintained on a passenger rate and the demand for Twentieth Century Limited service in the hauling of live stock must be paid for by a higher freight rate or the payment for special service. With the demand for increased speed and a reduction in freight rates, towns are passing ordinances for concrete, tapestried and frescoed cattle pens, and the cattle coming from the ordinary farm feels, on entering these railroad pens, like the tramp suddenly ushered into a home of refinement and culture.

What you gentlemen are interested in is not so much the live stock rates (for they are reasonable for the service offered), but to obtain the best transportation facilities possible. I don’t believe the American people will ever compel an individual corporation to continually sell its commodities at a financial loss. In that reasonableness which has always ultimately marked American opinion, the solution will be reached when we become open-minded and grant each party the right to protect his interests, recognize the force of his argument, and give a just remuneration for the services rendered.

You gentlemen are familiar with the history of live stock transportation in the United States. The writers of romance have pictured to us the trials and joys of the early cowboys of the West. With them we have walked the trails from Texas to New York. The movement of cattle from these distances was costly in the shrinkage of the cattle and the length of time necessary to reach the markets. Municipalities finally rebelled against having large numbers of cattle driven through their towns, and with the passing of the open country, and the fencing of the small farms, this method of transportation, except in remote regions, has passed away. Water transportation has not proven effective in the United States. Rails can be laid to the packing plants, but streams of water cannot be so easily handled. Water transportation at its best is for low class commodities, where the element of time does not play its part, and is confined to fixed seasons. Those of us who lived in river towns will recall how in early days live stock of all kinds was unloaded at the wharfs and driven through the city to the packing plants. According to statistics, this method of transportation is used but little by live stock shippers.

A new economic phase of live stock handling has developed with our increased population and the packing industries. Packing houses are now established nearer to the points of production of live stock. Kansas City is killing and using 65 per cent of its output from territory within a radius of 150 miles. Only 15 per cent of the live stock killed at Kansas City comes from distant points. Texas at one period drove her live stock north or southeast, but today is killing about 52 per cent of the live stock.
within her own state. The same is true of Oklahoma and other western states. If I am reliably informed, the products of seven carloads of live stock when killed can be shipped in two cars of 45,000 pounds minimum per car. The development of refrigeration and refrigerating cars has been the factor in the centralization of packing houses near the points of production.

With this centralization of packing plants and the increased production of cattle on the smaller farms as against the ranges, a more acute phase of the sanitary problem presents itself.

The growth of our cities, with increased values and inadequate transit facilities, has created congested areas, and these congested areas are the breeding places of immorality and disease. City builders in all our large cities are endeavoring to wipe out this congestion and so plan our cities as to give all the people breathing spots and better sanitary conditions.

Irrigation, forest preserves, dividing of the large ranges into small farms, and the demand for increased agricultural products, has had its marked effect in the decreased amount of visible supply of cattle and live stock in the United States. To meet the requirements will necessitate increasing the number of live stock on the smaller farms at least 150 per cent. In the irrigated regions land has become so valuable for raising other products that only a small percentage of it is given over as pasture for the family cow, and no hope is offered that these lands will supply the growing deficit in the number of live stock. For the small farms to increase the number of cattle means that around the packing centers we will have a live stock congested area, which will become more and more an avenue for disease. This will increase your activities. The live stock history of the congested European countries bears evidence to this fact. The problem of sanitary regulations in the preservation of live stock takes on a more complicated phase than heretofore. Instead of dealing with one farm we deal with a number, and the spread of disease will be more rapid, and percentage of deaths greater, than when it was possible to quarantine certain sections and forbid the driving of cattle to or from these ranges. Sanitary inspection will be more thorough, investigation for the prevention of disease more scientific, and the testing of cattle become more frequent.

This new condition creates a more urgent need to enact such laws as will be a protection to the public. Under these conditions our laws should be more stringent and regulations more exacting. Instead of multiplying our laws, we should have either a Federal Sanitary Law, or, if our Jeffersonian prejudices and State Rights theories will not permit us to have a
Federal Law, we should at least join the movement to frame laws, which, in essentials, will be uniform in every state in the Union. From a railroad standpoint today, no railroad officer, unless he consults the legal authorities, is certain as to whether he can accept a shipment of live stock from one state to another. The laws of our states are so divergent, and at times appear almost contradictory, that some are of the conviction that we have too many lawyers, who, for the protection of the legal profession, are, as national or state legislators, enacting laws which assure the attorneys a livelihood.

Our laws should be simple and comprehensive, laws which the ordinary mind can understand and which will be so uniform throughout the Union that the transportation companies will know that, when they accept a shipment from any state in the Union, or even from point to point within a state, and the shipper has a certificate from a member of your organization showing his live stock is in a transportable condition and fulfills the conditions of the sanitary regulations, the shipment will go forward.

In a country composed of all nationalities, with people of strong and weak heritages, we need laws that are uniform and simple, in order to have confidence and avoid panics and incriminations. Many of our state statutes seem to imply a lack of confidence either in equity or human desire to do the right thing, and in the multiplication of these statutes you are adding a greater burden upon the railroad agent. The public wants him to answer all telephone calls regarding train service or even of the weather; his duties require him to sell tickets, make out bills of lading, assist in the loading of cars, light the fires, keep the wicks of the station lamps trimmed. He becomes the janitor, the bureau of information, always on the alert for the execution of orders; and with these duties you unconsciously have added to the other obligation, by the increased number of state statutes, to establish in his office a law library, so that when a shipment of live stock is offered to him for his road, from his station to a distant point, he can refer to this library, amidst his many other duties, and see whether the railroad can receive this shipment and forward the same.

We speak very glibly of the conservation of natural resources, and the preservation of forests, when what is needed more than anything else is a conservation of common sense. This will solve all the other conservations that have been presented to us within the last few years. With this exercise of common sense, we, the people, will be able to enact such laws as will be simple, wisely considered, comprehensive and just, and with a penalty that will assure their honest execution and enforcement by all parties. With such penalty a uniform law, obligatory upon all parties, will not be easily violated. It will give your bureaus more authority and
avoid the present necessity of both parties to the controversy to employ expert legal help to try to determine just what the legislators thought they meant when they framed the law. Such a law will do away with much of the misunderstandings, reduce the number of complaints, and hence, the number of claims upon the transportation companies, as well as state authorities, because the purpose of the sanitary laws is more vital to the interests of the public than to the railroads.

Ralph Waldo Emerson said that a benefactor is a man who can make two blades of grass grow where but one grew before. In recent years we have had an increasing number of organizations. The purpose of some is for business development and others for mutual protection of the exchange of ideas. At a recent dinner given in New York City one of the speakers defined a twentieth century benefactor as a man who in these days of multiplied organizations can make one society grow where two struggled before. Our government has caught this spirit of increasing the number of its bureaus until some of our magazines are viewing with alarm a bureaucratic government, and are lamenting that a republic, through its bureaus, is becoming more autocratic than a monarchy. Our complex life, due to our advanced civilization, the two seeming almost paradoxical, may demand more bureaus. At times it seems, however, that we are more prone to create a new bureau than foster an old, or to give those bureaus now in existence greater authority and activity.

Our industrial corporations, when they find a new department is necessary, will establish such a department only after due consideration, and if the department is established, it will receive an appropriation necessary to man it with the best officers, its functions clearly defined, and it will be made an efficient factor in the development of the business of the corporation. In too many of our states, and even in our nation, we are apt to suggest the establishment of a bureau, and feel satisfied in establishing the bureau without creating the necessary appropriation for its maintenance or operation, or finding the right man for its head. Public service positions are not attractive, as a rule, to highly trained, experienced men, either because the bureau is limited in its scope, or the salary paid is not fair compensation for the services rendered. It is to be deplored that so many of the heads of our various bureaus, whom the nation or the state has trained to that point of efficiency where they can be of most service, should, because of the financial necessities, be induced to resign their positions and enter service with private corporations. In the conduct of the affairs of the nation, state or municipality, where the lives of so many are influenced, and the financial problem is so great, the compensation paid to the head of our official bureaus should be adequate, so that there can be no inducement offered to the head of that department, or even the members of the
department, to leave the public service, save when it is a matter of health or the service to be rendered by a private corporation for the public is greater than that given by a state or national bureau. Let us have fewer bureaus, and those which we do have so well maintained by the public as to make them of greater service.

As applied to the sanitary bureaus of our nation and state, there are few departments which can become of more service to the nation than these. These bureaus should have a stability which is comparable only to the stability of the state itself, and the tenure of office should be conditioned, not upon possible greater financial inducements, or political preferment, but upon the service rendered in conformity with the requirements of the office. The civil service tenure of office is not altogether satisfactory, because of the difficulty of discharging an inefficient employee. Inefficiency should be easily handled; the bureau made more important than any individual connected therewith. By so doing we shall have in office men who will be familiar with their work, whose experience will be the experience of the department, and a scientist or expert whose long tenure of office will give him that respect which is his due.

Stability makes for efficiency. The railroad companies desire to cooperate with your bureaus to the end of having a thorough investigation of all the live stock districts of the United States made; to have your inspectors men of such high standing that when reports of districts are made the railroads can be assured that when they accept shipments from districts reported "not infected," those shipments can be moved to the points of destination without delay. Because of the time element in transportation, reliability in reports is essential, and your bureaus should have such assistance that a thorough investigation can be made. The Pure Food Laws, as applied to meats, should begin on the ranches and farms, rather than at the packing houses or grocery stores. Investigation as suggested is a protection not only to the railroads, but to all the people and to the government, and lessens the number of inspectors now at our packing plants and protects the people of the small communities who rely for their meat products on the local slaughtering houses.

In railroads we have bureaus known as "classification committees," one of whose duties is to make suggestions as to the kind of packages necessary for the shipments of various commodities. Shoes, dry goods and groceries must be packed according to the rulings of the committee, or else the railroads can refuse to accept the shipment. You gentlemen can cooperate with the railroads in devising plans whereby live stock is put into a transportable condition. This doesn't mean that each head of live stock must be crated or that the railroad companies desire to be relieved from
furnishing suitable equipment for live stock transportation, or that the shipper should go to a great expense in the preparation of his live stock for shipment, save that every shipper of live stock should furnish a certificate issued by the bureau of his state, to the effect that the live stock for shipment is free of disease and is in a transportable condition. The issuing of such a certificate by the various state bureaus involves the appointment of assistants, for whom you, as heads of the bureau, can vouch, and establishes a greater confidence between the bureaus of the several states and the government, since that certificate should be acceptable by the various states and the government as is the gold coin of the realm. Should there be fraud or connivance in the issuing of the certificates, not only should the individual member of your bureau be personally responsible, but there should be an odium upon the bureau of the state with which such inspector is connected.

A uniform sanitary law and a uniform certificate of good health, as above suggested, would be of great assistance, not only to the railroad and the public, but to the shipper. We could cite you many cases where shippers taking advantage of the present method have knowingly and viciously shipped cattle not in a transportable condition, hoping either that the cattle would pass to the purchasers, or if damages were to be collected, to compel the railroad companies to pay the claims. In one of our western states a shipper sent a carload of live stock from one point in that state to another, and upon arriving at point of destination and being unloaded, the inspector said: "These sheep are scabby." The shipper replied: "I am aware of that fact." When asked when he first knew that they were diseased, he replied: "When I made the shipment. There is no one there to prevent my shipping the sheep. Thinking the railroad company was more able to stand the loss than I, I loaded and shipped them." The result of this act on the part of the shipper was that the railroad company was compelled to fumigate the car, all the runways, the pens, and dipping not only his sheep, but all the sheep with which his sheep had come in contact, and for this expense had no recourse at law to compel this shipper to pay this expense to which the transportation company was put to, because of his willful act.

The certificate of your bureau, stating that the live stock is in a transportable condition, should be both for inter-state and intra-state shipment and should place upon the shipper a penalty as is now the case with shippers to foreign ports, to the end that if it can be proven that either this shipper or your inspector fraudulently issues or obtains a certificate of good health, that either or both shall be compelled to pay for all expenses to which the railroad company or stockyards companies may be put to in fumigation, and so on, with added penalties such as other laws of our states and govern-
ment inflict. Such certificates of live stock being in transportable condition will also do away with that lamentable condition of so-called veterinarians grafting on the emigrants and compelling them to pay, not for services rendered, but because of their ignorance of their present conditions, large sums of money for having their live stock, which is part of their emigrant goods, passed from one state to the other. It has been stated here that such men, a disgrace to their profession, meet these ignorant emigrants and compel them to pay large sums varying from $10 to $50 to pass live stock which should be passed without the payment of any sum. These certificates for transportation of live stock will do much toward elevating the standards of your profession and create a confidence between your various bureaus, and give us that protection which we rightly demand.

