Seventeenth Annual Meeting
OF THE
United States Live Stock
Sanitary Association

CHICAGO, ILLINOIS
DECEMBER 2, 3 and 4, 1913
Report of the Seventeenth Annual Meeting
OF THE United States Live Stock Sanitary Association

CHICAGO, ILLINOIS
DECEMBER 2, 3 and 4, 1913
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>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officers and Committees</td>
<td>6-7</td>
</tr>
<tr>
<td>Constitution and By-Laws</td>
<td>8-9</td>
</tr>
<tr>
<td>List of Members</td>
<td>253</td>
</tr>
<tr>
<td>Opening Address, by C. P. Caldwell, President Chicago Medical Society</td>
<td>11</td>
</tr>
<tr>
<td>Response to Opening Address, by W. H. Dalrymple</td>
<td>14</td>
</tr>
<tr>
<td>President's Address, by Peter F. Bahnsen</td>
<td>16</td>
</tr>
<tr>
<td>Hog Cholera—</td>
<td></td>
</tr>
<tr>
<td>The Control of Hog Cholera—A Review of Four Months' Work</td>
<td>38</td>
</tr>
<tr>
<td>How May a State Most Effectively Combat Hog Cholera? By J. W. Connaway</td>
<td>46</td>
</tr>
<tr>
<td>Necessary Equipment of Laboratories for the Production of Hog Cholera Serum, by Paul Fischer</td>
<td>48</td>
</tr>
<tr>
<td>The Control of Hog Cholera in Germany, by Kurt Schern</td>
<td>50</td>
</tr>
<tr>
<td>Report of Committee on Uniform Methods for the Control of Hog Cholera</td>
<td>205</td>
</tr>
<tr>
<td>Farm and Dairy Sanitation—</td>
<td></td>
</tr>
<tr>
<td>The Purity of the Farm Water Supply and Practical Methods</td>
<td>72</td>
</tr>
<tr>
<td>of Insuring Clean Drinking Water, by H. A. Whittaker</td>
<td></td>
</tr>
<tr>
<td>Some Effects of Poor Ventilation, by C. C. Lipp</td>
<td>97</td>
</tr>
<tr>
<td>Elimination of Sources of Contamination in Milk, by W. D. Frost</td>
<td>101</td>
</tr>
<tr>
<td>Report of the Commission on Milk Standards</td>
<td>222</td>
</tr>
<tr>
<td>Tuberculosis—</td>
<td></td>
</tr>
<tr>
<td>The Present Status of the Control of Bovine Tuberculosis by Vaccination, by S. H. Gilliland</td>
<td>107</td>
</tr>
<tr>
<td>The Possibilities and Limitations of the Intradermal Test for Bovine Tuberculosis, by C. M. Haring</td>
<td>114</td>
</tr>
<tr>
<td>Delayed Reactions Following the Injection of Tuberculin, by J. G. Wills</td>
<td>78</td>
</tr>
<tr>
<td>Report of Committee on Extension Work of International Tuberculosis Commission</td>
<td>202</td>
</tr>
<tr>
<td>Control Work—</td>
<td></td>
</tr>
<tr>
<td>Present and Future Attitude of the Railroads Toward Live Stock Sanitary Control Work, by F. S. Brooks</td>
<td>132</td>
</tr>
<tr>
<td>Proper Basis for Interstate Recognition of Health Certificates, by S. H. Ward</td>
<td>137</td>
</tr>
<tr>
<td>The Control of Hog Cholera by Slaughter Methods, by George Hilton</td>
<td>138</td>
</tr>
<tr>
<td>Necessary Regulations for Inspection and Disinfection of Horses and Mules for Interstate Shipment, by C. E. Cotton</td>
<td>147</td>
</tr>
<tr>
<td>Official Inspection on Interstate Cattle, by C. J. Marshall</td>
<td>151</td>
</tr>
<tr>
<td>Tick Eradication—</td>
<td></td>
</tr>
<tr>
<td>The Most Successful Methods of Tick Eradication, by J. A. Kiernan</td>
<td>163</td>
</tr>
<tr>
<td>Miscellaneous Papers—</td>
<td></td>
</tr>
<tr>
<td>The United States Government Meat Inspection, by V. A. Moore</td>
<td>19</td>
</tr>
<tr>
<td>Measles in Live Stock and Its Relation to Rural Sanitary Conditions, by B. H. Ransom</td>
<td>24</td>
</tr>
<tr>
<td>The Diagnosis of Glanders, by J. R. Mohler and A. Elchhorn</td>
<td>28</td>
</tr>
</tbody>
</table>
The Control of Glanders in New York State, by J. F. DeVine... 34
Investigations With Swamp Fever, by L Van Es.................. 67
Observations on Dourine in the Northwest, by A. W. Miller 184
Anthrax immunization and Control, by E. R. Forbes............. 187
Investigations of the Etiology of Infectious Abortion of Mares
and Jennets, by E. S. Good................................ 189

BUSINESS SESSIONS.

Membership .................................................. 192
Appointment of Delegates .................................... 192
New Committee ................................................. 192
Federal Registration of Tuberculosis-Free Cattle .......... 192
Election of Officers ........................................... 192
Proposed Joint Session With Chicago Medical Society........ 192
Proposal for Change in By-Laws ............................. 192

REPORTS.

Committee on Legislation ..................................... 193
Committee on Finance ......................................... 195
Committee on Resolutions ..................................... 196
Committee on Uniform Regulations ........................... 197
Committee on Cattle Tick Eradication ....................... 200
Committee on Extension Work of the International Committee on
Control of Bovine Tuberculosis .............................. 202
Committee on Uniform Methods for the Control of Hog Cholera... 205
Committee on Suggested Meeting at Panama-Pacific International
Exposition, San Francisco, 1915 ............................. 218
Secretary-Treasurer ............................................. 218
Commission on Milk Standards ................................ 222

State Live Stock Sanitary Officials—
California ....................................................... 241
Colorado .......................................................... 242
Delaware .......................................................... 242
Iowa ............................................................... 243
Kentucky .......................................................... 248
Louisiana .......................................................... 244
Maine ............................................................. 245
Mississippi ....................................................... 246
Montana ........................................................... 246
Nevada ............................................................ 247
New Jersey ....................................................... 247
New Mexico ...................................................... 247
New York ........................................................ 248
North Dakota .................................................... 248
Oregon ............................................................ 249
South Carolina ................................................... 250
Texas .............................................................. 250
Wyoming (State Veterinarian) ................................ 251
Wyoming (Board of Sheep Commissioners) .................... 252

ILLUSTRATIONS.

Fig. 1.—Sketch showing surroundings of feed lots where cattle in-
fested with Cysticercus bovis were fed ....................... 25
Fig. 2.—Lesion in lungs of Cow No. 2 ........................ 79
Fig. 3.—Cow No. 2 ............................................. 81
Fig. 4.—Lesion in lung of Cow No. 13 ......................... 82
Fig. 5.—Injection of tuberculin for intradermal test ........ 115
Fig. 6.—Local reactions to intradermal test .................. 116
Fig. 7.—Reaction to ophthalmic test .......................... 118
OFFICERS—1914

President.
S. H. Ward, St. Paul, Minnesota.

Vice Presidents.
C. M. Haring, Berkeley, California.
F. S. Brooks, Kansas City, Missouri.
V. A. Moore, Ithaca, New York.
E. R. Forbes, Fort Worth, Texas.

Secretary-Treasurer.
John J. Ferguson, Chicago, Illinois.

Finance.
W. F. Crewe, Bismarck, N. D.
D. F. Luckey, Columbia, Mo.
E. Pagram Flower, Baton Rouge, La.

Legislation.
John R. Mohler, Washington, D. C.
C. A. Cary, Auburn, Alabama.

Credentials.
P. F. Bahnsen, Atlanta, Ga.
Wm. Penn Anderson, Amarillo, Texas.
W. J. Butler, Helena, Montana.

Resolutions.
C. E. Cotton, Minneapolis, Minnesota.
Fred F. Walker, Boston, Mass.

Program and Publication.
John J. Ferguson, Chicago, Illinois.
B. H. Ransom, Washington, D. C.
W. G. Chrisman, Blacksburg, Virginia.

Uniform Health Certificate.
J. A. Kiernan, Birmingham, Alabama.
A. Joly, Waterville, Maine.
E. Pagram Flower, Baton Rouge, La.
J. I. Gibson, Des Moines, Iowa.
W. N. Waddell, Fort Worth, Texas.
V. C. WHITE, Boise, Idaho.
C. A. CARY, Auburn, Alabama.
SAM GRAYBILL, Topeka, Kansas.
C. D. LOWE, Morristown, Tennessee.

**Cattle Tick Eradication.**

GEORGE WHITE, Nashville, Tennessee.
W. H. DALRYMPLE, Baton Rouge, Louisiana.
M. RAY POWERS, Clemson College, S. C.
CHAS. F. DAWSON, Jacksonville, Florida.
C. A. CARY, Auburn, Alabama.
W. G. CHRISMAN, Blacksburg, Virginia.
R. M. GOW, Fayetteville, Arkansas.
W. N. WADDELL, Fort Worth, Texas.
P. F. BAHNSEN, Atlanta, Georgia.

**Extension Work of International Tuberculosis Commission.**

M. H. REYNOLDS, St. Anthony Park, Minnesota.
JOHN R. MOHLER, Washington, D. C.
JOHN J. FERGUSON, Chicago, Illinois.

**Uniform Methods for Control of Hog Cholera.**

PAUL FISCHER, Columbus, Ohio.
M. DORSET, Washington, D. C.
A. T. KINSLEY, Kansas City, Missouri.
W. H. DALRYMPLE, Baton Rouge, Louisiana.

**Suggested Meeting at Panama-Pacific Exposition, San Francisco, Grievances.**

B. F. DAVIS, Cheyenne, Wyoming.
E. PEGRAM FLOWER, Baton Rouge, Louisiana.

1915.

JOHN J. FERGUSON, Chicago, Illinois.
S. H. WARD, St. Paul, Minnesota.
C. J. MARSHALL, Harrisburg, Pennsylvania.
Constitution and By-Laws

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

CONSTITUTION

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

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

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

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

BY-LAWS

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

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

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

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

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

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

Section 7. The revenue of this Association shall be derived as fol-
laws: 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.
Reports of Standing Committees.
Reports of Special Committees.
Report of Secretary-Treasurer.
Reading of papers, discussions, etc.
New business.
Election of officers.
Appointment of committees.
Adjournment.

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

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

Section 11. All proposals for the alteration of the Constitution and By-Laws shall be submitted in writing, and no alteration shall be acted upon until it has been referred to the executive committee and presented anew by them at the next meeting of the Association.
Report of the Proceedings

OF THE

Seventeenth Annual Meeting of the United States
Live Stock Sanitary Association

Hotel Sherman, Chicago, December 2, 3 and 4, 1913

MORNING SESSION, DECEMBER SECOND.

The meeting was called to order at 9:30 a. m. by the President, Peter F. Bahnsen of Georgia.

Opening address by Dr. C. P. Caldwell, President Chicago Medical Society. Mr. President and Members of the United States Live Stock Sanitary Association: I consider it a great honor, as it is a pleasure, to be invited to address an Association of scientific gentlemen, whose main object is the protection of public health through the study of the question of a pure and adequate food supply.

As the President and in the name of the Chicago Medical Society, which, by the way, is the largest and best organized local medical society in the world, with a membership of 2,500 physicians, I desire to pledge to your organization our earnest support and active cooperation.

Here at Chicago, during the first week of December, annually assemble the forces responsible for creating the meat supply of the United States. Out at the Stock Yards are congregated the efforts of the master breeders and feeders of the nation, a spectacle which for the moment engages public attention. The United States Sanitary Association constitutes an agency of progression not only essential to this great live stock industry, but in a large measure to the maintenance of the public health. During the sixteen years of activity of this Association gigantic progress has been made by veterinary science. The "hoss doctor" who enjoyed scant respect twenty years ago has evolved into a skilled professional man indispensable in the growing complexity of modern civilization.