The railroad companies, as far as I have authority, are perfectly willing to co-operate with you gentlemen in the cleaning and fumigation of cars as soon as you are able to present to our transportation companies a system of fumigation which is effective and inexpensive, and when used by the railroad companies will receive your approval.

Railroad companies must clean their cars, not only as a protection to themselves, but to other shippers, since it is not of advantage to move cars heavily loaded with refuse matter.

The railroad companies are also willing to co-operate with you on the question of service, reminding you, however, as I said before, that the best service cannot be obtained by lowering freight rates, or by capitalizing those freight rates to the advantage of the shipper and the disadvantage of the public. The railroads of Illinois recently were granted by the State Commission an increase of 7 cents per ton on coal hauled within the state. The public press immediately announced that the coal dealers, because of this 7 cent per ton increase of freight rates, would raise the price of coal 25 cents per ton; in other words, capitalizing the freight rate of 7 cents per ton increase; they are reported to have compelled that 7 cents to earn 18 cents, or a 250 per cent dividend on an increase freight rate, and then endeavored to persuade the public that the railroads, because of the increased freight rates, have increased the price of the necessary commodities. Let us at least be fair. If a freight rate is reduced, there should be a corresponding reduction of price in the commodities affected by that freight rate. Or if the freight rate is increased, the price of those commodities should not be increased more than the increased freight rate; or if the price of commodities increase, let us put the burden of the increase, not upon the railroads, but where it really belongs. You shippers of live stock are asking better equipment, larger rails, insurance, quicker service, urging the necessity of reaching various packing centers at certain hours, and some-
times some of you ask all of this on a less remunerative basis. As some of you gentlemen have said, it is not a lower freight rate that you should ask, but a service commensurate with the freight rates paid. Under these conditions, with a freight rate meeting all the demands made by you, the railroads will be able to give you the service and equipment necessary.

In closing let me repeat, the railroad companies would be pleased to co-operate with you in establishing either a Federal or uniform state sanitary laws, and ask that when we establish bureaus, that such bureaus shall be well manned for efficiency and by men who are paid salaries equal to those paid by private corporations, and that such bureaus shall make a thorough investigation of all live stock districts infected; assist in recommending to our state legislature and Inter-state Commerce Commission a law which shall compel the shipper of live stock to obtain from the state or government bureaus a certificate, stating that when live stock is offered to the railroad companies the same is in a transportable condition; that the railroad companies will be pleased to co-operate with you in fumigating and in the cleaning of cars when your agent shall have presented to the companies methods that are effective and inexpensive, and that when you, by demonstration, not as a theory, can recommend means and methods for accomplishing these, that the railroads, who are amongst the largest tax payers of this nation and the various states, will assist in protecting the health of the public, aid in the prosperity of the people, and in the co-operation with you we believe that it will create better service, higher efficiency and a better satisfaction. The officers of the railroad companies are always pleased to meet any committee that you may appoint to confer with them and discuss in a frank way with you any subject important enough to discuss, and by conference establish closer relationship between shippers and the railroads.

EQUINE ANEMIA INVESTIGATIONS IN NEVADA.
A CLINICAL STUDY
BY WINFRED B. MACK, D. V. M.
University of Nevada.


Something over three years ago we had our first experience with the disease which we have designated Equine Anemia. Called to certain valleys in the eastern portion of Nevada by the most alarming reports of an exceedingly fatal disease among horses, we were confronted with this malady, of which we had no knowledge. Since that time the disease has been the subject of an extended investigation. Our study has shown fairly
well the clinical nature of the disease together with the character of the tissue changes but it has thus far failed to reveal the essential cause, the means by which to prevent or control it or to develop a successful line of treatment. At the request of your Secretary we have consented to briefly review our work for the members of this association. We can add but little that is new. Our later experience serves to confirm the statements we have already published. This subject has become too broad to cover fully in a short paper, hence we will discuss chiefly our clinical observations, touching briefly on our experimental work but making no reference to the pathology of the disease which has been quite fully discussed elsewhere."

The disease occurs in an altitude of from 5,600 to 7,000 feet, in valleys close alongside and to the west of the Ruby Range of mountains. Practically all of the animals concerned in this investigation were born and reared in these valleys. A portion of them had spent their entire lives in the valleys, others had ranged in the mountains up to 10,000 or 11,000 feet. The climate is extremely dry, irrigation being essential for all crop-growing. An extensive outbreak occurred in mid-summer, 1906, another in 1907. The first cases of which we have definite knowledge appeared in June; by September the outbreak had subsided. Again in the summer of 1907 scores of animals were lost; that year it was December before it abated. Since 1907 there have been no extensive outbreaks but a few cases have occurred each year, about as many of them during the winter seasons as in summer. So far as we have definite knowledge the malady exists only in the locality mentioned. There have been reports of the death of horses in other portions of the state which indicate the possibility of a wider distribution but no means for confirming that suspicion have been presented.

The symptoms are variable. The variations depend on the type of the disease encountered, acute, subacute or chronic, and on the individual variations that occur in cases of the same type.

In the beginning of an acute attack one might mistake it for a severe case of influenza or it might suggest petechial fever except for the absence of the characteristic swellings found in that condition.

Equine Anemia. Bulletin No. 68, Nevada Agricultural Experiment Station, 1909.
Equine Anemia. Bulletin No. 72, Annual Report Nevada Agricultural Experiment Station, 1909, p. 46.
The essential change is a progressive, extensive and often a rapid destruction of the red blood corpuscles. The cause of this destruction still awaits demonstration. Other tissue changes and their attendant symptoms appear to be secondary to this anemia. In the most acute cases, which prove fatal in a few days, a count of the blood corpuscles may show 4,000,000 to 6,000,000 erythrocytes per cmm. This fails to impress one as constituting a profound anemia. That the red corpuscles are, nevertheless, undergoing rapid destruction is evidenced by marked discoloration of the visible mucosae and by extensive deposits of blood pigment in the tissues of certain organs which are revealed when sections of those organs are studied microscopically. In less acute cases anemia may become extreme. Blood counts showing 3,000,000 to 4,000,000 red cells per cmm. are here the rule; 2,000,000 is not at all an exceptional count while as low as 1,000,000 is sometimes encountered. Usually there is no leucocytosis; complications may arise to produce it, but as a rule, we do not find it. In some cases, on the other hand, there is decided leucopenia. There is frequently a marked relative increase of polynuclear cells. We consider this lymphocytosis, when found in connection with other symptoms, of considerable diagnostic value. The visible mucosae are, in acute cases, markedly discolored, showing a deep, yellowish red, with the conjunctival veins engorged. In less acute cases they become pale. Usually the pallid mucosae are deeply stained with yellow. If the destruction of red corpuscles is sufficiently slow to enable the disposal, by the body, of the liberated pigment, this icteric appearance may not be presented.

The temperature is extremely variable. In a very acute attack hyperthermia may be fairly constant, ranging from 104 degrees to 107 degrees F. In less acute cases the fever is irregularly remittent. It may go as high as in the acute cases, hold for varying periods, then decrease. It seldom reaches the normal. The remissions may be of a few hours duration or of days or even weeks. Changes of temperature of four or five degrees in either direction may occur within a few hours. In chronic cases the increase in temperature is less, although nearly always somewhat above the normal. There are periods, however, when these cases show considerable rise, accompanied by other symptoms more or less acute.

The heart action is profoundly disturbed and never fails to show more or less deviation from the normal. This constitutes always one of the prominent features of the malady. The heart beats are increased in force and frequency. Not only may they be distinctly felt with the hand held against the cardiac region but in a number of cases they were plainly visible twenty or thirty feet from the patient. The pulse rate runs from about forty to fifty-six in chronic cases, about fifty-six to eighty-eight in the more acute ones. We have observed pulse rates of 103, 125 and 140 in
desperately sick animals shortly before death. The arterial pulse is soft and compressible, even when the heart is beating violently. Venous regurgitation is plainly visible in the jugulars in nearly every case.

Respiratory disturbances are much in evidence. This is manifest in all stages and types of the disease. In chronic cases and during remissions in the less acute ones, we find the respirations somewhat more frequent than normal and more or less labored. In the more acute cases and during the febrile periods that occur in remittent cases, this condition is more marked, apparently corresponding to the temperature and cardiac disturbances. Respirations of from 12 to 16 per minute, up even to 23 or 26 are the rule. As high as 36 to 44 are sometimes noted. In spite of these respiratory symptoms we are unable to detect, by clinical means, such changes in the lungs as one would be led to expect, nor do autopsies reveal pulmonary lesions sufficient to account for them. We must, therefore, look elsewhere than to changes in the pulmonary tissues for an explanation of these phenomena.

Affected animals lose strength rapidly. Nervous and muscular energy are very greatly reduced, patients becoming very weak. They develop a peculiar gait, staggering and dragging their legs along the ground. In this condition even slight exertion serves to quickly exhaust the patient and to accentuate the cardiac and respiratory troubles. In chronic cases of moderate severity light exercise brings these symptoms into prominence and is useful in the diagnosis of doubtful cases.

The duration varies from a few days in acute cases to several weeks, even months sometimes, in subacute ones. In chronic cases the variation is even greater, extreme instances extending over periods of eighteen months or longer being sometimes met with.

The mortality is high. Practically every animal in which the diagnosis was established has died. A few apparently recovered to relapse and die several months afterward.

An attack may appear suddenly or it may have a most insidious onset. Animals supposedly in good health may be found with symptoms already well developed, perhaps within from 12 to 24 hours after being handled or worked. There are reports of finding horses in the field dead from this disease within from 2 to 12 hours after being taken out of harness in apparent good health, but these reports lack scientific confirmation. On the other hand, an animal may gradually lose condition, attracting no attention until, when carefully examined, the disease is found to have already made
considerable progress. Or it may happen that an animal becomes suddenly exhausted while at his accustomed work without having shown any premonitory symptoms.

Affected animals exhibit marked dejection during febrile periods and in advanced chronic cases. The nervous functions are interfered with. Patients become dull and stupid. Sensation is lowered and there is coordination of movements. During remissions the patient becomes brighter.

All patients lose flesh rapidly except, perhaps, in the early stages of mild chronic cases. Even in acute cases of but a few days duration the emaciation becomes notable; in the less acute and advanced chronic cases it is most remarkable. The hair loses its luster, the skin its flexibility. We frequently see fat, sleek, healthy animals reduced by a few weeks illness to thin, hide-bound, dejected specimens. The appetite remains keen, patients eating with apparent relish, even ravenously, except when the temperature is highest. Even then there is a greater desire for food than is usual in diseases accompanied by high fever. However, the consumption of large quantities of food does not check emaciation. Edema of the dependent portions of the body is quite constant, especially in the less acute and chronic cases. The legs seldom swell. The superficial lymphatic glands frequently show enlargement.

In the last stages of the disease capillary hemorrhages frequently appear. Bloody serous fluid drops from the nostrils and the feces may be blood-stained. Occasionally petechiae are seen in the mucosae of the mouth, nares and vulva. We have not seen them in the conjunctiva. Aside from those above noted we have seen no nasal discharges.

As above stated the disease may run a remittent course. The remissions are irregular in both occurrence and duration, treatment apparently having little or no influence. During remissions the patient brightens perceptibly, the inexperienced observer often being led to consider him convalescent. He may take on flesh for a time and the numbers of red blood corpuscles and the hemoglobin content of the blood may rise. Invariably such cases have relapsed. The relapse may occur in a day or two or after several months.

Many of the symptoms observed are difficult to understand in the light of our present knowledge. Assuming that the disease is a specific infection, as seems probable, certain symptoms are explainable. It is possible that the presence in the body of the products of the extensive destruction of red blood corpuscles may explain some of them. Doubtless others are referable to an insufficient supply of oxygen. With the red blood corpuscles so greatly reduced in numbers and the hemoglobin content
of the blood correspondingly lowered, the oxygen carrying capacity of the 
blood is very materially reduced, so that all of the tissues suffer for want 
of oxygen. Anemia and the resulting insufficient supply of oxygen probably 
accounts for the excessive fatigue that follows even moderate exertion and 
is doubtless also the cause of the respiratory and cardiac disturbances. The 
staggering gait, dragging of the hind feet, muscular weakness and lack of 
control do not appear to be alone the result of emaciation but rather 
due to a want of nervous tone. This and other nervous derangements 
doubtless depend on the deficiency in the oxygen supply, possibly also on 
the presence in the body of the products of blood destruction. When the 
etiology of the disease shall be clearly established many of these questions 
will be answered. Until then it is useless to speculate on the action of 
possible toxins and other similar matters.

Treatment has not been successful in our hands. Arsenic, with nux 
vomica, digitalis, gentian and iron sulphate, and in Fowler’s solution has 
appeared to afford some temporary relief but practically all cases thus 
treated have relapsed and died. Various sera and antitoxins have been 
tried, of course in a purely empirical way. Influenza antitoxin will 
usually cause the acute symptoms to abate and the patient to brighten 
hopefully, but we have seen no instance where permanent benefit has resulted 
from its use.

There is no evidence that this disease is contagious, in the sense in 
which that term is usually employed. While there is every clinical 
indication that it is a specific infectious disease we must have more con-
clusive evidence than our experiments have yet afforded before we are 
warranted in pronouncing it such. Its character leads one to suspect protozoan infection rather than bacterial.

We have searched very carefully for a parasitic micro-organism, using 
microscopic, cultural and inoculation methods, but thus far have failed to 
demonstrate such an organism. Our examinations have been made in the 
initial, the intermediate, the terminal stages of the malady and post-
mortem. We have studied peripheral and central blood, exudates and 
the solid tissues. Some examinations have been made during periods of 
high fever, others as a febrile attack was coming on, some while the tempe-
ration was on the decline, still others between attacks, but nothing definite 
has resulted. Some of our inoculation experiments, in which we have 
attempted to produce the disease experimentally by inoculation in horses, 
have given apparently positive results, but in others the results have been 
apparently negative. We have injected blood and blood serum sub-
cutaneously and intravenously and have given, per orum, blood and serous 
fluid obtained post-mortem. The results of these experiments do not yet
warrant the conclusion that the disease is infectious. Neither do they prove that it is not infectious. The only verdict we can render from the evidence yet in hand is the one “not proven.” These experiments will be continued until definite deductions can be made from the results. There is a possibility that the horses with which we have worked suffer more or less from chronic infection, that many of them are immune to the disease. It is possible that we are dealing with a condition similar to that in southern cattle in regard to Texas fever. We are endeavoring to secure horses from outside the district in question in order to eliminate that possibility.

In many respects this disease closely resembles the infectious anemia of the continent of Europe and the so-called swamp fever or infectious anemia that is widely distributed in the southern and western portions of the United States and western Canada. They may be identical but we have thus far failed, in certain important respects, to establish such identity. Particularly is this true of our inoculation experiments, which have failed to yield the prompt, positive results reported by several investigators of those maladies. At the present time we will venture no opinion as to the identity or non-identity of the Nevada disease with those affections.

THE PRESIDENT—The next paper is that of Dr. A. T. Kinsley, of Missouri, on “Infectious Equine Anemia.”

INFECTION EQUINE ANEMIA.

BY A. T. KINSLEY, M. Sc., D. V. S.
Pathologist, Kansas City Veterinary College.

Equine Infectious Anemia, also known as Pernicious Anemia, Swamp Fever, Equine Malaria, or Spanish Fever, prevails in various states of the United States, in some of the provinces of Canada and in some European countries.

Some literature is now available on the subject of Equine Infectious Anemia. The first accurate description of the disease appeared in 1904. Several subsequent reports from various locations contain additional information of the disease.

In 1902 this disease prevailed in northeastern Indian Territory (Oklahoma) and at that time several blood smears were examined but nothing definite was determined.

Equine Infectious Anemia is characterized by extensive blood changes, by variations of the severity of the attack, by irregularity of course, and is accompanied by symptoms of general anemia.
The causative factor has not been identified but is known to be a filterable virus which is probably primarily located in the blood of the affected animals. The infection appears to remain on farms for a considerable length of time and is probably capable of existing for some time outside of the animal body. Thus one farm near Coffeyville, Kan., has been affected for about fifteen years, the owner having lost horses or mules nearly every year during that time. Another farmer in Montgomery County, Kan., lost all of his horses with Equine Infectious Anemia during the winter of 1907-8, and during the summer of 1908 a pony was kept in the barn for about four weeks and it became affected and died.

The infection is not readily transferred from farm to farm, for several premises that were free from the disease were inspected in Oklahoma and Kansas that were within sixty to one hundred rods of barns in which the disease had prevailed periodically or continually for several years, however, the disease is slowly becoming more general, i.e., a greater territory is infected. During the past eight years the disease has extended nearly 200 miles north and east into Kansas and Missouri, from the location in which it was first identified in Oklahoma.

Many theories have been advanced as to the source of the virus and the manner of infection, but nothing has been positively determined to date. The disease is transmissible from affected animals to healthy susceptible animals by blood inoculation, however, it appears that blood-sucking parasites have no relation to the transmission of the disease as single cases have been observed in barns where flies and mosquitoes swarmed indiscriminately from the diseased to the healthy horses. The disease has been observed affecting one of a team of horses that were watered from the same trough or pail and fed in a common manger and feed box. Colts may become affected while sucking a healthy, unaffected mare; in other instances, colts may suckle an affected mare with impunity.

Horses and mules are about equally susceptible, the disease probably being more prevalent in horses. The disease has no regard for age, or breed, neither does the kind of food vary the susceptibility. Dr. Robinson of Independence, Kan., is of the opinion that the infection is obtained in water, but this cannot be verified in other locations. The disease is equally prevalent in the river bottoms and on the hills, but it is more prevalent in July, August and September, than during the remainder of the year. There is no doubt but what the disease is more prevalent in wet seasons, in fact in southeastern Kansas, the disease has not been very prevalent during the last two seasons and both years have been exceptionally dry, particularly during the summer months.
The disease may appear suddenly or it may have an insidious onset. In those cases in which the disease appears suddenly the affected animal has a very dejected appearance. The temperature varies from 104 degrees to 107 degrees F., and if the animals are not treated the high temperature continues for from three to eight days with slight variations. Respiration is usually accelerated, the increased rate being in proportion to the temperature. The cardiovascular variations are the most constant and characteristic symptoms; the first impression of the pulse, in practically every case, is that it is wiry, though on closer examination it is found to be full, but it is compressible and feels streamy, i.e., the principal pulse wave is followed by a secondary flow of smaller volume—an anaemic pulse. The pulse-rate varies from 60 to 90, depending upon the severity of the attack. There is an indistinct cardiac murmur typical of anaemia, and a jugular pulse which becomes more and more marked as the disease advances. The animals are quite weak, in some instances they stagger when walking. The visible mucous membranes, which are at first blanched, later assume a dirty-yellow color. Petechial hemorrhages, varying in size from a mere point to irregular areas the diameter of a leadpencil, are present in the ocular mucous membrane. All sphincter muscles are relaxed. The anus is frequently so flaccid that it is necessary to insert a thermometer far into the rectum to obtain the body temperature. There may be frequent urination, and in the later stages of the disease there may be constant dribbling of urine, because of the relaxation of the cystic sphincter. The animals become extremely emaciated and there may be edema of the dependent parts. In the later stages the animals always become very weak although they may eat ravenously until they die. In some instances the animal appears to suffer considerably in the beginning. The affected animal appears restless, rolling and groaning and while standing, constantly shifting from one foot to the other, this latter being especially marked in the posterior limbs. An occasional case is observed in which there is epistaxis.

The premonitory symptoms of those cases having an insidious onset consist of a general dejected appearance and the affected animals fatigue easily. After the onset the symptoms are the same as described above except they are less intense.

The chronic type is usually secondary to an acute attack, the chronic form being continuous or periodic and this type is probably more frequent in those cases in which the disease had an insidious onset. When the attack is continuous the general indications of the disease are emaciation, weakness, edema of dependent parts, and a worn-out appearance. The animals affected with the chronic type always eat heartily. The mucous membranes are dirty white or pale-yellow in color, and there may be a rise
of from one to three degrees in temperature. The respiration is accelerated and the pulse is of the characteristic anaemic type. There is always a marked jugular pulse and a typical heart murmur. The sub-maxillary lymph-nodes are usually enlarged. The symptoms are practically the same during the attacks of the periodic type as described in the acute cases. During the intermission, in the periodic type, the animals are dull and fatigue easily, although their appetite is good and they apparently digest all of the food they consume. There is usually more or less weakness in the posterior limbs, which in some instances become so marked that the animals fall when turned quickly.

There are usually some cutaneous wounds found on post-mortem examination, caused by the animals falling against fences or mangers, or even to the ground. The blood is thin, pale and water like, and separates as it coagulates. The various lymph nodes are enlarged, oedematous, hyperaemic, hemorrhagic or necrotic, the mesenteric group being the most extensively involved. There is a subcutaneous oedema of the dependent parts in the chronic cases, but oedema is usually absent in the acute type of the disease. The peritoneal, pleural, and pericardial cavities usually contain a considerable quantity of a thin limpid fluid. The serous membranes are pale, flakes of coagulated lymph are deposited upon them, particularly of the small intestine, and petechial hemorrhages are usually noted in the sub-serous structures. The visceral organs are anemic; the digestive tract always contains a considerable amount of food-stuff, especially in the chronic cases. The liver, though usually normal in size, is icteric, the intensity depending upon the chronicity of the case. The spleen is about normal in size in the acute cases, though it is darker in color and softer in consistency; in chronic cases it is enlarged and more or less indurated. The kidneys are anaemic and friable, and it is not uncommon to find infarcts in their cortex. The bladder is usually empty because of the relaxed sphincter vesicae. The lungs are usually oedematous and contain many petechial hemorrhages in the sub-pleura. The heart is pale, friable, and contains sub-pericardial and sub-endocardial hemorrhages; it is always enlarged in chronic cases and may contain infarcts. The cerebral and spinal meninges are usually anemic though their veins may be gorged with blood. The brain and spinal cord are anemic, soft, and usually contain petechial hemorrhages beneath the pia mater. The red bone marrow is dark in color, the yellow marrow is gelatinous in consistency.

The most characteristic microscopic lesions are found in the blood. The hemaglobin content (which according to the Tallquist scale ranges from ninety to one hundred per cent in normal equines), varies from ten per cent to eighty-five per cent in the affected animals. The red blood-corpuscles varies from 1,006,400 per c.mm to 6,800,000 per c.mm. There
is anisocytosis, poikilocytosis and occasionally a nucleated cell (erythroblast) is observed. The changes occurring in the white blood-corpuscles are somewhat variable. The one principal change is the increased proportion of poly-morphs. The muscular and glandular tissues are affected with parenchymatous degeneration. Pigmentation with haemoglobin and its derivation is prevalent in practically all tissues, especially the liver, spleen and heart, and if the case is of long standing the tissue in which petechial hemorrhages occur is also intensely pigmented. The liver cells are extensively disintegrated. The central portion of the liver lobules are infiltrated with leucocytes, and the liver cells and intercellular spaces contain pigmentary deposits in those cases that have died of the acute type of the disease. In the chronic type the principal hepatic lesion consists of fibrous hyperplasia and pigmentation. The spleen contains an excess of blood in the early stages and the splenic corpuscles are practically obliterated; cell fragments and detritus are found mingled with the splenic pulp in the later stages of the acute type, but when the disease has become chronic there is a limited sclerosis throughout the entire splenic tissue.

The principal diagnostic symptoms of acute infectious anemia are high temperature, accelerated respiration, anaemic pulse, anaemic cardiac murmur, jugular pulse, petechial or muddy appearance of the conjunctiva, relaxation of the sphincter muscles, enlargement of the sub-maxillary lymph-nodes and general depression. The location and history must also be given due credit. The haemoglobin test is of considerable value; a complete blood examination gives positive evidence of anaemia. The blood inoculation is the only positive method of diagnosis of this disease, although due consideration of the history and symptoms usually gives sufficient evidence for diagnosis.