Gradually but surely the medical and veterinary professions have engaged in co-operation work until today they are allied forces working for the public weal.
The veterinarian has succeeded in securing state laws for the advancement and elevation of his profession, veterinary colleges have improved their standards of education and you have attained the standing of professional men in every sense of the term.

Instead of being a drag on education you have become educators, and in congratulating you on this attainment I desire to assure you that the medical profession fully realizes the growing importance of the branch of science you represent, and as time works along co-operation will be even closer than at present.

The veterinarian is essentially a sanitarian. It is as important to prevent disease as to cure it, and I believe every physician should have a knowledge of veterinary science. A few years ago it was considered of little importance whether a physician knew about infectious diseases of animals or not, but bacteriological researches have opened up comparatively a new sphere of science, and we recognize that many diseases are due to specific micro-organisms capable of causing disease both in mankind and the lower animals, rendering it necessary for the physician to have had training in comparative pathology to do his duty by his patients.

Gentleman, we welcome the veterinary scientists, realizing that the greater the degree of efficiency reached by your sanitary boards the more effectively will diseases of the human family be controlled.

The veterinary profession should be represented on every board of health and legislators impressed with the importance of providing state sanitary boards with sufficient funds to control and stamp out contagious and infectious diseases.

The veterinarian of today is engaged mainly in preventive work; in fact, that appears to be his logical function. He forestalls infection, and in that capacity he has already saved the live stock interest of the country millions of dollars. In this connection I desire to express emphatic approval of the efforts now being made by Dr. Dyson, the State Veterinarian, to prevent the State of Illinois from continuing to be the dumping ground for diseased animals from adjoining states. For some reason or other, Illinois has lagged in this preventive work, with the result that a large percentage of the milk supply of our state is drawn from tuberculous herds, a condition obviously intolerable, only needing energy and ability for correction. Illinois ought to be placed in the same position as other states, which have effectively stopped the importation of disease and have only to contend with sporadic local outbreaks. If Dr. Dyson succeeds in accomplishing this for Illinois, and I believe he will, the whole state will be his debtor, and it is a work which deserves the hearty co-operation of the medical profession. I am afraid that the importance of this infected milk supply question has been minimized and solution of such a vital problem will necessitate strenuous work, both by live stock sanitarians and physicians. While upon the question
of milk I may state that the Chicago Medical Society has for several years maintained a milk commission composed of its own members. This commission has supervision over a number of dairies in northern Illinois and southern Wisconsin. These dairies produce and ship to Chicago a pure and clean raw milk certified by a sealed cap of the Chicago Medical Society. Wherever a dairy has been certified under our requirements, it has proven an object lesson to neighboring dairies producing a commercial milk, and has improved their output. The herds are tested every six months for tuberculosis. We have been able by careful detail to deliver in Chicago a clean, raw milk having a bacterial count of less than ten thousand per c. c. Some of these dairies have been able to maintain, for over a period of four years, an average bacterial count of less than 2,500, as compared to the Chicago standard for commercial milk of 120,000 c. c.

Our members have taught their clients the benefit of clean raw milk, with the result that where four years ago 10,000 quarts of certified milk were used per month in Chicago, 300,000 quarts are now being delivered. This demonstrates that it is only a question of educating the public and creating public sentiment. Gentlemen, if the newspapers would give your Association and its achievements one-fourth the space devoted to a description of a duplex milking and ice cream machine, or the King's horses, or Madame Highbrow's ermine cloak at the Live Stock Show, it would save you a long and weary educational campaign by other methods.

The battle for the eradication of tuberculosis has merely begun, and in that fight the sanitarian must be an important factor. Another sphere for co-operative work by the two professions is that of securing proper inspection of municipal slaughtering. Where federal inspection is enforced, the public health is well safeguarded, but scattered all over the country, from the Atlantic to the Pacific, are abattoirs, large and small, where sanitary conditions are deplorable, no restriction whatever being enforced. Such slaughterers are able to remove evidence of disease and sell the carcass without hindrance. This practice is a constant menace to the public health. It is such a condition that warrants the conviction that every board of health should have a veterinarian among its members, that the meat and milk supply should be placed above suspicion. Each profession needs the other, and the public needs us both.

Gentlemen, you have already accomplished much, but the work has barely been commenced. One has merely to glance at your programme to realize the comprehensive nature of your task. Repression and eradication of the cattle tick is of itself a gigantic campaign, its success meaning a vast and needed increase to the beef supply and creation of wealth to the southern states now inflicted by that pest. Only a few years ago we did not even know the nature of the tick or the cause of splenetic fever and yet, in a brief period
your science has determined beyond all possibility of skepticism that the cattle raiser of the south may be relieved of this handicap.

Control of hog cholera has also been demonstrated to be practicable. I will not attempt to estimate, even approximate, the value of this work to the farmers and meat consumers of the United States, but I know personally more than one hog raiser who is ready to testify to the merit of preventive measures so far as his product is concerned. Once the grower recognizes the fact that he needs a preventive, rather than a cure, the value of your campaign to control hog cholera will be realized.

Gentlemen, the health of our food producing animals is largely in your hands. Doubtless tuberculosis, anthrax, hog cholera and other diseases to which animal flesh is heir will always be with us in some degree, so that your task will never be completed, but the medical profession realizes the importance of your work, assures you of its willingness to co-operate and congratulates you upon the splendid success which has attended your scientific labors. (Applause.)

Dr. Dalrymple: Mr. President, Dr. Caldwell, Members of the Association—I deeply appreciate the honor, Mr. President, of being invited to respond to the address of welcome on this occasion, although I fully appreciate that the honor might have been placed in abler hands. On behalf of the United States Live Stock Sanitary Association I desire to thank you most heartily, Dr. Caldwell, for the cordial welcome extended to this Association, which is this year holding its annual meeting in the great City of Chicago.

When you were speaking I felt that it was a treat to hear such a prominent member of the medical profession express his conviction of how we are appreciated in our work by the medical profession. It occurred to me also that but a few words of response would be necessary, as Dr. Caldwell does not require to be told what this Association is doing or what its work is meant for—he seems to be fully conversant with the work we are trying to do for the good of humanity.

When thinking of sanitary matters and in the discussion of them I am often reminded, Dr. Caldwell, of the impressive words of the immortal Parkes—Edmund Alexander Parkes, the father of modern hygiene—when he said: "If we had a perfect knowledge of the laws of life and could practically incorporate this knowledge into a system of hygienic rules, disease would be impossible." It is not reasonable, of course, to expect that such perfect knowledge will ever be obtained, and even if obtained, it is scarcely likely to be acted upon. The laws of life, or, rather, the dangers from disease, will never be appreciated by the human family; they are too readily and too easily effaced from the public mind. So far as this Association is concerned, our aim is to endeavor to apply this knowledge, especially of sanita-
ton, in the conservation of the health and life of the domestic animals, and through that the public health, the health of man and the general betterment of the public.

Sanitary laws seem to have been in existence in very ancient times, and are found in very ancient history. I believe it is said that if the sanitary laws embodied in the code of Hammurabi, who ruled over Babylon some twenty-one hundred years before the Christian era, were in effect to-day very little change would have to be made. In those laws we have undoubted evidence of the existence, not only of the medical practitioner, but of the veterinary practitioner. If I recollect correctly, there is in these sanitary laws something after this fashion: "If a doctor of an ox or an ass should treat a wound in an ox or an ass and cure it he (the doctor) receives one-sixth of a shekel of silver for his fees, but, on the other hand, should the animal die he (the doctor) must give to the owner one-fourth of the price of the ox or the ass;" I am trying to quote the words of the code. In the case of the medical man, his fees were somewhat larger, and in the case of a severe wound, if the patient were a noble or an aristocrat, the doctor who successfully treated the wound received something like ten shekels of silver, and if the patient were a prebeian or slave he received five shekels for his cure. If his aristocratic patient should die the medical man was subject to the loss of both hands. Now, from that it would seem to me that even in those ancient days they had a very fair knowledge of the uses of disinfectants and anaesthetics, otherwise I am afraid they would have had a good many handless M. D.'s in those days. It indicates to me, I think, and to all of us, that they had a knowledge of sanitation, so far as the use of disinfectants and antiseptics was concerned.

This, I understand, Mr. President, is the seventeenth anniversary of our organization. It began as a rather small and modest organization seventeen years ago, and was then known as the Interstate Association of Live Stock Sanitary Boards. Its growth and progress have really been phenomenal, until in 1909, I think it was, its name was changed to the United States Live Stock Sanitary Association in order to enlarge the scope of the work. To-day, you see, we have a very fair representation in membership, and we find gentlemen here representing all of this great country; there are members present here to-day from the North and the South and the East and the West. Our work is national, we consider national problems as well as state problems, trying to bring about a uniformity in procedure and in the prosecution of the various live stock sanitary laws. I think I might say also that even our governmental department is guided to some extent by the deliberations in this body in some of the work which it has to do. The work, as I say, is national. We take into consideration the insidious and fatal diseases of animals with the purpose of trying to bring about conditions that will benefit not
only the animal itself and the economic conditions but, Dr. Caldwell, as you have said, the public health of the country. From that you will see that our work is national, and it is a most important work and carries with it a great deal of responsibility, as we are to an extent looked to by the country, if you will, to do that work conscientiously, both from the economic standpoint and the standpoint of public health.

I don't want to take up too much time, but I desire again, Doctor, to thank you very cordially for the warm welcome, and the way it has been expressed, from you, on this occasion, on behalf of the Association. (Applause.)

PRESIDENT'S ADDRESS.
By Peter F. Bahnsen, Atlanta, Georgia.

A time-honored custom extends to the Presidents of our modern organizations the privilege of expressing their views on such subjects as appeal to them as of more than passing importance; this expression is honored by receiving the title of "The President's Address."

I have nothing special to offer, as I take it for granted that all of you are as familiar with the existing conditions of our livestock sanitary control as I am. With your indulgence I will therefore present a brief review of the growth of the Association and suggest a few thoughts that appear to me as worthy of reiteration, which, if kept in mind, will tend to a healthy growth of our organization.

The following brief historical review of the Association was furnished by Dr. C. E. Cotton:

The United States Live Stock Sanitary Association was organized under the name of the Inter-State Association of Live Stock Sanitary Boards, in October, 1886, at Fort Worth, Texas, where it held its first meeting, electing Col. C. P. Johnson of Illinois as President and Taylor Riddle of Kansas as Secretary. The purpose of the organization was to make recommendations to the Department of Agriculture for the fixing of the quarantine line for Texas fever.

The second annual meeting occurred at Omaha, the third at Chicago, the fourth at Louisville, the fifth at Buffalo, the sixth at Wichita, the seventh at Denver, the eighth at St. Louis, the ninth at Guthrie, Okla.; the tenth at Springfield, Ill.; the eleventh at Richmond, the twelfth at Washington and since then in the city of Chicago.

The association, for the first few years, had a small attendance, representing but a few states and territories. The first publication of the proceedings was that of the annual meeting in 1903, held at Denver, where there were representatives from eleven states in attendance.

Perhaps the most successful meeting in the early history of this Association was that held at St. Louis in 1904. There were thirty members present, representing seventeen states, and at this meeting there were papers and discussions on contagious diseases and problems confronting the livestock sanitarian, as well as on the Texas fever question.

Interest in the Association and its work gradually grew, until in Washington in 1908 there was a large and enthusiastic meeting held, with some sixty odd in attendance, representing twenty states and members of the Bureau of Animal Industry.

In the year 1909 the meeting was held in Chicago, where there were
some seventy odd in attendance, representing thirty states. Prior to this meeting the Association had no constitution and by-laws and any member of a state live stock sanitary board whose state had paid Ten Dollars annual dues, had a voice in the meetings. At this meeting a constitution and by-laws were adopted and each member of a state or municipal live stock sanitary board, state veterinarians, employees of the Bureau of Animal Industry, or any one interested in live stock sanitation was made eligible to membership. By the new constitution the name was changed to the United States Live Stock Sanitary Association.