The principal diagnostic symptoms of the chronic type are emaciation; circulatory disturbances of the same character but more intense than in the acute type, muddy appearance of all visible mucous membranes, relaxed sphincter muscles; general weakness, especially marked in posterior limbs. The haemoglobin will be found to vary from ten to seventy per cent. The red blood-corpuscles may be diminished to 1,000,000 per cm³. There will be poikilocytosis and aniscytosis and there may be an occasional nucleated red blood-cell. The percentage of poly-morph leucocytes is increased.

The prognosis should be guarded. Most practitioners report about fifty per cent mortality. Because of the high per cent of mortality and the fact that the disease is continually invading new territory and becoming more general throughout the American continent, the states, provinces and federal governments should instigate some system of control and the investi-
gations now under way should be rigidly continued until sufficient definite knowledge is obtained of this disease to insure positive control and the ultimate eradication of it from the continent.

**DR. KINSLEY**—I presume I should have asked an apology for presenting, I think, the only paper at this Association in reference to disease in horses. It seems that the bulk of the discussion has been in the meat producing animals and the milk producing. My only reason for presenting this was because of my anxiety concerning the disease in my community. I feel safe in stating that we have had at least 100 square miles of newly infected territory in the past two years, and I believe that a more conservative estimate would be 200 square miles. Now perhaps this is not significant, but where we find a practitioner in a small community that has from twenty to forty cases of pernicious anemia at one time, and that the disease is gradually extending, it seems to me that at one time were doing something to prevent further spread and further, this disease is now in its earlier stages in this country. If we let it go as has tuberculosis run at large we will have a similar problem to deal with or perhaps even worse.

I thank you.

**THE PRESIDENT**—The discussion is now open on this paper.

**DR. FLOCKEN**—I would like to ask Dr. Kinsley if he has seen any recovered cases of the fever?

**DR. KINSLEY**—I have seen cases that have passed through the fever and apparently recovered, yes, sir, and from which blood was obtained and inoculated in a healthy horse without producing any results.

**DR. FLOCKEN**—Have you ever inoculated a recovered case to test its immunity?

**DR. KINSLEY**—Do you mean if we have inoculated a case that has passed through the disease to see whether it was immune?

**DR. FLOCKEN**—Yes.

**DR. KINSLEY**—I have. I produced the disease in one out of three. Understand, the experiments I have conducted have all been paid for out of my own pocket, so they have not been as extensive as they should have been.

**DR. MOHLER**—Mr. President: Dr. Kinsley has well said that this disease is of great economic importance and it is constantly spreading in the United States. Only recently, within the last ten days, we have been
testing the blood of some horses in the southern part of Virginia, and it has been shown that this infectious anemia is present in that locality as another new center of infection. For the past four years the Bureau of Animal Industry has been conducting a series of experiments relative to the nature and cause of the disease and methods for combating it. We are now working along three independent lines. The first is regarding the transmission of the disease. As Dr. Kingsley has said, swamp fever is an infectious disease. It is not contagious. We have had infected horses standing alongside of normal horses for weeks and months, and in no single instance has the disease spread from the affected animals to the exposed healthy horses. In order to get some light on the method of transmission of this disease we have been studying the possibility of various insects—especially flies and mosquitoes—playing the role of intermediate hosts for the virus. At the present time we have not come to any definite conclusion with reference to this method of transmitting the disease. Another line of investigation that we are conducting is with reference to the treatment of the disease. The few results that we have obtained in the treatment of this infection by the intravenous injection of trypanblau seem to indicate that it has a certain beneficial action upon the course of the disease. There is a third series of investigations which we are conducting in addition to these two that I have enumerated, and that is with reference to methods of vaccination against the disease. Merely to cite one instance of the elusiveness of the disease and the difficulty of proving the presence or absence of the infectious principle which causes swamp fever, I might say that in September, 1908, we had a horse which was suspected of having recovered from infectious anemia. The animal reacted shortly before that time, but until the following June, 1909, there was absolutely no indication of the horse having any infection whatsoever. At that time another febrile reaction was noted, and the examination of the blood and of the blood cells indicated very strongly that the animal was infected. From that time until last May, 1910, the animal might be in a condition for the use of its serum in treating and immunizing other exposed horses. In order to be certain that this blood was not virulent, I inoculated a healthy donkey in the fore part of May with the blood of this supposedly recovered horse, but much to our chagrin the donkey came down with typical symptoms of infectious anemia within fourteen days, showing that the infectious principle was still present in the horse that had not reacted since June, 1909. It just happened that in a few days after this donkey gave a reaction, the original horse that had not reacted since June, 1909, gave a typical reaction the latter part of May, 1910. Therefore, in doing any work along the line of treatment it is absolutely essential that we check up the experiment by inoculating the blood of the suspected recovered case into a normal and healthy horse before we can definitely determine whether such a recovery has actually taken place or not. And there we come to another difficult
proposition; the expense connected with the experiments on swamp fever is excessive. As Dr. Kinsley has just stated, few individuals could afford to carry out the investigation along these lines. Very strangely, the disease is not transmissible to the usual experimental animals. We are now endeavoring to diagnose the disease by diversion of the complement tests, but at present, the only way of definitely ascertaining the absence or presence of the virus in the blood of the animal is by the inoculation of other equines. We have cut down the expense at the experiment station of the Bureau by using burros and donkeys which are quite susceptible. The period of incubation is irregular, the course chronic, and the symptoms and lesions somewhat obscure, which, together with the inceptibility of experiment animals, make it a very difficult disease to investigate, I can assure you.

DR. KINSLEY—I would just like to add a word if I may have permission. The question asked by the doctor in the rear of the room concerning the apparent cure or relief from the disease; with regard to which I would say, first, that I have been having shipments of blood obtained by a reputable veterinarian and I know all cases that he has obtained the blood from. I had the blood shipped in thermos bottles. I have been receiving the blood from twelve to eighteen hours after it left the horse, and the lowest temperature obtained by that blood in the thermos bottle was 97½ degrees Fahrenheit, and I think it is not sufficiently low to destroy the virus. I have tested four cases that were known to have the disease four years ago; each of the four was tested by a ten cc. of disfibrinated blood. Now understand, the horses I have used are those we buy for dissecting subjects at the college. They are not good subjects for experimental work, and I didn't mention it for that reason, but then it has been tested out on three horses that have been known to have recovered fully three years ago, and I have had only opportunity for watching them for thirty days, but in that length of time no symptoms appeared. Now I realize that is not sufficient evidence to draw any positive conclusions, although I think it is somewhat indicative of the fact that those animals have recovered because we can obtain fresh virus from an animal that is infected and produce the fever in this same class of horses usually within twenty days, not always, but usually in about seventy per cent of the cases.
REPORT OF COMMITTEE ON STATEMENT OF FUNDAMENTALS OF GOOD STATE LIVE STOCK SANITARY LEGISLATION.

1. Legal provisions should be made that the Executive Officer must be a Veterinarian.

2. The Executive Officer should be appointed by a small non-partisan Board.

3. Said Board should consist of Stockmen and Veterinarians.

4. Final authority for general policies and general methods should rest with the Board.

5. Election, term of service, and pay of Executive Officer and other appointees engaged in State Live Stock Sanitary Control work should be in the hands of the Board.

6. Board members should do no field work in person and should receive no pay other than actual expense incurred in attending necessary Board meetings.

7. The Board should be invested with authority to suitably dispose of animals affected or exposed to communicable disease.

8. The Board should be authorized to issue necessary operative quarantine regulations.

9. The Executive Officer and Deputies should be invested with necessary power so that they may enter premises, inspect, quarantine, and enforce disinfection.

10. The law should prescribe penalties for violation of law or regulation.

11. The law should provide that anybody who knows of or suspects the existence of any communicable disease, must report to the State under penalty.

ADOPTED.
Chicago, Ill., December 7th, 1910.

THE UNITED STATES LIVE STOCK SANITARY ASSOCIATION.

Your Committee on Tick Eradication recommends the following territory situated within the quarantine area, be released from quarantine.

MISSISSIPPI—Release from quarantine, Marshall County north and west of the Illinois Central Railroad. Benton County north of Tippah Creek.

TENNESSEE—Release from quarantine the balance of Madison County, Overton County, balance of Fentress County, balance of Lincoln County, and that portion of Polk County north of Hiwassee River.

SOUTH CAROLINA—Release from quarantine Union and Laurens Counties.

VIRGINIA—That Fluvanna County and Chesterfield County be released from provisional quarantine.

NORTH CAROLINA—Release the following counties: Stanley, Randolph, Wape, Chatan, Montgomery, and Franklin.

TEXAS—Release the following area from quarantine: Cottle County and those parts of Hardeman County north of the Fort Worth and Denver City Ry., Mitchell and Howard Counties, north of the T. P. Ry.

OKLAHOMA—That the following area be released from quarantine: That part of Jackson County now in the blue, that portion of Kiowa County lying north of the line between townships four and five north, and that part of township four, north, ranges nineteen and twenty west, that portion of Caddo County now in the blue, that portion of Cleveland County now in the blue, that portion of Pottawattamie County included in townships Ten and Eleven North Two East, that portion of Lincoln County now in the blue, and that portion of Pawnee County included in the following named townships: townships 21 and 22 North, Five East; 21 and 22 North, Four East; 22 North Three East, and those portions of 23 North Three East, 23 North Four East, 23 and 24 North Five East.

ALABAMA—No recommendation.

MISSOURI—No recommendation.

ARKANSAS—No recommendation.

LOUISIANA—No recommendation.

CALIFORNIA—No recommendation.

JAMES LEWIS, President.
CHARLES KEANE, Secretary.
G. T. BRYAN,
E. R. FORBES,
M. RAY POWERS,
W. P. ELLENBERGER,
Committee.

ADOPTED.
CHICAGO, Ill., December 7, 1910.

THE UNITED STATES LIVE STOCK SANITARY ASSOCIATION.

Your Committee on Tick Eradication recommends the following territory, situated within the quarantine area, be released from quarantine.

RESOLVED that there be no open season for the movements of southern cattle this year, and that no additional territory be added to the provisionally quarantined area.

JAMES LEWIS, President,
CHARLES KEANE, Secretary,
G. T. BRYAN,
E. R. FORBES,
M. RAY POWERS,
W. P. ELLENBERGER,
Committee.

ADOPTED.

RESOLUTION BY COMMITTEE ON UNIFORM HEALTH CERTIFICATE.

This Committee recommend to the United States Live Stock Sanitary Association that it request the Bureau of Animal Industry to formulate a uniform certificate for the interstate shipment of live stock destined to states requiring inspection, and in the case of cattle for milk production and breeding purposes destined to states requiring the tuberculin test, such certificate to be accompanied by a record of said test, issued by a qualified Veterinarian regularly registered with the Bureau of Animal Industry.

R. W. HICKMAN, Chairman,
S. H. WARD,
J. F. DEVINE,
CHARLES KEANE,
PETER F. BAHNSEN,
Committee.

ADOPTED.

RESOLVED that the Chairman of this Association appoint a Committee to revise the nomenclature of swine diseases and to formulate a definition of hog cholera.

E. M. NIGHBERT,
A. J. KINGSLEY,
S. H. WARD.

ADOPTED.

WHEREAS representatives from the Cattle Raisers Association and the Panhandle Live Stock Association of Texas have expressed to this Association the desire of the members of their respective bodies, to assist vigorously to uphold and conform to the Bureau of Animal Industry regulations covering splenetic fever;
BE IT RESOLVED that the attached memorandum be adopted by this Association.

E. M. NIGHBERT, Chairman,
S. H. WARD.

ADOPTED.

As representatives of the cattlemen of Texas, we, at the suggestion of some of your members from the states who are familiar with trade relations between their respective states and the open areas of Texas, wish to submit the following:

RESOLVED, That when the properly constituted authorities show to the agents of the Bureau of Animal Industry that they will by vigorous methods assist in the strict mainenance of the rules that should obtain to conform to the requirements of the Bureau of Animal Industry, we pledge our hearty support and co-operation.

E. B. SPILLER,
Sec'y and Gen'l Mgr. Cattle Raisers Ass'n of Texas,
Ft. Worth, Texas.

WM. PENN ANDERSON,
Pan Handle Live Stock Association,
Amarillo, Texas.

ADOPTED.

WHEREAS, The Almighty has in his wisdom called to the great beyond, our esteemed co-worker and member, Dr. Leonard Pearson, of Pennsylvania;

BE IT RESOLVED, That this Association extend to his family and the people of Pennsylvania, our sympathy in their great loss.

Dr. Pearson was recognized as being of lovable character and a scientist of international reputation.