The finances of the association were always limited and embarrassing to the officers until the meeting of 1910, when through the good offices of the then and present Secretary and the change in the collection of annual dues, this difficulty was overcome.

United States Live Stock Sanitary Association—what a wonderful scope for useful activity; yet, how specific its very purpose. Its preamble, fixed by the constitution, reads as follows: "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."

Associations grow more numerous day by day, the very atmosphere in which we live breathes organization, but one after one, some old, and many newly hatched, associations die of inertia or their membership is assimilated by more active organizations.

It is true many bodies have assembled and organized on principles so broad and interests so diversified as to force the various special interests in question to segregate. This last named condition often happens where special interest is one form or another is to be served. But in an organization whose principal aim is to best serve the public, it is far better that all factions be represented. Nothing helps in broad public questions like the "Get together and pull together spirit."

Had this Association accomplished nothing except to aid in advancing the cause of tick eradication, it would not have been created in vain. But it has done more—much more. As an organization we may point with pride to that better understanding and a determination to help one another, which is a natural outgrowth of our annual meetings and discussions. Not only do we understand each other better, but the public understands us better and respects us more. It took several years to get results out of the Uniform Health Certificate agitation. Not all states have as yet adopted this Uniform Health Certificate, but in due time they will. The annual discussion of the tuberculosis problem is gradually rounding into proper form for intelligent, uniform action. It is needless for me to even hint to you of the magnitude of the task. The ever-recurring question, Shall the several states take up this work, or shall we wait for action of the Bureau of Animal Industry? is still unsolved. My personal opinion is that each state should fortify itself against the introduction of diseased cattle, the Bureau lending such co-operation as its own appropriations would justify; lending their aid especially to such states as are busily engaged helping themselves.

Of late years special interest has been manifest in the suppression of hog cholera and in obtaining a sanitary milk supply. Our meetings have offered every opportunity for discussing these subjects of such vital importance to all the people. The best talents engaged in the respective branches of sanitary control work referred to have spread their experience and observations before us. It is true these problems have not yet been conquered, but we must remember Rome was not
built in one day—"Sondern es haben viele Haende viele Tage fleissig
daran gearbeitet."

Primarily this Association was organized to aid each member in
rendering a more efficient service to the people. Should it ever fail
in this its days are numbered. A useless organization is a dead body
and dead things ought to be buried. However, there is no danger of
this organization being inactive as long as its present membership re-
 mains in its fold. Some may need a curb, none need the spur. And
yet the first duty of any association is the duty of self-preservation.

Show me an organization untrammeled by impending financial
difficulties and I'll show you an organization whose members take pride
in voicing the sentiment of the immortal Scott, "This is my own." An
association whose membership live in constant dread of special assess-
ments to pay obligations long since due have an irrepressee tendency
to contract "cold feet," and why not? It is very romantic to stoically
stand on the deck of a sinking ship; provided the limelight of public
admiration is illuminating the scene, but most of us would prefer to
have a seat in the life boat and take future chances of gaining immortal
fame.

This is a rather heterogeneous organization, consisting as it does
of men employed by various interests to perform various duties. In a
way we are all seeking the same goal, yet, our opinions often vary
and our actions lack harmony.

Under the provisions of our by-laws this organization is made up
of men who represent varied views of the many sided problems of live
stock sanitary control. We have the scientific investigator, whose laud-
able ambition is ever and alone in search of the ideal, his very thoughts
rebel against conditions as they exist, his constant aim is what they
should be. Aiming high, it is no reflection on his integrity or ability
should he miss the mark.

Then we have the direct representatives of the people, the Bureau
of Animal Industry members, members of the Live Stock Sanitary
Boards, and the State Veterinarians whose duty it is to put into prac-
tical service the information and experiments which have received
the O. K. of scientific investigation. They must, in their respective
territories, stand sponsor for the various methods endorsed and em-
ployed by them to obtain results in their work; it is their duty to
see that no unfavorable legislation relative to their task is enacted
into law; and then they must see to it that the laws, once enacted,
are carried into effect—this duty alone will keep any ordinary man
in a sea of troubles and perplexities. One-half of the public is urging
them to rigid enforcement of the law, while the other is equally as
active demanding special exception for themselves and their interests,
or are busily engaged trying to repeal a law that does not appeal to
them.

Then we have the representatives of transportation companies—my
heart goes out for them in their troubles. Long experience in dealing
with these men has convinced me that they are anxious to comply
faithfully with every requirement of law. Daily they run the gantlet
of, to them no doubt, an endless confusion of diverse state and federal
restrictions and requirements on the one side and on the other side the
ofttimes incomparable stupidity of a cheap clerk or agent, plus the
over-anxiety of the soliciting freight agent, who is vastly more inter-
ested in securing business than in seeing that sanitary requirements
are enforced.
I believe we could help these men to help us by bringing about a more uniform requirement and by adopting one uniform state or interstate health certificate. Even at that they would have troubles enough of their own. A realization of these various viewpoints and interest will broaden our personal views and make us more tolerant toward each other. A man of contracted ideas and with pin point observation is unfit to struggle with the many intricate problems of live stock sanitary control.

The first duty of any organization is self-preservation. Unless this great fundamental principle is constantly kept in mind the purpose of the Association will avail little. Any organization tottering—a financial wreck—through a few spasmodic conventions cannot hope to impress its influence for good upon a country or its people. Independence and an ability to meet all obligations promptly are as essential to an organization as to a business enterprise or an individual.

We have been fortunate in obtaining a Secretary who pulled the old ship safely through the financial storm. What is the future outlook for this Association?

Candidly speaking, our possibilities are beyond conception. Properly pulling together we shall achieve results far in advance of our fondest anticipation. Rules and regulations endorsed by us will be enacted into laws. Needed appropriations, when backed by the Association, will be forthcoming. A mere word of caution from this body will make the unscrupulous dealer and the crooked veterinarian trouble. A certificate of membership will be a badge of honor. Our annual proceedings will be an international textbook on live stock sanitary control.

Shall we pull together? I believe we will.

THE UNITED STATES GOVERNMENT MEAT INSPECTION.

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

There is no public service in which sanitarians should be more interested than in the United States Government Meat Inspection. There is no other protective service in connection with food production that has been more difficult to establish, that has had greater obstacles to overcome, that has made more rapid progress and that has protected more people. Although the first legislation relative to federal meat inspection—that of Aug. 30, 1890 and March 3, 1891—pertained more to the finding of a market for our pork and pork products than to safeguarding the people against unwholesome meat, it was the beginning of what has developed into a Federal Meat Inspection which compares most favorably with any other in the world. This is a strong statement, but it is not made with a spirit other than that of genuine appreciation that our government officials have profited by the experience of the pioneer nations in this work and have incorporated as far as possible the best of modern methods on the subject.

The law of 1906 authorized the Secretary of Agriculture to prescribe regulations for the careful inspection, for disease or other unwholesome conditions, of the carcasses of animals at the time they are slaughtered; to require the packing houses to be kept in a sanitary condition; and to inspect all meat and meat products before they are placed on the market. This authority applies only to those establishments which are engaged in export or interstate trade. Following the enactment of this law, it was necessary for the Department of Agriculture to prepare and enforce regulations to cover the three essential points, viz., the inspection of carcasses; the sanitary control of

19.
the establishments; and the re-inspection of the meat and meat products.

The efficiency of a meat-inspection service depends upon two important factors, viz., the comprehensiveness of the regulations and the thoroughness with which they are enforced. The sanitary value and justice of the regulations are measured by the extent to which they embody protection against insanitary handling of carcasses and the effect of diseased and spoiled meat upon the consumer; and the degree to which they are enforced rests with the executive, educational and moral qualities of the inspectors.

In the growth of the present government regulations, it should be stated that under the legislation enacted prior to 1906, the Secretary of Agriculture had issued regulations relative to the inspection of animals before and after slaughter, and had prescribed rules for the condemnation of carcasses because of disease and injuries. These are known as Bureau of Animal Industry, Bulletin No. 9 (1895), Order No. 33 (1899), Order No. 125 (1904), and Order No. 137 (1906), and various amendments thereto. In the formulation of that part of the regulations pertaining to the diseases of animals and the physical conditions that should condemn the carcasses, the experiences of other governments, especially Germany, were largely drawn upon. After the law of 1906, which extended the authority of the Secretary to the sanitary control of packing houses and to the inspection of the preserved meat and meat products, he appointed a commission to revise the regulations that were in force at the time the new law went into effect, concerning the inspection of animals for disease. This commission was headed by Professor W. H. Welch of The Johns Hopkins Medical School. The commission recommended certain changes in the regulations then in force and these were adopted by the Department. The regulations of 1907, known as Order No. 150, and which are still in operation, are more rigid than those of other countries, in that they do not provide for the sale, under prescribed restrictions, of certain classes of meat which other countries utilize. The principle underlying these regulations is that if an animal is diseased or injured in such a way that its flesh may be dangerous or unsafe for the consumer, its carcass shall be condemned. The regulations give the consumer every possible protection. The extent of this protection is illustrated by the last report of the Bureau of Animal Industry, which states that during the year 1911 Government inspection was carried out in 939 establishments, located in 266 cities and towns. There were 52,976,948 carcasses inspected, of which 117,383 were condemned and 82,710 passed for tallow and lard. In addition to the inspection of the carcasses at the time of slaughter, 6,934,233,000 pounds of meat and meat products were inspected and of these 21,073,577 pounds were condemned.

The qualifications of the veterinary inspector are assured by the requirements imposed by the Government that, first: He must have graduated from a recognized veterinary college, and, secondly, that he must have passed a civil service examination in veterinary medicine. Again, to insure for the inspector a more thorough scientific training, the Department, some years since, prescribed the minimum requirements, in the way of curriculum, equipment and teachers, for the veterinary colleges whose graduates are eligible to take the examination.

In organizing the Meat Inspection Service under the law of 1906, the Government secured trained and experienced men to assist in formulating regulations for the guidance of the inspectors. Likewise, the veterinary inspectors have been taken from those who have qualified
by their special training and who have been successful in a competitive, technical examination. The meat inspectors are also trained men and skilled in the detection of tainted or sour meat. I do not know of any better mechanism for securing an efficient public service.

The sanitary control of the packing houses presents difficult problems. In many ways they are more trying to deal with and harder to overcome than the inspection of the carcasses. The meat business, in this country, began in a small way and after the fashion of the country butcher. The killing and dressing of animals for food has always been looked upon as a disagreeable task; because of the dirt and blood associated with it, the inference seems to have been that the work should be done in a dirty place. With the growth of our population, business rapidly increased and necessitated such repeated additions to the slaughter houses that at the time the present law went into effect there were many large, poorly planned, dark, unventilated structures. They conformed, however, to the general idea of the meat business at the time they were built and the public did not object to them then any more than the masses do now to the local uninspected slaughter houses. The law of 1906 required that the packing houses having Federal inspection be made sanitary. In response to this, the worst of the buildings were in some cases condemned and in others were voluntarily replaced by new structures. The better ones were more or less remodeled. Windows and skylights were put in, the old half-rotten wooden floors were replaced by brick or cement. The walls were either cleaned and painted or were rebuilt with brick, tile or cement. Toilets and dressing rooms for the men were put in, and ventilation, water and drainage were supplied. Suitable benches, tables and trucks were provided for holding the viscera and for handling the meat. A system was instituted for frequent and thorough cleaning of the floors, walls and all tables, trucks and implements. The coolers were repaired. The wagons for transferring the meat were kept clean. In fact, a great change took place. Actually millions of dollars were spent in bettering the conditions for the more sanitary handling and preserving of the meat and meat products. This work is still in progress. I have personally observed in New York, Buffalo and Philadelphia extensive building operations in connection with the packing house business and I am informed that the same is true in other places. While there still remain old buildings, there is not to my knowledge a single packing house having official inspection that is not kept clean and in such a sanitary condition that meat can be handled within it in a wholesome manner. I know of no other industry where such large expenditures have been made in so short a time to improve the conditions for protecting the product.