BE IT FURTHER RESOLVED, That a copy of this resolution be inscribed in the minutes of the United States Live Stock Sanitary Association, and a copy forwarded to his immediate family.

E. M. NIGHBERT, Chairman,
S. H. WARD.

ADOPTED.

RESOLVED, that the suggestion in the address of Mr. W. H. Manss, of the C. B. & Q. Railway Company, with reference to uniform laws, regulations and inspection certificates governing the interstate and intrastate transportation of live stock are worthy of the serious consideration of this Association.

BE IT FURTHER RESOLVED, That the Chair appoint a Committee of five members to consider the best ways and means to accomplish this great problem and report same at next annual meeting.

E. M. NIGHBERT, Chairman,
S. H. WARD.

ADOPTED.

RESOLVED, That the report of the International Commission on Tuberculosis be approved and accepted for publication in our next annual report.

E. M. NIGHBERT, Chairman,
S. H. WARD.

ADOPTED.
RESOLUTION

RESOLVED, That some definite action be recommended by this Association for the control of pernicious anemia in horses.

E. M. NIGHBERT, Chairman,
S. H. WARD.

ADOPTED.

Chicago, Ill., December 7, 1910.

BE IT RESOLVED, That a Committee of three members be appointed by the President to formulate a code of ethics for the guidance of the members of this Association. The report to be made at the next annual meeting.

E. M. NIGHBERT, Chairman,
A. J. KINGSLEY,
S. H. WARD.

ADOPTED.

RESOLUTION.

WHEREAS, The proceedings of this Association have been of more than usual interest, dealing with questions of vital importance to all officers of sanitary organizations, and have been discussed with a commendable frankness, bringing out both sides of the questions involved;

THEREFORE BE IT RESOLVED, That the Program Committee be requested to publish the proceedings of this meeting without delay, and that Dr. Eichorn's paper be accompanied by lithographic reproductions of the illustrations showing the methods, paraphernalia and practical application of hog cholera in Hungary.

E. M. NIGHBERT, Chairman,
A. J. KINGSLEY,
S. H. WARD.

ADOPTED.
The health of the livestock in the State of New York has been very good for the last year. There have been no outbreaks of unusual diseases. Rabies, which has prevailed to a considerable extent for the last few years, is gradually disappearing, and there have been fewer outbreaks of swine diseases and less anthrax than usual.

The situation relative to bovine tuberculosis has also improved. The operation of the present law which requires all tuberculin tests in the State to be reported to the Department of Agriculture, together with the prohibition of unapproved sales of reacting animals, is tending to keep the infected individuals where they are. During the year ending September 31, 1910, the New York State Veterinary College distributed to the State 43,275 doses of tuberculin, of which 29,237 has been used officially by the State. The remainder has been used by Veterinarians in private practice. The most valuable feature of the State sanitary work in regard to tuberculosis is the practice of retesting all herds where reactors are found on the first test. This is cleaning up many herds and in doing so it is educating the owners in the nature of the disease so that once they come in possession of sound herds they will keep them from further infection. The educational work that has been and is still being done has caused many dairymen to have their herds tested and to build up sound ones. More and more attention is being paid to this subject which is tending to direct the growth of this insidious disease out of our herds. The State is doing all it can to assist those who are undertaking to eliminate tuberculosis from their cattle and with the co-operation of the breeders and dairymen the work of eradication is progressing. Another hopeful sign is the tendency of dairymen to raise their cows, thereby avoiding the great danger of bringing the disease in with purchased cattle. Our dairymen are beginning to realize that it is the sound herd and not a non-reacting tuberculined individual that must be considered the unit to deal with in connection with bovine tuberculosis.

The agricultural law which requires all infectious diseases of animals to be reported to the Department of Agriculture is enabling the State to locate centers where anthrax, glanders, hog cholera and other infectious diseases have appeared and to assist the local authorities and veterinarians in their work of eradication. The laboratories at the State Veterinary College are rendering much assistance to the veterinarians by aiding them in the diagnosis of suspicious cases. This makes it possible for veterinary practitioners to make an early diagnosis and to promptly apply methods of control. We are justified, therefore, in stating that marked progress is being made in the livestock sanitary work of the State.

J. F. DeVINE,
Veterinarian.
ARIZONA.

REPORT OF SANITARY WORK AND CONDITIONS IN THE TERRITORY OF ARIZONA.

There have been no new sanitary laws enacted in the past four years in the Territory and this year the Legislature will not meet as our convention is now in session, framing a Constitution for our new State, which we trust will be accepted by the President and by Congress.

I will state, however, that as a result of strict enforcement of sanitary measures for thirty years, all classes of live stock in the Territory are practically free from all contagious and infectious diseases. As a result, the Government requires no inspection for cattle and horses offered for interstate shipment, and even sheep are only inspected by the Government in two counties when offered for interstate shipment.

All stock entering the Territory must be accompanied by certificates of health or pass inspection, and dairy and breeding stock must be accompanied by tuberculin test certificate. We have extremely little tuberculin infection in dairy herds, but we expect our new State Legislature to enact laws requiring the inspection of dairy stock and products with a view to entirely freeing the stock from infection and to controlling methods of handling our dairy products so that they will be delivered to the consumer free from all classes of infection.

Respectfully submitted,
J. C. NORTON,
Territorial Veterinarian.

ARKANSAS.

The Sanitary Control work in the State of Arkansas has been conducted along the following lines. The duty of supervising the live stock sanitary work of the State for the purpose of preventing the introduction and spread of contagious or infectious disease is vested in the Board of Control of the Agricultural Experiment Station, the official of this Board of Control being the Veterinarian of that institution.

The Veterinarian has inquired into all outbreaks of glanders and has in most instances traced their origin to the introduction into the State of diseased horses from some point from without the State. A number of horse dealers and quack veterinarians have been in the past year fined in our Courts and in some instances served jail sentences for violation of our State law which prevents the introduction into the State horse stock suffering or exposed to contagious or infectious disease.

No outbreak of anthrax has been certified to by the Veterinarian but several reported outbreaks proved to be untrue. New rules and regulations have been made by the Board of Control regarding anthrax, whereby the Veterinarian can have special quarantine proclaimed by the Governor when an area of more than one farm is involved. No anthrax vaccine can be used in the State without the approval of the Veterinarian.

All outbreaks of hog cholera and swine plague have been investigated. These diseases have been limited during the past year. Approximately 100 hogs have been vaccinated by the Niles-Dorsett Serum Alone method which has proven very beneficial in checking the outbreaks. Our State Legislature
did not provide money for the preparation of hog cholera serum. A limited amount of hog cholera serum was made at the station by Veterinarian, the same being financed by the Veterinary Clinic fund.

The Veterinary Department has co-operated with the Bureau of Animal Industry in Tick Eradication work. Efficient work has been carried on in several counties of the State during the past year by the Veterinary Department in co-operation with Dr. A. E. Wight, Bureau Veterinarian in charge of Tick Eradication in Arkansas.

Two hundred head of cattle have been tuberculin tested to comply with the interstate shipment laws governing cattle for breeding and dairy purposes with a positive reaction in only two head. 5,000 cattle used for dairy purpose were tested during the last year by the veterinary department in co-operation with a Veterinary Inspector of the Bureau of Animal Industry. This line of work was taken up in order to comply with the ordinance of the city of Memphis. The result of this testing of the 5,000 cattle was that seventy head reacted and were destroyed in accordance with our State laws.

J. F. STANFORD,
Veterinarian.

CALIFORNIA.

During the past year the chief efforts of this department have been concerned principally in the work of eradicating the cattle tick, sheep scabies, glanders, and in the testing of breeding herds for tuberculosis. In addition to this other infectious diseases of animals, as well as routine work, has assisted in consuming our time.

In the work of eradicating the cattle tick, and in the inspection and dipping of sheep for the eradication of scabies, California has worked in cooperation with the United States Bureau of Animal Industry. This work has been well systematized and is well under control.

During the past year over 700 hundred head of horses and mules have been destroyed for glanders. This is the first year that systematic work looking towards the eradication of glanders has been attempted. In previous years only clinical cases were destroyed unless the owner consented to allow the testing and destruction of reactors. During 1910, however, all contact animals have been tested and the reactors destroyed along with the clinical cases. This accounts for a large number of horses and mules destroyed.

The State Legislature of California will be in session this winter and the following legislation will be introduced:

Request for funds with which to establish a laboratory for bacteriological and pathological work, and the employment of a veterinary bacteriologist. It is intended that this laboratory will be used for the preparation of immunizing serum for hog cholera, as well as for general pathological investigations.

Legislation will be introduced providing for a special tax on the horse and mule industries in order to raise sufficient funds with which to indemnify owners for the destruction of horses and mules destroyed for glanders.

Legislation will be introduced providing for (at least) the compulsory testing for all breeding cattle for tuberculosis, and (possibly) for all dairy cattle, and providing for a method of marking and segregation of the reactors from the non-reactors.

CHARLES KEANE,
State Veterinarian.
The sanitary work connected with live stock in Delaware is entirely in the hands of the State Board of Agriculture, assisted by the writer and certain other designated veterinarians. This Board has ample law for controlling all diseases, but for lack of funds they cannot be generally enforced.

The writer prepares for the Board of Agriculture tuberculin, mallein, anthrax vaccine, and anti-hog-cholera serum, a special laboratory and outfit for the latter having been recently provided.

While all the sanitary work has begun in a small way, there is a steady increase in the demand for the above biological products, and for my services as consulting Veterinarian to the Board of Agriculture.

During the past year 5,000 double doses of anthrax vaccine have been shipped to various infected centers in the State. This disease has been officially recognized as existing here since 1892. No doubt its onset was co-incident with the establishment of the morocco factories in Wilmington. The infected area comprises the northern third of the State, or that part whose rivers drain into Delaware River and Bay. It occurs every spring, summer and fall, or from March to November, its severity being governed by the season. It is largely controlled by vaccination, as no epidemics have occurred in late years. A full report of my three years' work done on anthrax will shortly appear in bulletin form from the Bureau of Animal Industry and from the Delaware College Agricultural Experiment Station.

The Delaware law prohibits the bringing into the State any bovine which is not pronounced free of tuberculosis as shown by the tubercular test. If a man sell a tuberculous animal the buyer can recover the purchase price and besides sue the seller for damages. There has been a light demand for tuberculin.

Glanders—The State seems to be free from this disease, notwithstanding our proximity to the horse markets of the East.

Hog cholera—The Board of Agriculture has furnished the funds for preparing anti-hog-cholera serum in a small way in the past year. Its use has been attended with gratifying success, and the demand has increased so that it was necessary to enlarge our facilities and establish a serum laboratory.

I wish to call attention to the possibility of transferring tuberculosis. In my work I have known serum to produce tuberculosis locally at the point of injections of serum, even after it had been on hand for several months. It seems that the carbolic acid content of the serum does not kill the tubercle bacillus. This would indicate that the hogs should be tested with tuberculine before use in such work.

Veterinary sanitary legislation—At the last session of our Legislature a bill was presented creating the office of State Veterinarian and appropriating money to eradicate tuberculous cattle. It failed of passage for various reasons. In its stead a bill increasing the appropriation for the State Board of Agriculture was passed. It is highly probable that this appropriation will be still further increased by the next Legislature, which meets in January, 1911, so as to allow the Board to engage the services of veterinarians more freely than in the past, and to prepare hog-cholera serum on a larger scale.
I can say, in general, that Veterinary Sanitary matters are undergoing a gradual and permanent improvement, and claiming increased interest of Delawarians.

Respectfully submitted,

CHARLES F. DAWSON,
Veterinarian, Delaware College and State Board of Agriculture.

OREGON.

To the Honorable Members of the United States Live Stock Sanitary Association:

Gentlemen—In compliance with the request of your Honorable Secretary, Mr. J. J. Ferguson, I have the honor to present the first report of the live stock sanitary work of Oregon to your Association.

Oregon, because of her great adaptability to the raising of live stock, does not import any considerable number of domestic animals into the State for purposes other than the perfection of her already great number of breeds, and the strengthening of her present blood lines. Because of this condition, and with one exception, we have been in the past practically free from exotic disease, or such diseases as do not normally inhabit the American continent. An infection of Johne's disease has been diagnosed in a herd of pure bred Jerseys recently imported from the Isle of Jersey. The three animals infected have been destroyed and sections of the intestines have been forwarded to the pathological laboratory of the Bureau of Animal Industry, Washington, D. C., for confirmation with a later positive report. No new cases have been diagnosed. Aside from glanders of horses and tuberculosis of cattle, the State has been reasonably free from contagious and infectious diseases. Hog cholera has been comparatively rare and were it not for the introduction from without along with shipments of hogs from our corn states, the disease would be almost unknown. Hog raising in Oregon has not reached anything like the development it has farther east and consequently the disease does not spread to the extent it does in our central western states. Then again, the disease takes on a less severe type here in Oregon, possibly due to the fact that the virulence is attenuated in some manner, from climatic conditions or a less susceptibility of our native hogs, which are not often more than of average fatness. We have attempted to control this disease here in the State by a system of public stock yard quarantine. We permit no hogs to go for purposes other than immediate slaughter that have been allowed to come in contact with any public feed yard, car or other intermediate object that might be the means of harboring infection. The Union Stock Yards at Portland have arranged to handle unexposed animals through an isolation yard which is regularly disinfected and into which only hogs are allowed to enter which have come from sections of the State known to be free from hog cholera and for which disinfected cars have been used for shipment and other precautions taken during loading. From our exper-
ience and observation it would seem that all or practically all feeding and unloading yards between here and the middle states are infected with hog cholera. As yet there has not been a single shipment of hogs from the corn states which have been kept fourteen days after their arrival here, which have not developed hog cholera. Hence, the unwisdom of allowing such hogs to go for feeding or breeding purposes.

Rabies has not yet made its appearance within our State, although at this writing we have just returned from an investigation where a coyote had bitten two small boys and a number of domestic animals, including two dogs. Unfortunately, through the ignorant act of a country practitioner, the coyote was cremated entire and our immediate means of diagnosis were lost. We have forwarded the dogs to the State Board of Health office where the dogs will be held under observation while the boys will be given the antirabic vaccine pending developments. Throughout the northeast section of Oregon and the southeast section of Washington and the western central section of Idaho, there has been a continual rabid coyote scare during this last summer. What observations we have personally made have proved negative, although I must admit that our positive means of diagnosis were generally lost through total destruction of the carcass.

As to other diseases, actinimyicosis is not as common as in the central states but is frequently met with. Our sanitary laws do not classify this as an infectious disease and hence it does not come under our jurisdiction. Our work in this connection has been that of advising dairymen not to use animals suffering from this affection as the possibility of pus infection and the fungus causing the disease gaining access to the milk pail by attendants passing the animal, are great. We have advised owners to destroy infected animals where they have so far advanced as to appear incurable. Black-leg has been quite effectually guarded against by vaccination in highly infected districts and through the judicious burning of all infected carcasses we think the disease has been materially lessened. Infectious abortion and possibly a dietetic abortion has been quite prevalent in certain sections of the State. This disease has existed in mares and has covered quite an area. It is possible that the disease was caused by an unusually cold period of weather, which forced many pregnant mares to eat foods contaminated with molds and undoubtedly a long period without water was experienced by many of these animals.

Coital exanthema has been of frequent occurrence this last year. The disease has respond to treatment almost without exception and by the use of a rigid quarantine we have kept the disease confined to a small area.

Glanders has existed in the arid sections of the West for years; and in many states, until recently, practically unhampered. Consequently we find the disease quite generally distributed, though possibly not more so than in several of our eastern states. The disease in the higher, dryer sections of our State assumes an extremely chronic type, seldom manifesting itself in the facry form except occasionally in mules. The virulence of the infection seems to have been greatly lessened through the attenuating influence of a dry climate, high altitude and ever shining sun. We have not infrequently found one animal infected amongst a number of horses, all of which proved negative to the mallein test. Occasionally an owner will assert that "he knows his animal is not suffering from glanders because it has been running at the nose for ten years." This gives some idea of the chronic type that exists in the arid sections of our western states. The proper course to
pursue with respect to the non-clinical reactors seems to be a much mooted question. Personally we favor the branding of all such cases and the quarantining of the same upon the owner's farm, permitting him to make use of them for four years and if after that time they prove to be free from disease, to permit the quarantine to be removed from such animals. Something more than 100 animals have been destroyed during the past two years. We have made a mallein test requirement on all incoming horses, mules and asses used on railroad or other construction work. We have found that animals used where sanitation is poor and dust irritation great, are much more apt to develop open glanders from occult lesions which ordinarily would give no or little trouble. Railroad contractors often hire ranch animals during the winter months and these when returned home have often spread glanders over a wide area after they have received infection and exposure.

Tuberculosis of cattle has received much attention from our office this last year. At the present writing, 8,330 cattle have been tested in Oregon this past year. Our records show that 1,208 of these have reacted to the tuberculin test. A post-mortem on 800 that have thus far been completed shows sixteen not to have presented visible lesions. Glands from eight of these animals have been forwarded to Washington for a laboratory diagnosis, with a report from the pathological department of the United States Bureau of Animal Industry that in four sets of glands laboratory lesions were found. We have met with one peculiarity of our temperature charts that seems to be particularly peculiar only to the temperature readings of the animals which showed no microscopical or laboratory lesions. That is in those cases that have proved non-tuberculous, the temperature chart shows the animal to have reached normal at the eighteenth hour, after injection, whether this is a matter of coincidence or whether it is a phenomenon deserving of further investigation, we are unable to say, as our number of observations have been necessarily limited. Upon communication with other sanitary officials, we have been advised that this is of negative value. But upon recalling the facts that often the temperature takings after the animal has shown a necessary condemnation temperature rise are neglected or not carefully recorded by a number of practitioners, we can see how a consultation of the records of tests might be of little value in deciding this matter. Oregon presents a range of wide variability in respect to her bovine tuberculosis. In the western portion of the State in which the larger commercial raw milk dairies are located there is a large per cent of tuberculosis, particularly the city milk supplies. Rural districts located in the humid sections of the State are practically as free as are the arid sections of eastern Oregon, which has less than one per cent. A test of some two thousand cows in western Oregon outside of the Portland milk supply, shows approximately three per cent. Portland's dairy animals ran from thirty per cent at first down to about fifteen per cent. We attribute the decrease to the facts that our first investigations were made on dairies reported to be unusually unsanitary and the fact that unscrupulous dairymen have had private tests and have secretly disposed of their reacting animals to butchers, and possibly to the fact that some of the animals escape the test, being rendered tolerant to tuberculin by repeated injections. There is much agitation in the State at this time favoring a state-wide compulsory test. We are inclined to recommend against such a measure at this time until the dairymen can be educated to the necessities of sanitation, ventilation and thorough disinfection. At the present time we have no indemnity fund for remuneration to owners having their animals destroyed because of tuberculosis or glanders. We hope to receive a liberal appropriation at our coming Legislature and are planning to develop a co-operative testing between members of our Board of Health and live stock.
owners. At the present time we have several times as many applications for tests on file as can be attended to this coming year. If a state-wide test is not passed by our coming Legislature we are almost sure to pass a compulsory ante-sale test for all animals sold or interchanged within the State, and with the protection afforded by our interstate importation requirements, we hope to prevent further spread of bovine tuberculous and after a period of two years, which we hope to devote to educational work and co-operative testing, we expect to begin in earnest towards a state-wide effort to gradually control and eradicate bovine tuberculosis.

Respectfully,

WM. H. LYTLE,
State Veterinarian and Sheep Inspector.

MASSACHUSETTS.

Having only recently accepted the position of Chief of the Cattle Bureau of the Massachusetts State Board of Agriculture, I am somewhat unprepared to present the existing conditions of the various branches of the work coming under the jurisdiction of that Bureau. It is a well recognized fact, I believe, that Massachusetts has always been looked upon as a leading state along all progressive lines, believing in the supreme importance of the best possible laws for the protection of health, including laws which will secure the most desirable conditions under which dairy products may be furnished to our great consuming public. To uphold and strengthen this well established reputation, so far as pertains to the sanitary conditions of live stock of the State, is my most earnest desire.

We are particularly fortunate in having in this and nearby states some of the most eminent authorities on such subjects to be found in this country. Though not myself a scientist or a veterinarian, I recognize the fact that such authorities must be consulted and their co-operation secured, in order to obtain the best results. Because I so believe, and because I hope to combine scientific advice from such high authorities with the practical experience I have gained in a lifetime of association with every branch of live stock industry, you will perhaps pardon me for assuring you that the high standard of excellence established by my predecessors in office will not be considered by me the highest obtainable. I shall be at all times, by means of conference with fellow-members of this Association, and in every other sane and sensible way possible, endeavor to place Massachusetts, from the standpoint of sanitary conditions for her live stock, in a position that shall be second to that of no state in the Union.

In conclusion I wish to express my appreciation of the complimentary action of your members in electing me to serve as First Vice-President, an honor of which I shall endeavor to prove myself worthy by zealous effort in behalf of the Association.

Most respectfully submitted,

FRED F. WALKER,
Chief of Cattle Bureau of the Massachusetts State Board of Agriculture.
NORTH CAROLINA.

The sanitary control work of North Carolina is done by the Veterinary Division of the Department of Agriculture. This Division is under direct control of the Commissioner as Chairman Ex-Officio of the Live Stock and Quarantine Committee, the other five members being also members of the State Board of Agriculture.

This Board meets semi-annually June 1st and December 1st. At each meeting appropriations and regulations are made by which the work is conducted.

The appropriations made in June last was $10,000. From this are paid salaries of three veterinarians—myself, two assistants, a stenographer and five cattle inspectors engaged in tick eradication and all traveling expenses, office equipment, postage, etc. 'One-half of this was for tick eradication alone, therefore, the appropriation is small for the demands and needs of the Division.

Tick Eradication—Owing to our geographical location this work of eradicating ticks consumes much of our time and funds. $8,500 is the amount of the present State appropriation. The Bureau of Animal Industry has a force of ten men at work in the State. With the combined efforts of both forces, a territory of 2,244,880 acres, comprised of the counties of Franklin, Wake, Chatham, Randolph, Montgomery and Stanly, is ready for release December 1, 1910. There are in this district 517,752 head of cattle. A glance at the map will show that this territory extends almost across the State from south to north in a slightly eastwardly course. Immediately eastward and adjacent to these counties or district is a tier of counties which is ready to be worked, in fact, has had the original farm to farm inspection partially made. This territory, comprising the counties of Halifax, Nash, Edgecombe, Wilson, Lee, Moore, Richmond and Scotland, will make a splendid modified territory, as we term it, around the east of which the State will place its quarantine line. You will observe that one-half of the State has been freed from ticks and released from quarantine since 1902, the date upon which the first quarantine line was established. By actual count fifty-five of the ninety-eight (98) counties are west of the quarantine line or in the free area or non-infected area.

The real value of this work can easily be seen by comparing the value of cattle in the free area with those in the ticky. From the State Auditor's report of 1909 we note the cattle in the free area are worth thirty-three per cent (33%) more than those in the tick infected area.

The regulation adopted by the State Board of Agriculture December, 1909, giving the State Veterinarian power to quarantine ticky animals in barns and barn lots; also disinfect same and charge to owner of cattle, and sell sufficient cattle to cover costs, has proven of untold benefit to the work. Owners of ticky animals certainly get busy when informed of the Regulation and become aware of the fact that their cattle are quarantined in a small lot and there to remain until free from ticks.

Tuberculosis—The tuberculin testing of cattle is requiring a large portion of our time. We now have under our care the herds owned by the State Penitentiary, Insane Asylums and many of the Orphan Asylums and large schools, also County Alms Houses. Many private owners, of course, are availing themselves of the opportunity offered them to clean up the in-
fected herds. In one county, Catawba, which is the leading dairy county, there are only three diseased cows of which we have records. We have tested all the large herds in the county. Of course there remain some cattle untested but those are few in a place and badly scattered.

We are now in communication with the County Officials trying to devise plans by which we may test the remaining cattle and wipe out what infection may be found.

The results of our testing indicate that about five per cent (5%) of the cattle tested, react. There being such a small per cent of diseased or reacting cattle, we are quite hopeful of the future of our work.

The State, at present, does not reimburse owners for diseased animals. However, there will be a bill introduced at the Legislature during January, asking that an appropriation be made for this purpose.

Hog Cholera Serum—There is now a small appropriation, $1,200, for the manufacture of serum. The land, ten acres, has just been leased and the buildings, which consist of a laboratory, serum room, bleeding room and pens for diseased and check pigs, have been erected. The hogs, ten hyper-immunes, have just been put in.