In the evolution of our meat inspection service teachers as well as pupils have had to learn. Nowhere in Europe is slaughtering done on so large a scale as in this country. There is still much to learn about almost every feature of the packing house business with reference to the best facilities and methods of inspection. But the splendid co-operation usually existing between inspectors and packers will hasten the time when throughout the establishments the most desirable equipment will be installed and the most sanitary methods for inspecting and handling the meat will be employed.

Although the Bureau of Animal Industry has enforced a thorough meat inspection, with every year showing improvement over the previous one, there have been numerous and unjust criticisms of the work. Its very success is a challenge to the destructive critic. There is no
one more familiar with the weak places in this service and the difficulty in correcting them than the Department itself. Seven years ago our Government stepped into the business offices of hundreds of establishments and practically said to the proprietors, "You must submit to our directions regarding the condemnation of carcasses and preserved meats. You must put your establishments in a sanitary condition. You must do as we say or you cannot continue your business." More trying than persuading the packers of the justice of this new regime was the necessity of employing hundreds of inexperienced veterinarians to enforce the new law. This was a herculean task for the Department of Agriculture. However, the law was obeyed and a great reform took place in the sanitary methods of handling and inspecting meat. While criticisms have been frequent, I have failed to see in the public press any statement concerning the splendid work of the Department, and the wonderful progress which has already been made in safeguarding the public against unwholesome meat food. The insanitary and filthy slaughter houses have been transformed under inspection into sanitary places where meat is handled in a cleanly manner. The packers have learned that good sanitation in their places of business is a valuable asset. The meat inspection service can never be perfect because of the human element involved. Accidents will happen, mistakes will occur and errors in judgment will be made. These will exist under any system that can be devised.

An analysis of the criticisms will show that they are petty, being based on some error or accident, or more general attack upon the service. They are largely along two lines—namely, administrative and faulty regulations. The administrative complaint has been largely in connection with the Service Bulletins. A careful study of these Bulletins shows that they are virtually letters of instruction from the Chief of the Bureau to the inspectors and necessarily are not of general interest to the public. They are in the interest of efficient inspection and nothing else. The objections to the regulations seem to be confined to the fact that the flesh from animals in which there are localized infections or injuries is allowed to pass into the meat supply. These criticisms are based on the aesthetic rather than the sanitary consideration of the subject.

The time seems to have come when a statement of a few principles which should control meat traffic and meat inspection would be helpful. The purpose is to care for animals in such a way that they will remain well, and when they are dressed for human food, to handle the carcasses in a cleanly manner. The inspection implies that they shall be condemned if they are found to be diseased and passed if they are sound. It is well to remember that technically these are relative terms. The so-called sound bullock may be carrying in his intestines the bacilli of tetanus, botulism and malignant oedema. If from the south, his blood may be able to produce Texas fever in susceptible cattle; his heart muscle may be loaded with sarcosporidia; and the walls of the stomach and intestines may be infested with animal parasites. More than this, there may be the organized remains of pneumonia, pleuritis or peritonitis and the scars of former fractures of ribs and limbs may be found.

Among the infectious transmissible diseases may be mentioned anthrax, rabies, foot and mouth disease, tuberculosis, paratyphoid infections and trichinosis. The flesh of animals infected with these diseases is not known to be dangerous to man after thorough cooking, if we except those affections due to the group of paratyphoid or para-colon bacilli. This statement has a broad historical basis, for in cen-
turies past, flesh from animals thus affected was frequently or even regularly consumed. Each disease has to be considered by itself, if we wish to single out and define the danger to man. The real danger in such diseases as anthrax, rabies and glanders lurks in the handling of the carcass and in eating the uncooked meat by the unsuspecting purchaser, and in the further dissemination of the specific infection. Hence all traffic in any or all portions of carcasses affected with these diseases is prohibited. Trichinous pork is harmless to manipulation, but highly dangerous as an uncooked food.

An examination of the field of animal pathology shows that we actually have few ideally healthy animals. It is hardly to be expected that we should have. The abnormalities encountered are of many kinds, ranging from mere carriers of virus to various stages of local or general diseases. The trained inspector's function is to save meat wherever that can be done, rather than to reject it. The process of rejection is easy, but there would be little meat handled and sold if every minor blemish were counted against the animal.

As a result of this state of affairs, we find inspection of meats governed by different regulations in different countries. The meat inspection laws of Germany are far less exclusive, but at the same time more highly developed and worked out in more minute detail than in this country. As Smith has pointed out, diseased meat is there defined solely in accordance with the potential danger to the health of the human species and to other still healthy animals. Meat is classed as utilizable, non-utilizable and of inferior grade. A fourth class is created which is utilizable only under certain restrictions. These are, that it be sold after sterilization at a lower price and only in small quantities to any one purchaser. In Germany a considerable percentage of animals which our Government inspectors condemn are used for food.

There are many problems for the authorities to settle in the conduct of the meat inspection service and the proper classifications of meat and meat products based on their nutritive value and the physical state of the animals from which they come. The details are intricate and complicated. There are other serious questions relative to the spread of certain diseases of animals where the virus is known to be present in the tissues for several days before the disease can be detected by either symptoms or tissue changes. These problems will eventually be solved and the troublesome questions answered if our Government inspection is continued as a scientific, non-political and strictly civil service organization.

In the final adjustment of our meat inspection a number of changes will undoubtedly be made. The economic or financial aspect of the whole problem will be of no small importance. The strictness with which animals will be condemned because of local conditions or slight disease will eventually be governed by the law of supply and demand. If our meat supply becomes a continuously diminishing quantity, our standards will change and we shall come down more and more to the question of healthfulness, irrespective of other considerations. Because of the general popular misconception at the time the present law was enacted, regarding the dangers to the human family from diseased meat, the regulations of our Government are in some respects severe. We were not ready to accept the classification of meat foods as recognized in other countries. In this work we are still young. To attain perfection in equity to the live stock owners and protection to the public from our Government meat inspection service, we must abide the ripening influence of years.
The lesson for veterinary sanitarians to learn from our Government inspection and to teach in their respective communities is the need for municipal and state inspection that will insure to the people of the country protection against locally killed meat and the insanitary methods of handling it. With our best animals going to distant markets and the others left for the uninspected slaughter houses, it is easy to understand why locally killed meat may be inferior to that of the inspected houses. A state and municipal inspection would be of great service in finding the centers of infection in our farming community, thereby making it possible to eradicate the infectious diseases from the locality. Further, it would educate cattle owners in the necessity of exercising greater care for the protection of their stock. With about 40 per cent of our meat and meat products still uninspected, we cannot hope for the maximum benefits of such a service. As sanitarians, it would seem that our first duty in this matter is to support the efforts of our Government in meat inspection and our second duty to use our influence in extending its benefits to the country as a whole by supplementing it with the institution of Municipal and State Meat Inspection.

MEASLES IN LIVE STOCK AND ITS RELATION TO RURAL SANITARY CONDITIONS.

By B. H. Ransom, Washington, D. C.

It has been determined comparatively recently that measles in cattle is of rather common occurrence in the United States, and still more recently the common occurrence of measles in sheep has been established. Pork measles is extremely rare in the United States and of little practical importance so long as the rural population adhere to the custom of eating pork only after it has been well cooked. It will acquire a great importance if the practice of eating raw or rare pork ever becomes as common as the rare or raw beef habit.

The parasite of beef measles occurs in its adult stage as a tapeworm of man, _Taenia saginata_. The larval stage in beef is commonly known as _Cysticercus bovis_. Human beings acquire the tapeworm as a result of eating raw or imperfectly cooked beef containing the cysticercus. Cattle in turn become infested, as a result of swallowing the eggs of the tapeworm with food or water contaminated by the feces of tapeworm carriers.

In view of the prevalence of measles in cattle, as determined by the post-mortem examination of animals slaughtered under Federal inspection, it is quite evident that _Taenia saginata_ is a common parasite of man in localities where cattle are raised and fed. During the last fiscal year nearly 43,000 beef carcasses were retained on account of measles out of approximately 7,000,000 cattle slaughtered under Federal inspection, over 0.6 per cent. That is, on the average, one out of every 166 cattle slaughtered is found infested with _Cysticercus bovis_. At some stations during certain months of the year the infestation has run as high as 5 per cent, or one animal in every 20.

This infestation traces back directly to improper sanitary conditions in the pasture, barnyard, or feed lot. It is a notorious fact that people living in the country are generally very careless in the disposal of human excreta. On farms privies are commonly lacking. A sanitary commission which has been engaged in work in nine states in this country found by actual inspection in 125 counties that 21,000 out of 43,000 rural homes inspected, nearly 50 per cent, were without privies. It may be, and probably is, true in the states where the major portion of the
cattle industry is located that a much smaller percentage of farms are without privies. In my experience in various parts of the country where the cattle industry flourishes, however, I have found that the privies on farms and in small towns are commonly very imperfect from the sanitary standpoint, and further that on farms it is more often the custom than not for the privies to be reserved for the use of the women and children. Under such conditions it is not at all surprising that *Cysticercus bovis* should be common among cattle. To bring about an improvement in methods of disposing of human excreta on farms will necessarily be a slow process, and will depend chiefly on better education of the people in regard to sanitary matters. There are many places, however, where cattle are gathered together in large numbers and fed for the market on by-products of cottonseed mills, sugar beet factories, etc., which can readily be improved greatly in respect to sanitation. The owners of these places are usually willing to adopt suggestions which will tend to improve sanitary conditions, and a little time devoted by sanitary officials to such places will be well spent.

As an example of insanitary conditions which are almost certain to result in an extensive infestation of cattle with *Cysticercus bovis*, the case of some feed yards at a cottonseed oil mill in Oklahoma is of interest. During the winter and spring of 1911-12 about 1,500 cattle were fed in these yards and later marketed at various live stock centers. Data were obtained relative to the post-mortem examination of 523 of

---

Figure 1.—Sketch showing surroundings of feed lots where cattle infested with *Cysticercus bovis* were fed.
the cattle. The remaining cattle were not traced to the point of slaugh-
ter. The 523 cattle were slaughtered in three lots at different times. Of
the first lot of 251, twenty-five, or 10 per cent, were found infested with
Cysticercus bovis; of the second lot of 201, thirty-nine, or 19 per cent,
were infested; and of the third lot of 71, forty-one, or 58 per cent, were
infested. Altogether, therefore, 105, or 20 per cent of the 523 cattle
slaughtered, were infested with measles, one in every five. The explana-
tion of this high percentage of infestation is evident from the accom-
ppanying sketch (Fig. 1) of the yards and surroundings where the cattle
were fed. This sketch is based upon the report of an investigation made
by Dr. R. F. Eagle, formerly of the Bureau of Animal Industry. It will
be noted that the regular water supply for the cattle was taken from a
river 75 yards below a sewer outlet. The river is about 30 feet wide,
very shallow, and has a very sluggish current. It was observed that
the bank of the river which formed a portion of a tract of land de-
designed for a public park, was strewn with human feces. The cotton-
seed hulls used for feeding the cattle were stored in a building where
tramps commonly slept during the feeding season. Evidence was ob-
tained which indicated that there was more or less contamination of
the cottonseed hulls with the feces of tramps or mill employees to whom
the hull house as a place for defecation would undoubtedly appeal, espe-
cially during very cold weather. About 40 men on an average were
employed at the mill during the winter months. The outhouse toilets
provided for the use of the mill employees were very poorly constructed,
the excreta falling either directly on the ground or in boxes set on the
ground level. It is estimated that between two and three hundred dif-
f erent men used the outhouse toilets during the cattle feeding season,
this estimate being based upon the fact that the mill employees were
mostly transients, many leaving daily and others taking their places.
At the lower end of the feed yards was a stagnant pool which drainec-
r a water shed that includes a portion of the town and the cottonseed
oil mill with its three primitive outhouses. On at least three occasions
during the feeding season, for about three days at a time, the regular
water supply from the river was shut off on account of frozen pipes, so
that the cattle were forced to drink from the stagnant pool.