The hogs were transferred from the former plant which was only a temporary and experimental pen of small dimensions. We have made a small quantity of serum and injected some few hundred hogs with very satisfactory results, immunizing about eighty-five per cent (85%) of the hogs injected.

Importation of Live Stock—The Board of Agriculture passed a Regulation, December 1, 1909, making it necessary for all live stock entering the State to be accompanied by a health certificate given by a reputable Veterinarian and endorsed by the State Veterinarian of the state in which the shipment originates, or a certificate given by a Bureau of Animal Industry Inspector.

Stallion Registration Law—The proposition of having all stallions, standing for public service, registered is now confronting us. In all probability a bill asking for the passage of such an act will be presented to the Legislature during January.

Respectfully submitted,

W. G. Chrisman,
State Veterinarian of North Carolina.

North Dakota.

The Legislative Assembly meets in this State biennially, the next session occurring in January, 1911; accordingly there has been no new legislation during the past year.

The labors of the Live Stock Sanitary Authorities have been principally directed towards the eradication of glanders, this disease having been very prevalent in this State. The mallein test has been resorted to very extensively for the diagnosis of this disease and a large number of animals have been condemned through this agent.
This State provides an indemnity for horses destroyed for glanders under certain conditions—an indemnity not to exceed $50.00 for any one animal. It is anticipated that it will require an appropriation of $80,000 to pay for the animals destroyed during the past two years.

The State Serum Institute, which is established with an annual appropriation of $3,000, produces all the hog cholera serum used, and the Director advises me that he has a considerable quantity of serum on hand, which could be purchased through him. Dr. L. Van Es, Professor of Veterinary Science, Agricultural College, N. Dakota, is Director of the Institute. All the tuberculin required is also manufactured there.

Little has been done towards the eradication of tuberculosis, owing to the fact that there is no money available for this purpose. The stock owners are now showing considerable interest towards the suppression of this disease. The State Dairy Association has passed resolutions requesting an appropriation for this purpose, and they anticipate having a law passed which will provide for the indemnity of animals destroyed. At least their influence will be exerted along these lines. It appears that it will be necessary to partially indemnify the owners for animals that may be slaughtered on account of tuberculosis before the co-operation of stock owners can be secured.

The sanitary authorities desire to adopt the most successful method suggested up to this time, and for this reason they seriously consider the recommendations made by the International Commission on the control of bovine tuberculosis.

We are handicapped to some extent in this State owing to the fact that there is no abattoir where Federal inspection is maintained and where reacting cattle might be slaughtered and thereby lose their identity. At present we find it very difficult to make a proper disposition of carcasses of reactors that pass post-mortem inspection, owing to the fact that in the smaller towns the people object to using this class of meat where they have knowledge of it. In our endeavor to clean up a few herds in some of our larger towns, of 5,000 population, it was found that a report was made public that this class of animals was to be slaughtered and the butcher was served with a notice that he would be boycotted if he attempted to handle this class of meat.

However, we hope that some better arrangements can be made and some of these obstacles are overcome.

Yours respectfully,

W. F. Crewe
State Veterinarian

SOUTH CAROLINA.

The following is a summary of my report as State Veterinarian for fiscal year 1909-1910.

INVESTIGATION OF CONTAGIOUS DISEASES.

GLANDERS—This disease was reported and investigations made in the following counties:—Pickens, Greenwood, Fairfield, Bamberg, Colleton and Charleston. In Charleston County two glandered mules and a glandered horse were appraised and destroyed. Sixteen horses and mules which had been exposed were tested with mallein and found free from disease. Six horses and
mules in Colleton County were also tested, but failed to react. In Pickens County one glandered mule was appraised and destroyed and two animals, which had been exposed, were tested and found free from disease. Premises on which glandered animals had been kept were thoroughly disinfected and further spread of the disease prevented. Other cases reported proved to be diseases of non-contagious character.

**TUBERCULOSIS**—During the past year 508 cattle were tested for tuberculosis in the following counties:—York, Oconee, Anderson, Spartanburg, Greenwood, Union and Aiken. Of this number twenty-three were found tuberculous. Fifteen of these were appraised and destroyed in accordance with State law and the remainder are now under quarantine.

**CEREBRO SPINAL MENINGITIS**—Outbreaks of this disease were investigated in Anderson and Edgefield Counties. In Anderson County three valuable mules were lost and in Edgefield County two animals were affected, one of which died. These animals had received damaged corn and no further cases developed after the feeding of this corn was discontinued. In Pickens County a contagious disease of cattle was reported, but on investigation it was found that these cattle were suffering from effects of eating damaged stover. Medicinal treatment was prescribed and owner advised to discontinue this food. The affected animals recovered under treatment. Newspaper articles were published and literature regarding this disease was given wide distribution throughout the State.

**TEXAS FEVER**—This disease was reported in Marion, Darlington and Newberry Counties. Several outbreaks occurred in other counties, but no investigations were requested. Owners were given instructions regarding the various methods of tick eradication and medicinal treatment was prescribed.

**SYMPTOMATIC ANTHRAX**—This occurred in York, Chester and Greenville Counties. Several valuable animals died before the outbreaks were reported, but the remainder were vaccinated, thus preventing spread of the disease. Newspaper articles regarding this disease were published in all state and county papers. Arrangements have also been made to supply this vaccine to the citizens of the State free of cost.

**GASTRO INTESTINAL PARASITISM**—Intestinal parasites continue to cause heavy loss among sheep and young cattle throughout the State. Inspectors on our tick eradication force and farmers throughout the State have from time to time reported heavy losses from these parasites. The parasites causing the heaviest loss of young animals are the stomach worm (strongylus contortus) and the hook worm (uncinaria radiata).

In my last annual report attention was called to the uselessness of medicinal treatment and to the wide distribution of these parasites throughout the State. At the present time we can only hope to control this problem by abandoning, draining or cultivating low pastures. If we could impress on our farmers the necessity of keeping young stock in new pastures on high ground until they are twelve or eighteen months of age, we would have accomplished much towards the control of this problem. This division has published two bulletins on this subject and these, together with the bulletins on the same subject issued by the United States Department of Agriculture, have been given wide distribution throughout the State.

In Pickens, Anderson, Abbeville, Greenwood and Lexington Counties losses resulting from parasitic infection were so heavy that the owners
attributed the loss to a contagious disease and requested investigation. Post-mortem examination of the diseased animals confirmed our diagnosis and the owners were given information regarding the necessary preventive measures to be adopted on their premises.

**Hog Cholera**—Outbreaks of this disease were reported in Calhoun, Abbeville, Spartanburg and Chester Counties. Undoubtedly this disease is prevalent throughout the State, but few requests for investigation have been received. All premises on which diseased hogs were found were quarantined and thoroughly disinfected, thus preventing spread of the disease.

This disease was also reported in Chester and Spartanburg Counties, but on investigation it was found that cholera was not present. In Chester County two hogs died before our arrival, but the remainder were in perfect health. The supposed outbreak in Spartanburg County was similar, the loss of one hog from some unknown cause led the owner to believe he had cholera on his premises.

**Immunization Against Hog Cholera**—This method of protecting hogs against hog cholera, which has been developed by the United States Bureau of Agriculture, has proven most satisfactory and many states have made appropriations and are already preparing and distributing this protective serum to farmers at actual cost through the State Veterinarians or Live Stock Sanitary Boards.

During the past year Dr. Barnett, of the Experiment Station, has conducted a few experiments with serum prepared by him in co-operation with the United States Bureau of Animal Industry. As no appropriation has yet been made for the preparation of this serum in South Carolina, I recommend that the South Carolina Experiment Station be given an appropriation for the preparation of this serum, which should be distributed to the citizens of the State through this office.

**Eradication of Cattle Ticks**—This work is conducted by this office in co-operation with the United States Bureau of Animal Industry. The work has been in progress since July 1, 1907, and four counties (Oconee, Pickens, Greenville and Anderson), have been released from federal quarantine. Several other counties will also be released December 1, 1910. Owing to lack of proper co-operation from cattle owners, progress is necessarily slow.

**Report of Work Accomplished.**

<table>
<thead>
<tr>
<th>County</th>
<th>Herds inspected</th>
<th>Cattle inspected</th>
<th>Premises quarantined</th>
<th>Cattle quarantined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oconee</td>
<td>1,305</td>
<td>8,686</td>
<td>129</td>
<td>650</td>
</tr>
<tr>
<td>Pickens</td>
<td>1,914</td>
<td>8,800</td>
<td>189</td>
<td>800</td>
</tr>
<tr>
<td>Greenville</td>
<td>2,420</td>
<td>14,680</td>
<td>362</td>
<td>1,225</td>
</tr>
<tr>
<td>Anderson</td>
<td>2,177</td>
<td>14,428</td>
<td>281</td>
<td>1,680</td>
</tr>
<tr>
<td>Abbeville</td>
<td>1,488</td>
<td>12,127</td>
<td>359</td>
<td>3,000</td>
</tr>
<tr>
<td>Greenwood</td>
<td>940</td>
<td>5,887</td>
<td>261</td>
<td>705</td>
</tr>
<tr>
<td>Laurens</td>
<td>2,526</td>
<td>12,446</td>
<td>103</td>
<td>900</td>
</tr>
<tr>
<td>Union</td>
<td>1,153</td>
<td>9,000</td>
<td>21</td>
<td>200</td>
</tr>
<tr>
<td>Spartanburg</td>
<td>1,955</td>
<td>12,337</td>
<td>374</td>
<td>3,050</td>
</tr>
<tr>
<td>Cherokee</td>
<td>1,509</td>
<td>7,996</td>
<td>283</td>
<td>1,876</td>
</tr>
<tr>
<td>Chester</td>
<td>1,284</td>
<td>7,538</td>
<td>195</td>
<td>1,500</td>
</tr>
<tr>
<td>York</td>
<td>1,076</td>
<td>8,814</td>
<td>296</td>
<td>2,850</td>
</tr>
</tbody>
</table>
From the following tables it will be seen that over fifty-three per cent of the total number of quarantined premises in these counties have been freed from ticks and released from quarantine.

<table>
<thead>
<tr>
<th>County</th>
<th>Premises freed from ticks and released</th>
<th>Premises now in quarantine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oconee</td>
<td>120</td>
<td>9</td>
</tr>
<tr>
<td>Pickens</td>
<td>167</td>
<td>22</td>
</tr>
<tr>
<td>Greenville</td>
<td>328</td>
<td>34</td>
</tr>
<tr>
<td>Anderson</td>
<td>281</td>
<td>0</td>
</tr>
<tr>
<td>Abbeville</td>
<td>175</td>
<td>186</td>
</tr>
<tr>
<td>Greenwood</td>
<td>129</td>
<td>132</td>
</tr>
<tr>
<td>Laurens</td>
<td>52</td>
<td>51</td>
</tr>
<tr>
<td>Union</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Spartanburg</td>
<td>107</td>
<td>267</td>
</tr>
<tr>
<td>Cherokee</td>
<td>36</td>
<td>247</td>
</tr>
<tr>
<td>Chester</td>
<td>55</td>
<td>140</td>
</tr>
<tr>
<td>York</td>
<td>74</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td><strong>1,527</strong></td>
<td><strong>1,326</strong></td>
</tr>
</tbody>
</table>

Veterinarians and Inspectors Employed During the Year:

**State Veterinarians.**

Dr. M. Ray Powers,
State Veterinarian.

Dr. R. O. Feeley,
Assistant State Veterinarian.

**Federal Veterinarians.**

Dr. E. M. Nighbert, Inspector in Charge,
Spartanburg, S. C.

Dr. A. P. Edgerly, Greenwood, S. C.

Dr. J. F. Fahey, Spartanburg, S. C.

Dr. Kingsland, Spartanburg, S. C.

**State Inspectors.**

L. B. Brandon, Abbeville,
Chas. Bruce, Westminster,
O. M. Clark, Chapin,
W. B. Dean,
W. F. Gaillard, Anderson,
M. M. Hall, Pendleton,
R. C. Littlejohn, Gaffney,
J. B. Smith, Newberry,
P. W. Spencer, Leslie,
R. R. Tolbert, Greenwood.

**Bureau of Animal Industry Inspectors.**

R. L. Brawley, Gaffney,
W. W. Brown, Spartanburg,
G. L. Carnes, Gaffney,
S. F. Clark, Inman,
C. C. Myers, Oakway,
G. S. Scott, Rock Hill,
J. L. Timmerman, Calhoun Falls,
J. W. Williams, Laurens,
H. C. Wilburn, Union,
S. H. Williams, Spartanburg.

**Inspection of Imported Live Stock—Importation of Live Stock—**

A recent Act of the General Assembly requires that all shipments of animals coming into this State for work, dairy, feeding or breeding purposes be free from diseases and accompanied by a health certificate issued by an authorized veterinarian. As the majority of states now have similar laws, it is fortunate that South Carolina has also adopted this measure for the protection of our live stock industry as it will necessarily follow that states without protection will become the dumping ground for diseased live stock that cannot be shipped into other states.

This Act also forbids the importation of tuberculous cattle and requires the tuberculin testing' of all breeding and dairy cattle over six months of age. The necessity for such legislation is shown by the fact that thirty-three
states now require the tuberculin testing of all dairy and breeding cattle as a qualification for entrance from other states. Nineteen of these states passed such laws during the past year. Following is a list of states above mentioned:

<table>
<thead>
<tr>
<th>Alabama</th>
<th>Maryland</th>
<th>Oklahoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td>Massachusetts</td>
<td>South Carolina</td>
</tr>
<tr>
<td>Delaware</td>
<td>Minnesota</td>
<td>South Dakota</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>Montana</td>
<td>Tennessee</td>
</tr>
<tr>
<td>Idaho</td>
<td>Nebraska</td>
<td>Texas</td>
</tr>
<tr>
<td>Indiana</td>
<td>New Hampshire</td>
<td>Utah</td>
</tr>
<tr>
<td>Kansas</td>
<td>New Jersey</td>
<td>Vermont</td>
</tr>
<tr>
<td>Kentucky</td>
<td>New Mexico</td>
<td>Virginia</td>
</tr>
<tr>
<td>Maine</td>
<td>New York</td>
<td>Wisconsin</td>
</tr>
<tr>
<td>Michigan</td>
<td>North Dakota</td>
<td>Wyoming</td>
</tr>
<tr>
<td></td>
<td>Oregon</td>
<td>Washington</td>
</tr>
<tr>
<td></td>
<td>Pennsylvania</td>
<td></td>
</tr>
</tbody>
</table>

Health certificates are accepted from official veterinarians, state and federal.

**Animals Imported Into South Carolina During the Year**—

- Horses and Mules ........................................ 23,990
- Cattle for dairy and breeding purposes (tuberculin tested) 126
- Cattle for feeding ........................................ 2,113
- Hogs for breeding ........................................ 249

**Prescribing for Animals Affected With Non-Contagious Diseases**—

Hundreds of letters requesting information concerning non-contagious diseases are received each year. If those making requests of this character can secure the services of qualified veterinarians, they are referred to these practitioners. Letters of this character from communities where there are no veterinarians are given careful attention and although the symptoms described are usually very indefinite, still it is often possible to help those making these requests and this is therefore considered one of our most important duties.

**Correspondence and Other Office Duties**—The correspondence of this office is probably larger than any other office in the Agricultural Department. In addition to that above mentioned we have many letters pertaining to state inspection and tick eradication. During the past fiscal year over 3,000 letters have been mailed from this office.

The examination and proper filing of records of quarantined premises, which are forwarded daily by inspectors engaged in tick eradication work, together with the filing of certificates which accompany each importation of live stock into this State makes an enormous amount of work which demands every spare moment.

Respectfully submitted,

(Signed) M. Ray Powers,

W. R. Perkins,

Director Agricultural College, Clemson College, S. C.
SOUTH DAKOTA.

Until two years ago the livestock sanitary work in South Dakota was in charge of the State Veterinarian, who received his appointment from the Governor and whose term of office was two years, his salary was fixed by law at fifteen hundred dollars per year and necessary traveling expenses, which could not exceed eight hundred dollars per annum. The last session of the Legislature, however, enacted a law known as the Live Stock Sanitary Law, which provided for a sanitary board composed of five members. Members to be located in different localities of the State and each member to have supervision over his respective district. Two members are located west of the Missouri River, one to have supervision over the sheep interests, and the other the range cattle interests, and three members east of the river. This part of the State is divided into three districts and each member supervises his own district.

The State Veterinarian is Executive Officer of the Sanitary Board, whose duty it is to do the field work and report to the Board in session in detail all the work done by him and his deputies at least four times a year.

The entire appropriation for the maintenance of this law is ten thousand dollars per annum. The State Veterinarian's salary not to exceed eighteen hundred dollars per annum. Under this law the Board have the right to appoint as many deputy state veterinarians as is deemed necessary and on the recommendation of the State Veterinarian, practically all the qualified men in the State were appointed and all have done good work for the State.

The Sanitary Board has made regulations from time to time, as conditions demanded, and during the coming session of the Legislature they will endeavor to have these regulations incorporated in the law.

In conclusion I will say, that the work in South Dakota is going along very nicely under the new order of things. All are apparently satisfied with the Sanitary Law and Sanitary Board.

Mr. F. M. Stewart, of Buffalo Gap, South Dakota, is President of the Board and Mr. F. R. Cock, of Belle Fauchre, is Secretary and to these two men a great deal of credit is due, first for their efforts in getting the law enacted and second, for the work they are doing towards its maintenance.

TENNESSEE.

We have no State Veterinarian. When the Legislature meets in January we will, assisted by the Veterinary Association, recommend the appointment of a State Veterinarian. Each City Health Board looks after sanitation in their respective towns. I have had about forty horses and mules killed this year for glanders; 620 cows killed for tuberculosis; forty-eight head of cattle killed for Johnes' disease, and in all cases of contagious diseases I have the surroundings thoroughly disinfected. I shall advocate before next Legislative Assembly a compulsory law requiring every cow given the tubercle test. Only the larger cities have ordinances requiring the testing of all cows that furnish milk. There is no expense fund permitting my attendance on meetings outside of the State and I will not have the pleasure of attending your meeting.

JOHN H. MCDOWELL,
State Live Stock Inspector.
TEXAS.

In the matter of new legislation, we have nothing to report, but we confidently look for an increased appropriation for our Live Stock Sanitary Commission, from the coming session of the Legislature.

In the Tick Eradication work, we have thirteen Inspectors in the field. During the past year some 45,000 head of cattle have been dipped under the supervision of our Inspectors for movement above the line. The Arsenical Dip has proven to be very effective, with some few exceptions, and in these cases the trouble was probably due to an inferior grade of Arsenic.

The cattlemen in the provisional area whose premises have been found to be infected and quarantined, are not as co-operative as they might be and some of them are troublesome and fail to make any effort towards cleaning up. These kind of people, however, are not in the majority.

During the year there has been taken out of the provisional quarantine area some seven whole counties and parts of four others, though there are a number of premises in those counties and parts of counties now under special quarantine.

Relative to Scabies, there being no appropriation for the carrying on of the work of eradicating that disease, there is little being done along that line by our Commission or the force in its employ. We have recently appointed one Special Inspector for this work.

We have at present little regulations on tuberculosis. We require the tuberculin test on all cattle entering the State. A section of the Advising Code of the State Sanitary Law, to be adopted by the different counties and cities, deals with the matter of requiring all dairy cattle to be tested. Some cities have adopted it and some have framed and passed most excellent Ordinances on the tuberculin testing and the sanitary milk supply. Others have taken no steps in the matter.

One outbreak of Lip and Leg Ulceration in sheep occurred in the Fort Worth Stock Yards but was promptly eradicated.

Infectious Equine Anaemia appears to be increasing in the Coast country.

Anthrax for the past two summers has been particularly severe along the Coast country.

E. R. FORBES,
State Veterinarian.

WISCONSIN.

The Wisconsin Live Stock Sanitary Board is composed of the Bacteriologist of the State Agricultural School, three members from the State Board of Agriculture, chosen by its members, and the State Veterinarian.

The State Veterinarian is the Executive Officer of the Board and serves without additional compensation. The other members receive three dollars per day and their actual expenses incurred while in charge of their duties.
In this short paper it will hardly be possible to give you more than a very brief outline of the work which the Board is doing toward the eradication of tuberculosis by means of the tuberculin test.

We have provisions, by law, for the disposition of tuberculous cattle. The owner is given three options:—(1) the animals may be appraised by three disinterested parties, the maximum appraisement being $55.00, and the owner receives three-fourths of this appraised value for all animals showing lesions on post-mortem, and full appraised value for those showing no lesions. The animals so appraised are shipped to some federal-inspected abattoir and the receipts from the sale of such of these animals as pass government inspection is deposited in the State Treasury. (2) The animals may be turned over to the Sanitary Board and shipped to a federal-inspected abattoir under the auspices of the Board, the owner receiving the net proceeds from the sale of the animals. (3) The animals may be held in quarantine under regulations of the Board. No money is paid for cattle until the Board is satisfied that the premises have been disinfected so as to prevent further spreading of disease. This requirement is met by a certificate from the local health officer.

On December 1 a law went into effect requiring that all cattle sold or transferred for dairy or breeding purposes shall have been tuberculin tested within two years prior to date of sale by someone approved by this Board. At this time it is not possible to give you any idea of how this law will work out practically, but every indication is that it will prove satisfactory, for it has the sanction of the agricultural community of the State. The passage of such an act may seem premature, and so it might be in a state where the people are not as well informed on tuberculosis as they are in Wisconsin.

A vigorous campaign of education has been carried on by the Board and the State Agricultural School for several years in the form of demonstrations and bulletins, the latter chiefly by the Agricultural School. Demonstrations have proved a most efficient means of education. These are held at the State Fair, County Fairs, Farmers' Institutes and during the Farmers' Course at the State University, and have proven such drawing cards to fair associations that they will make applications for the same and gladly pay all expenses incurred. During these demonstrations the diseased animals are killed before a crowd, a post-mortem held, and a demonstrator at the same time emphasizing the economic and sanitary aspects of tuberculosis.

I now come to the application of the tuberculin test, a point upon which the State of Wisconsin has been criticized by veterinarians and sanitarians throughout the country. We accept tests of licensed veterinarians and others who have passed a written examination by the Board. The term "licensed veterinarian" covers a multitude of sins in our State, for about fifty per cent of the veterinarians of Wisconsin are not graduates of any school, and a large per cent of these non-graduates are grossly incompetent and ignorant of the tuberculin test. By law we are obliged to accept their tests. To parties not veterinarians we give an examination which consists of practical questions on the tuberculin test, and theoretical questions on the economic and sanitary aspects of tuberculosis. The reading of clinical thermometers is a part of every examination. From the table of last year's work, which I am appending, it will be seen that the veterinarians have found six per cent of reacting animals, while parties who have passed our examination found three per cent. It will also be noticed that eleven per cent of the reacting animals showed no lesions for the veterinarians, while twenty-two per cent of those tested by permit men showed no lesions.
Veterinarians | Passed Men | Owners
---|---|---
Number tested | 23,009 | 20,580 | 4,592
Number reacted | 1,386 | 689 | 95
Per cent reacted | 602 | 3.34 | 2.6
Number killed | 1,204 | 562 | 48
No lesions | 140 | 128 | 13
Per cent no lesions | 11.6 | 22.7 | 27
Per cent showing lesions | 88.4 | 77.3 | 73
Total 'tested | 48,181 | | |
Total reacted | 2,171 | | |
Per cent reacted | 4.5 | | |

From this it will be seen that veterinarians obtain a higher per cent of reactors, and more of these show lesions on post-mortem. How much of this difference is due to the fact that veterinarians test a greater per cent of badly affected herds, I am unable to say. Some difference undoubtedly is due to this cause, but I hardly think that it can all be laid to this cause. It might be stated, however, that some of these "permit men," as we call them, do exceptional work.

I think we are making progress in our State, for not many years ago anyone who applied for tuberculin might receive it, whether he was competent to apply the test or not. This is not the case at present, for now only veterinarians and others who have passed our examinations can obtain it. A close check is kept on all tuberculin sent out, and every dose must be accounted for to the Sanitary Board, either by temperature records, returned tuberculin, or an explanation as to what was done with it.

From present indications it seems highly probable that there will be in the neighborhood of 150,000 cattle tested with tuberculin during the present year.

W. D. Clark,
State Veterinarian.
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<th>Name</th>
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<td>Allen, Dr. L. J.</td>
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