The cattle in the feed yards in this instance were accordingly ex-
posed to not less than four possible sources of infection with measles.
In the probable order of their importance they are as follows: First,
the outhouses which drained into the stagnant pool in the feed yards;
second, the regular water supply from the sewage laden river; third,
the cottonseed hulls which were more or less subject to fecal contam-
ination; and, fourth, the portion of the town which drained into the
stagnant pool. By drawing upon one's imagination one could scarcely
have devised a better example of insanitary feed yards than that fur-
nished by this actual case.

Sheep meases which has lately been discovered to be common in
this country is of about the same order of frequency as beef measles.
The statistics show that approximately 0.2 per cent of all sheep slaugh-
tered under Federal inspection during the last fiscal year were infested
with measles, but there are certain reasons for believing that this per-
centage is much below the actual percentage of infestation. Meat in-
spection authorities have generally held, on the basis of no good evi-
dence, however, that the sheep mease parasite is Cysticercus cellulosae,
the intermediate stage of Taenia solium, a human tapeworm, in an
unusual host, the sheep instead of its usual host, the hog.

By means of experiments, however, which have been recorded else-
where, I have been able to show that the sheep mease parasite is not
a species transmissible to man, but the intermediate stage of a dog tapeworm. From the public health standpoint the sheep measles parasite is therefore not as important as the beef measles parasite, but from the meat inspection standpoint the parasite is important because meat noticeably infested with parasites is not considered a desirable article of food. In view of the fact that there is good reason to believe that infestation with Cysticercus ovis may sometimes result in the death of the sheep affected, it is important also as a matter of live stock sanitation to prevent the spread of this parasite. Dogs become infested as a result of devouring measles mutton and sheep acquire the parasite as a result of contamination of their food or water supply with the feces of infested dogs.

Propagation of the sheep measles parasite therefore, instead of depending upon the relation of live stock to human beings, depends upon their relation to dogs. Prophylaxis consists, first, in destroying by fire or otherwise disposing of the carcasses of sheep which die on the farm or range in such a manner as will prevent their being devoured by dogs or wolves, and in the general exclusion of raw mutton from the diet of dogs; second, in systematically treating dogs with anthelmintics to rid them of tapeworms. In this connection it may be of interest to note that the Secretary of the National Wool Growers Association is planning to urge upon sheep owners the importance of keeping sheep dogs free from tapeworms. Proper anthelmintic treatment of dogs will not only protect sheep from infestation with Cysticercus ovis, but will also serve to prevent the infestation of live stock with various other more or less common and injurious parasites, such as the gid parasite, the echinococcus parasite, and the thin necked bladder worm.

The following method of treatment for tapeworms has been employed with good results on several hundred dogs by Dr. E. T. Davison of the Bureau of Animal Industry:

Allow the dog to have the usual feed and drink about 3 or 4 p. m. on the day preceding treatment, but give nothing further in the form of food or drink, with the exceptions noted, until after the medicine has acted. About 10 a. m., to a dog of ordinary size, give four 10-grain capsules filled with ethereal extract of male fern (Oleoresina aspidii, U. S. P.), administering at the same time about an ounce of water or milk, preferably the latter. By a 10-grain capsule is meant one which will hold 10 grains of quinine. Forty-five minutes later give a second dose, consisting of four capsules (10-grain) filled with freshly ground areca nut, and with this give as before about an ounce of water or milk. It is important that the areca nut be freshly ground. This treatment is usually followed by profuse defecation and the expulsion of the tapeworm, if any is present, in 30 minutes to an hour after giving the areca nut. No untoward after effects have been noted in any case among several hundred dogs treated with this remedy. The patient is usually ready for his evening meal.

In administering the medicine an assistant stands the dog, up on his haunches and holds the dog's mouth open, firmly grasping the upper jaw in one hand, the lower jaw in the other. The capsules are dropped on the back portion of the tongue, and enough water or milk is thrown in the animal's mouth to make him swallow. After administering each of the two doses the dog's head should be tied up as high as it can hold it and not choke. If this detail is omitted, the patient will almost invariably throw up the dose. During the remainder of the day the dog should be kept in confinement and the fecal discharges gathered up and burned, buried, or otherwise disposed of in such manner as to prevent the possibility of contaminating the feed or water of sheep or other live stock.
THE DIAGNOSIS OF GLANDERS

By

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

It is no longer doubted that in the work of controlling glanders the destruction of the infected animals should be given prompt consideration, and if possible the infection should be traced to its origin. Unfortunately, the nature of the disease is such that only a comparatively small proportion of the cases can be recognized by the ordinary clinical examination, and as long as we limit our efforts to the destruction of these cases, the disease will continue to spread. An effective control can be accomplished only by the elimination of all centers of infection of glanders. Therefore, it is essential primarily to have means of diagnosing accurately all forms of the disease.

Numerous publications have been issued on the various methods of diagnosis, and it seems that while some favor a certain method, or methods, others appear to produce sufficient evidence to point out the inadequacy of these methods. There is no question but that in the last decade important progress has been made in the diagnosis of this disease. In fact, since the discovery of mallein competent investigators have fruitfully studied this phase of the question of the control of glanders, and at the present time we possess several methods by which we are reasonably sure of diagnosing practically all cases of glanders. A minimum percentage of failures will probably always have to be contended with, as a good many factors enter into the execution of any test.

In judging a method which would be the most satisfactory for the diagnosis of glanders, various things have to be taken into consideration, but especially the reliability of the test. It should be convenient, the results should be manifested as early as possible, the reaction should be distinct and well marked, and, probably the most important of all, it should be possible for the practicing veterinarian to apply the test. The last condition must be seriously considered, since the standing of the veterinarian in the community and the confidence of the public in his work would be more manifest if in suspected cases he could personally decide on the diagnosis, instead of having to depend entirely on the results of serum tests made at some distant laboratory.

It would require a great amount of space to enter into the history of the various methods of diagnosis and to enumerate the data we possess on the different tests. The advantages and disadvantages of the various methods, especially of the subcutaneous mallein tests, have been repeatedly published and are accessible to all those who are interested in the subject. There is no question but that the subcutaneous mallein test is one of the valuable diagnostic agents for glanders, but no one can any longer deny that failures from this test are more numerous than are desirable. As a matter of fact, the uncertainty of the results from this test caused numerous investigators to seek some other methods which might replace the subcutaneous mallein test. Besides the failures resulting in this test, the technique of execution of the test, together with the time required for the conclusion of the test, makes it unpopular for many veterinarians and sanitary officers.

Of the other tests which have been devised for the diagnosis of glanders from time to time, the precipitation, the opsonic, and the conglutination tests will not be considered, since the results from these tests are not encouraging.
For laboratory tests the combined agglutination and complement-fixation test will no doubt remain the most satisfactory and can always be safely applied in cases where doubt arises as to the results of other tests carried out by the practicing veterinarian. Thus these should be considered as accessory tests and provision should be made everywhere, so that in case of doubt the serum could be subjected to these tests and the final decision should rest on their outcome.

During the past few years the ophthalmic mallein test has gained great favor in the diagnosis of glanders. The popularity of the test is rapidly gaining wherever this method has been applied, and among its supporters we find at the present time the greatest authorities on the subject of glanders and on clinical diagnosis. This method of testing is at present officially recognized in Austria, and the indications are that ere long it will constitute the official test in other countries. The results obtained in Austria, where the test has been employed for several years, are very gratifying, and Schnurer, one of our greatest authorities on glanders, claims that the control of the disease can be very satisfactorily carried out by the application of the eye test, supplemented in doubtful cases by the agglutination test. Bavaria has recently adopted this method of diagnosis for official testing. In Germany this method of diagnosis is also gaining in favor, and current veterinary literature contains expressions of satisfaction of this test from many German authorities. The Bureau of Animal Industry, in consideration of the favorable results obtained from this test, has decided to recognize this method of diagnosis for interstate shipments of equines, and the forthcoming issue of Service Announcements will contain this information. Horses offered for shipment to Canada must continue to be tested by the subcutaneous method, as the ophthalmic test has not yet been officially recognized by the Canadian authorities.

This method has a great advantage over others by its very simple application. It may be readily executed by any veterinarian, and its other advantages are that the results are obtained in a comparatively short time, and are, as a rule, distinct and definite. The simplicity of its application is plainly manifest when compared to the subcutaneous test, as it is only necessary to drop into one of the eyes of the animal to be tested 3 to 6 drops of concentrated mallein, or by a still simpler procedure to dip a camel's hair brush into the mallein and introduce this into the conjunctival sac of the animal. The reaction usually commences in 5 to 6 hours after the introduction of the mallein and lasts from 24 to 36 hours. A positive reaction is manifested by a purulent secretion from the tested eye. This may be very profuse or slight, sometimes associated with a severe conjunctivitis and edema of the lids, and at other times without any inflammatory symptoms being present. At times only a very small quantity of pus may be present in the inner canthus of the eye. At other times the reaction may result in a true pyorrhea.

The reaction manifests itself in varying degrees in the animals, but the intensity of the reaction has no relation to the extent of the disease in the reactor.

The available data on the ophthalmic mallein test is sufficient to draw conclusions as to the reliability of the method, and in Austria alone it has been applied on many thousands of cases with uniformly good results.

In considering the good results obtained and the advantages of this method of testing, a concentrated mallein has been prepared for this purpose by the Bureau of Animal Industry, and this was made available to a number of practicing veterinarians who desired to give this
method of testing a thorough trial. It has been also employed by in-
spectors of the Bureau of Animal Industry in their field work and re-
ports are accessible regarding its action for diagnostic purposes on
more than 8,000 cases. The results from all sources were uniformly
satisfactory. Practicing veterinarians who have given this method a
trial have reported very favorably on the tests made and those con-
ducted by the Bureau inspectors on several thousand animals were also
satisfactory. At all opportunities this method has been applied in
Washington, and recently in some immunizing tests of glanders con-
ducted by the Bureau of Animal Industry there was a good opportunity
to repeatedly employ this test. In all these instances the results were
uniformly good. In cases of glanders there appeared a marked purulent
conjunctivitis and the reaction at times was so severe that the animal
could not open its tested eye.

The essential factor in obtaining satisfactory results from the test
appears to be in the use of the right kind of mallein. It must be by all
means a concentrated mallein and apparently the best results follow
the use of raw mallein, which as a rule represents the mallein obtained
after the concentration of the filtrate from the bouillon cultures of the
glanders bacilli. The ordinary mallein used for subcutaneous testing is
not adaptable, and the few failures which have been reported in the
literature were without doubt in the majority of cases due to the fact
that the mallein employed was not sufficiently concentrated. Marioth
correctly asserts that the reaction does not depend as much on the
quality and quantity of the mallein as on its concentration. Our ex-
periments in preserving such mallein with the ordinary quantity of 0.5
per cent carbolic acid showed that it does not interfere with the
results of the test, although the lacrimation which follows immediately
after the introduction of the mallein is more profuse than when car-
bolic acid has not been added, but this disappears within one or two
hours after the application of the test. The concentrated mallein which
has been prepared by the Bureau for this work and which gave such
satisfactory results was carbolized, but contained no glycerin as a pre-
servative. Only the glycerin which is added to the culture media is
contained in this ophthalmic mallein. The precipitation which takes
place in the concentrated mallein is eliminated by repeated filtration
and the product even after several months of keeping showed no indi-
cation of a precipitate or cloudiness. It represents a brownish, syrupy
fluid.

It is advisable to provide the mallein for the tests in small vials,
each containing about 1.6 c. c. of mallein, which is sufficient for testing
fifteen horses. After the vial has been opened and part of the contents
used for testing, especially if the mallein has been taken out with a
camel's hair brush, it should not be used for tests applied on subsequent
days, but should be discarded.

Another form of mallein which has been used quite extensively
for the eye test is the mallein siccum or dry mallein. This represents
an alcoholic precipitate of mallein. It is a fine grey powder and must
be dissolved in water before it is used. The solution loses its effective-
ness in a very short time and must be prepared fresh on the day of
the test. Dr. K. F. Meyer, formerly of the University of Pennsylvania,
and now of the University of California, used the dry mallein ex-
tensively and at the present time this preparation is employed in Penn-
sylvania for the application of the ophthalmic test. For this purpose
two vials are sent from the laboratories of the Pennsylvania Live
Stock Sanitary Board, one containing the powdered mallein, and the
other sterile or saline water in quantities which will make a 5 per cent
solution of mallein. The contents of the bottle containing the solution is poured into the bottle containing the mallein and the test fluid is thus prepared. The results with this form of testing in Pennsylvania appear to be highly satisfactory, as may be seen from a publication by Dr. Meyer on the Conjunctival Reaction for Glanders, in the March, 1913, number of the Journal of Infectious Diseases.

The advantages of the use of one or the other of these forms of mallein for the eye test are not marked, as equally good results were obtained from the application of both forms of this product. The fact that the preparation of the raw mallein is less laborious and expensive than the mallein siccum and that it is ready for use on opening the vial would probably give this product a greater popularity. It is only natural that should subsequent extensive testing show the superiority of the dry mallein, it will be given preference over the raw product.

The favorable results which have been attained with this diagnostic method can no longer be denied. Its practicability is apparent and its use in the control of glanders appears to be advisable.

Glandered animals are hypersensitive to mallein in a way that the administration of small quantities of mallein produces local inflammatory processes. In larger quantities it produces a febrile general reaction. The hypersensitivity appears as rule during the third week after the infection and reaches its height in the first few months after the infection. In the subsequent course it may subside in retrogressive cases, even to the unsensitiveness of healthy animals, but even in these cases various conditions may bring on an increased sensibility.

Before the application of the test the animals should be carefully examined to ascertain whether the eye shows conjunctivitis or other changes which are associated with suppuration. Should such be present the test should not be applied.

The test consists in introducing into the conjunctival sac of the eye several drops of either undiluted raw mallein or a solution of precipitated mallein (0.1 to 0.2 c. c. per horse). This may be introduced either with the aid of a camel’s hair brush or with an eye dropper. The other eye is not treated, but serves as a control for comparison of the reaction. For the testing of horses in the same stable, the same dropper or camel’s hair brush may be used for all animals.

As soon as the mallein is introduced into the eye, practically all animals show a lacrimation, increased reddening of the conjunctiva and slight photophobia. No significance should be given to these symptoms. They disappear in one to two hours.

The characteristic manifestations of the reaction for glanders commences, as a rule, from five to six hours and lasts twenty-four to thirty-six hours, sometimes longer. It consists of a purulent discharge from the conjunctival sac, which is typical, as well as swelling and gluing of the eyelids. It is advisable to examine the tested animals from twelve to twenty-four hours after the application of the test in a good light.

A suppurative discharge of varying quantities is considered a positive reaction. The conjunctiva and the eyeball should also be included in the examination after examining the discharge. A pseudo-reaction can be produced by artificial or accidental irritation of the eye. By removing the purulent discharge (either by the stable attendant or by the animals licking each other, etc.) the positive result may be obliterated. In such cases dried pus may be frequently found on the parts around the eye.
Generally the positive ophthalmic reactions are not accompanied by fever or systemic disturbances. Occasionally, however, affected horses are hypersensitive to such a degree that even the few drops of mallein placed in the eye may enter the circulation and produce fever. Therefore, it is advisable to accompany the ophthalmic reaction with temperature readings. For this purpose the temperature should be taken twice, the first time when the eye test is being made, and the second time when it is judged. In a doubtful eye reaction where there is an increased temperature of 1½ degrees F., the test should be considered positive if the animal had a normal temperature at the time the test was made.

In the absence of any secretion the test should be considered negative. When there is a mucous secretion or lacrimation during the period of reaction, the test must be considered as typical, and in such cases it may be repeated the same day, when, as a rule, the results are more confirming.

The application of the ophthalmic test should not be repeated more than three times on the same animal within three months, as experiments show that the reaction after the third application usually loses its intensity in positive cases and on subsequent tests may be entirely absent. In cases where the results of the second test immediately following the first test are atypical, the blood of such animals may be drawn and forwarded to a laboratory for the serum diagnosis. From experience gained with the eye test, such a procedure would become necessary only in a comparatively few cases. In the control of glanders, animals may be retested every six months with satisfactory results.

The special Committee on the Control of Glanders of the American Veterinary Medical Association gave a most excellent report on the various phases of diagnosis of glanders, and the conclusions on the value of the eye test offered by the committee are in perfect accord with our findings, and therefore we deem it advisable to include them in this paper as follows:
1. The ophthalmic test not only meets all the requirements, but is without doubt the most convenient diagnostic method at our command.
2. Its reliability compares favorably with any of the other tests available.
3. The reaction is usually very distinct, and doubtful or atypical reactions are rather infrequent.
4. The ophthalmic test has the advantage that it does not interfere with subsequent serum or other mallein tests if such are deemed necessary.
5. The test may be repeated within twenty-four hours on same or control eye. If another retest is necessary, it should not be made in less than three weeks.
6. The ophthalmic test should be recognized by state and federal authorities, since its reliability can no longer be doubted.
7. In all atypical and doubtful cases of the ophthalmic test the combined complement-fixation and agglutination or subcutaneous mallein test should be utilized for confirmation. Such a procedure would minimize the failure and would assure the best results in the control of the disease in a single stable or in an entire community.

APPENDIX.

The results achieved in Austria with the ophthalmic test have been remarkably successful and deserve the most earnest consideration. The report of Professor Schnurer on "The Results of the Diagnostic
Procedure in Glanders in Austria" is a convincing proof as to the value of the eye test in the control of the glanders. The senior writer received a communication only a few days ago from Professor Schnurer and since it deals principally with the diagnostic value of the eye test, a quotation from the letter will no doubt be permissible.

"I am at the present contemplating collecting the results of the eradication of glanders in Austria during the last three years (1910-1912). During this time 60,894 tests were undertaken on 47,973 horses. Of 272 cases which were found on postmortem to be affected with glanders, 240 (88.2 per cent) were positive, 21 (7.7 per cent) gave an atypical reaction, while 11 (4 per cent) were negative. Of the 47,701 healthy horses, 189 (0.39 per cent) were positive or atypical, the remaining 47,512 (99.61 per cent) gave a negative reaction.

"According to these results, therefore, the eradication of glanders is only a question of organization—that is, the malleinization of horses at the border and conscientious following up of all suspected horses. Such procedure would without doubt result in a complete eradication of glanders. At the Veterinary School of Austria we now have difficulty in showing the student cases of glanders, and for demonstration purposes we are compelled to artificially infect horses, whereas several years ago we had every week at least one case of glanders in our clinics.

"I use as mallein at the present time a product which I, myself, prepare, which represents a bouillon filtrate from seven different strains of glanders bacilli, which has been concentrated to 1/10 of the original volume."

The optimistic view of Professor Schnurer is certainly justified from the results he achieved and clearly shows that with proper organization in the control work of glanders the eradication of the disease is only a question of time.

The eradication of outbreaks of glanders cannot, of course, be altogether attributed to the eye test, since from the report of Nevermann, Veterinary Councillor of Prussia, glanders has diminished remarkably in that country, although they employ the combined complement-fixation and agglutination test for the diagnosis, while McGilvray has practically eradicated glanders from the Province of Manitoba by means of the subcutaneous mallein test. The method of testing by means of complement-fixation and agglutination is undoubtedly the most accurate of any available, but since it cannot be as conveniently applied as the eye test, its disadvantages are apparent. There is no doubt that with the application of either the eye test or the combined complement-fixation and agglutination tests, good results may be obtained, provided that the work is conscientiously carried out and that all the reactors are destroyed without hesitation.

As long as the authorities will limit themselves to the destruction of clinical cases only and will not take immediate action on reactors of the occult and latent character, glanders will not only continue to exist, but it will spread.
AFTERNOON SESSION, DECEMBER SECOND.

THE CONTROL OF GLANDERS IN NEW YORK STATE.

By J. F. DeVine, Goshen, N. Y.

In submitting the title of my paper to your Secretary I advised him that my remarks would be confined principally to the title, since I consider that the history, distribution, cause and pathology of glanders have been sufficiently discussed for the time being, at previous meetings of this Association. This paper will, therefore, be brief with an attempt to explain the views and policies of our State Department on this subject, and with the hope of soliciting criticisms and aid on this perplexing problem from the able members of this organization.

We have recognized in New York State for some time that glanders was uncomfortably prevalent, both for human and equine safety and life. We have also felt that our knowledge of its dissemination and diagnosis was inadequate to set in force any radical system of control and eradication that would be equitable to the public and the horse owners, particularly where valuable horses are kept in great numbers, such as in New York City. We also recognized the fact that if we could control glanders in these large centers, its eradication in smaller towns and rural districts would be comparatively simple, as almost every new outbreak in the latter places was traceable to one of the large cities. Some of the perplexing questions which were ever confronting us were: The accuracy of mallein if it indicated glanders, and, Does mallein detect all cases of glanders? Here, as in many other things, the efficiency and reliability of the human element were so interwoven with nearly every strand of the entire technique and deductions, that, after all, the findings of the reagent were dependable in every step upon "the man behind the gun," beginning with the selection of the culture and medium and not ending until the inoculation and observation of the equine animal in question were completed. I think we are all pretty well agreed that where properly prepared, mallein, carefully and properly applied, positively indicates the presence of glanders, that a carefully conducted post-mortem will, in practically every case, substantiate the verdict, and that any carelessness or inefficiency on the part of the one applying the test might make the results worse than useless; but even with the greatest care and skill, we were ever finding cases styled suspicious. These indefinite cases were constantly crippling the advancement of control work, embarrassing officials and honest veterinarians, as well as exasperating horse owners and being pleasing and useful to dishonest dealers and veterinarians.

When mallein had once been used we were not certain how soon the test might be repeated with any reliability, and with the advent of the serological tests the disadvantages of the indefinite results with mallein were lamentably increased, owing to the fact that after a few days following the injection of mallein into the animal body it, like vaccine, produced or increased certain substances which we speak of as agglutinins and anti-bodies, which in turn caused great confusion in the sera findings; and while McNeil, of New York City, states that mallein in a healthy horse will not produce more than a 2 plus complement fixation, but that vaccine is apt to give as complete a fixation as true glanders, still it seemed as if the blood examinations were doomed to lead us into greater darkness. There was still another
phase of his problem viewed from economy; that was the proper dis-
position of the highly suspicious and positive reactors that exhibited
no evidence clinically of the disease, it being the opinion of some that
nearly every positive reactor, let its physical condition be ever so fine,
was always a dangerous animal at some time, and the chances of such
animals entirely recovering and forever ceasing to spread virus were
highly improbable. I confess that from practical observation I am not
entirely converted to this doctrine; but from post-mortem observations,
I am forced to conclude that, with rare exception, attended with un-
usual circumstances, it is false economy to delay the destruction of a
horse in which glanders has been clearly diagnosed.

After giving all these questions careful consideration, and being
encouraged by the advancement made in sera test work, particularly
the complement fixation, the Department of Agriculture, in co-opera-
tion with the New York City Health Department, decided to make
careful observations on the reliability of the complement fixation test,
supplementing it with either the ophthalmic or subcutaneous mallein
test, or both, and verifying the results where glanders was indicated
by post-mortem examination. The errors in technique in both the
field and laboratory were carefully watched and checked, with the
result that after we had received assurance from the City Health De-
partment that they would adopt a system of licensing all stables in
New York City where equine animals are stabled, thereby insuring
proper sanitary supervision of all stables and the closing of others as
undesirable, as well as establishing a disinfecting corps under official
veterinary supervision and the enforcement of the city ordinance of
tagging all horses sent to the dead dock, so that in case animals
dying from accident or disease other than glanders should be found
to be affected with glanders, the stables from which such animals
came might be located for further necessary inspection, we felt justi-
fied in submitting the following recommendations to the Commission
of Agriculture:

First: That prompt and positive action be taken in all cases where
glanders is clearly diagnosed, and that such animals be promptly de-
stroyed or held under strict quarantine.

Second: That we favored the complement fixation blood test, since
after the first few days of infection we believed definite results more
constant during the entire course of the disease than with the agglu-
tination, and more certain of detecting all cases of glanders than any
other known test, and that where this test indicated a four plus re-
action, supplemented by a corroborative ophthalmic reaction, such
animals should be considered as positively glandered.

Third: That a capable veterinary pathologist be placed at the
dead dock to autopsy all equine animals brought there, for reasons
stated above.

Fourth: That both the State Department of Agriculture and the
City Health Department co-operatively extend the present method of
inspection, by careful examination of all known exposed equine animals
in any stable where a glandered animal is found, with a view of de-
termining whether or not such animal or animals are affected with
glanders.

Fifth: That every animal so examined shall be identified by a tag,
cord with a seal, or any other practical method of satisfactory identi-
fication, and that a record be kept of such examination, and that
examination by both the State and Health Departments, and the re-
inspection of such animals, be made at such time or times as these
departments deem wise or necessary.
Sixth: That this work could be carried on with greater efficiency if the use of mallein and vaccine were restricted, for the present at least, to official veterinarians, or if by others, to be used in co-operation with an official veterinarian.

Seventh: To prohibit the use of vaccine, mallein or the application of any agent or substance that could act or interfere with the accurate results of mallein or sera-mallein tests, except under official direction.

These recommendations were approved by the Commissioner of Agriculture and have gradually been put in force during the past three months, and while all detail is not as complete as we hope to have it after a little more experience, we were greatly gratified with the report of the special committee of the American Veterinary Association on the detection of glanders, presented at the annual meeting September 2nd, 1913, as it substantiated in practically every detail our recommendations and policies. I here quote that report, in part:

"APPEARANCE OF THE REACTION OF THE VARIOUS TESTS AFTER INFECTION.

"Agglutinins reach their appearance in from four to five days and continue to increase in the early stages of the disease and diminish as the disease becomes chronic.

"Specific amboceptors of the complement fixation test may be demonstrated in from seven to ten days in quantities of diagnostic value, and their presence may be demonstrated during the entire course of the disease.

"Subcutaneous mallein test may, as a rule, be relied upon fifteen days after infection.

"Ophthalmic mallein test may be relied upon three weeks after infection.

"The ophthalmic test is without doubt the most convenient diagnostic method at our command.

"Its reliability compares favorably with any of the other available tests.

"The reaction is usually distinct, and doubtful or atypical reactions are rather infrequent.

"The ophthalmic test does not interfere with subsequent serum or other mallein tests if such are deemed necessary.

"The test may be repeated within twenty-four hours on same or control eye, and final retest in not less than three weeks.

"The ophthalmic test should be recognized by state and federal authorities, since its reliability can no longer be doubted.

"In all atypical and doubtful cases of the ophthalmic test the combined complement fixation and agglutination or subcutaneous mallein tests should be utilized for confirmation. Such a procedure should minimize the failures and assure the best results in the control of the disease in a single stable or in an entire community."

"Effect of One Test on the Others. All blood serum tests are influenced in three to six days after a subcutaneous injection of mallein or any glanders antigen, including glanders vaccines, for a period varying from six to eight weeks, following injection of mallein and up to three months and even longer following injection of glan-
ders antigen or vaccines. All blood samples therefore should be taken prior to or at the time of the mallein injections.

"The subcutaneous mallein test or injection of glanders antigen and vaccines may influence the ophthalmic mallein test. The ophthalmic mallein test should therefore be withheld for thirty days after application of the subcutaneous mallein.

"Control. In the reduction of glanders all clinical cases should be immediately destroyed. All suspected and exposed animals should be tested and the positive reactors destroyed. The remaining contact horses held under restrictions subject to further test after the expiration of at least fifteen days. All infected premises should be thoroughly cleansed and disinfected."

In conclusion I will give you the results of our short experience in this special effort to control glanders, with particular reference to New York City. While I have brought with me data covering details of each animal inspected, I have not incorporated it in this report, since, in my opinion, it would only add to the burden of printing and reading, without adding useful information. I therefore give the summaries, and will be glad to furnish a copy of detail to anyone sufficiently interested to request it.

Summary.

Number of horses examined........................................... 776
Number rejected:
As result of examination............................................. 412
Number re-examined..................................................... 57
Number rejected as result of re-examination........................................... 12

Examination:

Number diagnosed by clinical symptoms......................... 171 cases
Complement fixation ..................................................... 302 "
Agglutination test ....................................................... 398 "
Ophthalmic test .......................................................... 237 "
Mallein test ............................................................... 293 "

The four last-mentioned methods were duplicated in practically 400 out of 600 cases where it was necessary to apply tests, until confidence was established in a 4+ blood reaction. Most cases are now unhesitatingly destroyed on a 4+ reaction; the exceptions being where the owner or his veterinarian are not sufficiently acquainted with the accuracy of the complement fixation test; and perhaps the splendid physical condition of the animal argues against the blood findings. Such cases as well as cases where the blood reaction is indefinite are held in quarantine for further examination either by retaking the blood or supplementing one of the other tests, or both. This is comparatively easy under our tagging system.

Re-examination:

Number diagnosed by complement fixation......................... 22 cases
Agglutination test ......................................................... 16 "
Ophthalmic test ............................................................. 4 "
Mallein test ............................................................... 48 "

Here again two or more methods were used in some cases.

Results of post-mortem:

Generalized cases ....................................................... 259
Non-generalized cases .................................................. 147
No lesion cases ........................................................... 8
Clinical cases killed and no post-mortem report made........... 15
THE CONTROL OF HOG CHOLERA—A REVIEW OF FOUR MONTHS' WORK BY THE BUREAU OF ANIMAL INDUSTRY.

By M. Dorset, Washington, D. C.

Mr. President and Gentlemen: As I sat here the last few moments I have wondered if any one of the officers in this meeting has ever undertaken to eradicate hog cholera from even a very limited territory, because if you have you will understand how I felt when approached by Dr. Ransom about six weeks or the like of that ago, with the request that I review the work of the Bureau of Animal Industry for the present year and report our results in control of hog cholera. Now if you have not had the experience of trying to eradicate hog cholera, you won't be able to understand my feelings at all, but what I wish to convey to your mind is that the problem is so extremely complicated, that there are so many factors to be considered, and so many difficulties to overcome that eradication in the true sense of the word is impossible in a period of four months. Therefore what I propose to do is to discuss with you very briefly some of the difficulties we have experienced in our work this summer, and also to give you the benefit of the results we have obtained in certain features of the work.

This work of the Bureau of Animal Industry began on July the first, 1913, when the first appropriation ever made by the United States Government for the specific purpose of eradicating hog cholera or demonstrating methods for eradicating hog cholera, became available. The appropriation set aside for this work was $75,000.

Beginning then on July first, when this money became available, we have started our experimental work. The work has been located in Dallas County, Iowa; Montgomery County, Indiana; Pettis County, Missouri, and in Johnson and the north one-half of Gage Counties, Nebraska.

In each state, before the work was started, assurances of cooperation were obtained from the Agricultural College and from the State Veterinarian. The State College in each instance agreed to survey the county, determining the number of hogs raised and the number lost during recent years. The College was furthermore charged with the duty of carrying out educational work, explaining to farmers the purpose of the experiments, and enlisting their cooperation.

The State Veterinarian's duties consisted in the issuance of the necessary restrictive regulations. He was also to place a qualified assistant in the County, so that all quarantine and sanitary measures might be promptly and effectively enforced.

The United States Bureau of Animal Industry agreed to place in each County an inspector in charge, with two assistant veterinarians and a clerk. The Bureau was also to furnish, if possible, and to apply all of the serum required.

The principal lines of endeavor may therefore be classified as follows:

1. Education and Organization.
2. Quarantine and Sanitation.
3. Serum Treatment.

I have tried to give you a general idea of how the work was planned. Now granting that these forces have been organized and are in each county, for handling individual outbreaks of disease that were discovered after the Federal force of Inspectors was established in the county, we have followed the plan which was suggested some years ago by Dr. Melvin, which was briefly, to discover the infected center as
soon as possible, then to proceed to that center and treat not only the hogs on the infected farm, but all of those on immediately neighboring farms, for the purpose of protection.

In order to find out where the disease was located in the county, and that is a very important thing and a very hard thing to find out, the State College, assisted by our inspectors and the State Veterinarian, was to organize the farmers and select a certain number of volunteer representatives in each township. If possible we have tried to get one volunteer farmer for every four sections, making about nine in each township. The farmer will not go very far out of his way to find out anything for the Government officials, and we tried to make the area small enough so that he would probably be passing by most of the time, and that way get the information. Now these volunteer representatives scattered over the townships were to send in a notification immediately when there was an outbreak of disease, and we were to proceed with the treatment, as I have already explained.

Now, that in brief, is the way we have gone at this work. As I have said, the appropriation for the work was not available until the first of July, this year, and therefore the work of the Bureau of Animal Industry could not begin before that time. It was necessary then to organize the force of inspectors, arrange for the production of serum on a large scale after July the first of this year, before the field work could begin. We had to have the inspectors organized, instructed, and the serum ready for them to use, of course, before they could start to work.

What we actually accomplished was to place a force of inspectors, with Dr. O. B. Hess in charge in Dallas County, Iowa, on the first of July. We had Dr. Hess ready just before the first, and so he went in on the first. In Montgomery County, Indiana, Dr. Houck has been in charge, and he actually began work there about the 15th of July. In Pettis County, Missouri, the work was begun about the first of August. Up to the present time no active work has been carried on in Nebraska owing to the lack of funds and other interfering circumstances, and we have not been able to do more this year in Nebraska than to begin a survey. We are surveying and organizing one county now. I think if the work is continued next year it will be work well worth while, because we have missed the survey and organization in the counties we worked in this year very much. Now in view of this late beginning, that is, in July and August, you will not be surprised, I know, to hear that hog cholera was quite widely distributed in all of the counties in which we had to work when our inspectors entered the counties. I am sorry that it was not possible for me to have prepared maps and bring them with me so that you could see how the disease was scattered. In Dallas County, Iowa, when the work began, there were thirty centers of infection, when Dr. Hess went there the first of July. In Montgomery County, Indiana, there were sixty-four, and in Pettis County, Missouri, there were fifty centers of infection. So that estimating at least four exposed herds for each infected herd we should have, if our plan was carried out, treated 120 herds in Dallas County on the day we began work. That was the plan, to immediately form the zone of immunized animals around the infected center. Of course if we left that zone open we would defeat the plan we intended to carry out. We should have treated in Dallas County 120 herds for the purpose of protection, in Montgomery County, Indiana, about 250, and in Pettis County Missouri, about 200 immediately upon entrance in those counties. Those of you who have had experience in the production of anti-hog cholera serum will realize that this was a pretty severe tax on a laboratory that had never made any serum for distribution to farmers, but only some for use in
an experimental way. We were not, in other words, able to supply the
serum that was needed in these counties when the work began, and
therefore, even with our carefully laid plan, we were not able to carry
the plan out. We have pursued this plan and carried it out in the case
of individual farms whenever possible. We have protected as many
herds as we could, but we have not been able to give this plan a thor-
ough trial. The difficulties we experienced in connection with this were
caused mainly by the lack of serum.

Now there were other difficulties encountered in carrying out this
work. We have had a great deal of trouble with the organization of the
farmers and the survey of the counties. In the beginning the volunteer-
township leaders, the farmers who were to help us, gave little attention
to reporting outbreaks of disease, and the owners of sick hogs were fre-
quently skeptical or indifferent, and some had great faith in advertised
cures and medicines of various kinds, and they actually concealed the
disease, the fact that the hogs were sick being discovered only when an
inspector would see a pile of dead ones burning as he passed by on the
road.

Now, there were, of course, many individuals in these counties who
gave us a great deal of help, and without their assistance we could not
have made any progress at all. Furthermore it is very pleasing and
encouraging to say that the attitude of the farmers generally towards
the movement has changed very much since the work began, even in
these four months. Dr. Hess in Dallas County says that he had a great
deal of trouble getting reports at first, but that now it seems to him that
every farmer in Dallas County is anxious to have his hogs treated. Many
of the farmers will report their hogs sick because one is off feed or
appears a little unthrifty, in other words, Dr. Hess has the farmers
working with him now. Dr. Houck and Dr. Murphy make similar state-
ments. The interest evidenced on the part of the farmers will, of course,
lead to more active co-operation on their part, and no doubt will be of
great assistance to us next year.

In connection with the survey, that is, finding out how many hogs
there were in the county, where they were, where hog cholera existed
and the number of hogs lost, the State College, which was charged with
carrying out this survey, attempted to make it by sending cards to
farmers. These cards had printed on them the name of the man, post
office, hogs raised in 1911, 1912 and 1913, number lost, and so on. They
mailed these out to the farmers. In two of the counties they were sent
out with the Government frank, with the franked envelope, so no postage
was required to return it. That campaign succeeded in getting replies,
many of them unsatisfactory, from about one-sixth of the farmers in
the territory and consequently it is only just now, after six months work,
that the surveys are beginning to be completed. It required a house to
house personal canvass to get the figures. The farmers will not send
them in, you cannot get them that way.

Now in connection with the quarantine and sanitary work not very
much has been done. Each one of the State Veterinarians, in each of
these counties was to give us a man, put him in this county and leave
him there all the time to help, and I am sure that they have done every-
thing that they could to do that, but it has not been possible for them
to leave the man with us as they anticipated. Lack of the necessary
funds or other reasons have interfered with that.

I don't feel that we have laid as much stress on quarantine and dis-
infection as we should have done this year. We have, of course, in-
structed the farmers as to methods of disinfection and cleaning up; have
urged them to burn up their dead hogs, but they did not always do that,
by any means. Frequently crows and buzzards were seen feeding on dead hogs in the territory in which we were working, although the State Law distinctly prohibited allowing animals to lie out that way, requiring, in other words, burning or burial. When we began this work Dr. Melvin and Dr. Gibson and one or two others of us were talking of methods of controlling hog cholera and quarantine, and we wondered about the effectiveness of placarding the farms where infection existed. It seemed to be rather the general consensus of opinion among all of us that it might arouse the enmity of the farmer, and probably it would be a bad thing to placard his infected place. At any rate, we were rather uncertain about it; but I hope Dr. Gibson, if he is here, will not take offense at my referring to a card that he adopted. Dr. Gibson decided anyhow that he would placard diseased farms, and he furnished our men in Dallas County, Iowa, with these green cards. I don't know whether it is legible to all of those in the house or not. It merely reads: "QUARANTINE. HOG CHOLERA. KEEP OUT."

"Parties having business on these farms must keep away from hog lots. Parties occupying these farms are forbidden to go in or near the neighbors' hog lot. J. I. Gibson, State Veterinarian."

Now, Dr. Hess says that this card has worked very nicely; that he hasn't had any trouble at all with the farmers; that the farmers do not object to the placarding of their farms. He also told of one farmer whose hogs had the cholera, and he had put one of these cards on the barn, and when he came back later he found the card out on the front gate, and he asked the farmer "Why did you move that card?" "Why," the farmer said, "if I hadn't put that card out on the front gate I wouldn't have had any hickory nuts this fall." (Laughter.)

Now I have made a very brief review of the way our work was organized this year and of the difficulties we have encountered. The inspectors in the three counties, Dallas, Montgomery and Pettis, have, of course, been collecting statistics all of the time they have been there, and while, as I say, our figures are not complete for the year, I wrote to Dr. Houck, Dr. Murphy and Dr. Hess for data on certain points, so that I might get together some data which I thought might be of interest to this Association. I want to refer to certain features of the work and certain observations that we have made. First of all, as to the sources of infection in hog cholera. I think it is of fundamental importance to know how hog cholera reaches a farm. Each of the inspectors in charge was instructed to collect data concerning the source of infection in each diseased herd visited. In many cases it has been impossible for them to discover any reasonable explanation for the outbreak of disease, and in all cases in which they report a source of infection, the statement is naturally to be taken merely as an expression of the judgment of the inspector after carefully weighing all of the facts he could discover at the time. Then the inspectors have not reported on a large number of farms because they were not able to satisfy themselves as to how the disease reached the farm. In the case of 380 herds, however, they have expressed an opinion, and I have added them all together and put them in tabulated form for your information.

If you will notice the table, the upper left hand table entitled "Sources of Infection" you will see that there is a total of 380 farms, and that the sources of infection are classified under eight different general heads. Thirty-three per cent of the cases reported on were considered by the inspectors to have arisen from the visiting of neighbors, exchanging of work, helping to thrash, to fill silos, shell corn and things of that kind—exchanging labor. One prominent cause of transferring infection, apparently at least, according to these figures, is birds. The
other sources of infection are of minor importance, and do not deserve possibly special consideration. I confess that these figures are a surprise to me. In the past it has been my belief that birds did not play a very important part in the spread of hog cholera, although the possibility of the disease being spread in that way has, of course, been recognized.

In order to indicate possible lessons that may be drawn from these data, the sources of infection have been placed in two groups, as you will see from the chart. The first five sources of infection are grouped together, and may be designated "Nearby Sources of Infection." In most of these cases the infection must have come from nearby sources. The other may be designated "Distant Sources," in other words, agencies that may bring hog cholera from a distance. It is surprising to see that a little less than one-half of all cases of disease appear to have been brought to farms by agencies capable of transferring the disease from great distances. In other words, if a man by means of quarantine and disinfection protects himself from his immediate neighbors he is, if these figures are correct, only protecting himself against about one-half of the danger of this infection. He must still guard himself against the danger arising from the purchase of new stock, from infected streams and from birds, particularly carrion eating birds, such as crows and buzzards.

I have already stated that the plan of the Department's work during the present season contemplated the location of the infected farm, and then the administration of protective treatment to the herds in the immediate neighborhood of the outbreak. We have, of course, realized that such a plan is necessarily expensive, for generally each infected farm will expose four or five adjoining farms which would have to be treated under this plan. From the figures shown on this chart there is an indication that the location of a zone of immunized animals may not be as effective and sure as we have supposed, for the distant, non-immune herd may still become infected by birds, by streams, or by the introduction of new stock. I have been led to wonder whether equally as good results might not be secured by a prompt treatment of the infected herd, a thorough clean-up and disinfection of the infected premises, and the prompt destruction of all animals hopelessly diseased at the time the infected farm is first visited. This, of course, should be followed immediately by a canvass of the neighborhood, giving full information to all neighbors regarding the danger from the infected farm, and instructing them concerning methods of avoiding the contagion. Any herds very close by, clearly exposed to the diseased herd, could be protected with serum. If this plan were adopted it would cost very much less in serum, if it were effective. Of course that is the question: "Would it be effective? Can we get along without immunizing all neighboring herds?" This plan that I am suggesting here now would have to be coupled with an energetic campaign of education and the rigid enforcement of sanitary regulations governing the importation of live stock. I merely offer these ideas as suggestions and not in the form of definite conclusions. I hope that in the discussion which will probably follow that others will express their views on this subject.

Now I wish to refer to the result of the application of the serum alone and of the simultaneous treatment in diseased herds. The tables that I have here are all prepared from figures furnished by Drs. Houck, Murphy and Hess. As to the source of the serum, in Dallas County, Iowa, and Montgomery County, Indiana, all used was prepared at our experimental farm at Ames. In Pettis County, on the contrary, as our plant could not supply serum for that county, we have through the kindness and co-operation of Dr. Connaway secured from him practically all of the serum we have used in Pettis County. Now in Dallas County and
in Montgomery County we have used interchangeably the serum-alone and the simultaneous method. In Pettis County we have used almost exclusively by the serum-alone. There were in all 500 hogs, I believe, in Pettis County, given the simultaneous inoculation, and in those cases the serum was furnished by Dr. Niles. The fact that this occurred was a fortuitous circumstance not intended at all, but it is a fact that we used serum-alone in one county and the simultaneous method in two counties, without in the beginning intending to do so. This furnishes some very interesting data for comparison.

First, with regard to the infected herds. I want to say in explanation of this chart, that in Pettis County when a herd was treated all hogs that were treated were given the serum-alone. That is, those that were infected, as well as those that were well at the time of the treatment were given the serum-alone. In the other two counties, Dallas and Montgomery, on the other hand, all hogs that had temperatures exceeding 104° in an infected herd, and therefore probably infected, were given the serum-alone. The sick hogs, in other words, were given the serum-alone, and the hogs that were well in these diseased herds, as far as we could tell, were given the simultaneous treatment. I feel it is necessary to explain that before considering this table.

As this table shows, in Pettis County 3,801 hogs were treated in diseased herds, with a loss of 597. In Montgomery County, Indiana, 2,797 infected hogs were given serum only, and of these 610 died. In Dallas County, Iowa, 4,959 infected hogs were given serum-alone, of which 1,693 died. That gives a total of 11,557 hogs treated with serum-alone in diseased herds, of which 2,900 died. This indicates a loss of approximately 25 per cent. Now I want you to be very particular in understanding my explanation of this table. That is not the loss in the entire herd. The greater part of these hogs shown on the upper part of this table, headed "Diseased herds" are to be regarded as sick hogs, their temperatures exceeding 104° at the time of the treatment. That is why the loss is as high as it is.

I regret very much that I have not the figures showing the percentage of sick hogs given serum-alone in diseased herds in Pettis County. I have simply there the entire number of hogs treated with serum-alone. Some of those were sick, of course. Dr. Murphy says fourteen and one-half per cent. I am sorry that I cannot calculate that out so I can give you a percentage of the total, but supposing that all of those in Pettis County were well, you will see that we had something like 7,500 or 7,600 out of a total of 11,000 that were sick, considerably more than fifty per cent sick, and yet there was a saving of seventy-five per cent of those hogs.

Now with reference to the simultaneous treatment in diseased herds, the lower half of the same table shows the result of the simultaneous treatment. As I have already stated, the simultaneous treatment was applied only to hogs which appeared well at the time of inoculation, and which had a temperature below 104°. While this was the rule, Dr. Hess informs me that in Dallas County, Iowa, in the very beginning of the work he gave the simultaneous treatment to some hogs that had temperatures above 104 degrees, and which were, no doubt, in the incubative stage of the disease at that time.

As you will see from this table here, there were no hogs in diseased herds that were given the simultaneous treatment in Pettis County. The figures show that in Montgomery County there were 1,966 hogs, that the loss was 44; that in Dallas County there were 5,060 pigs in the diseased herds, they were in the herds with those sick ones, and there
was a loss of 160 hogs. The total was 7,026 hogs with a total loss of 204, which would mean a per cent of loss of 2.8. Now this loss of 2.8 per cent, as I have tried to make perfectly clear, and let me repeat it again so there will be no mistake, this loss of 2.8 per cent of simultaneously treated hogs in these diseased herds, as against 25 per cent of those receiving serum only, is not to be taken as meaning that the simultaneous method is more effective than the serum-alone, because the serum-alone was used almost exclusively, or in very large part, on sick pigs; the simultaneous method was used on well pigs; that is well as far as we were able to determine. Therefore this does not serve as a comparison of the two methods in any way.

Now of course the figures I have given are not complete for this year, they were only up to a certain period in the fall, but I find that at the time these figures were gotten together a total of 18,583 hogs had been treated in these three counties in diseased herds. In Montgomery and Dallas counties, where careful means were taken to determine the per cent of sick hogs in the diseased herds, the figures show that more than fifty per cent were sick at the time of treatment. That is gotten from this table here, as you can plainly see, the simultaneous treatment against the serum-alone. Dr. Murphy says there were fourteen per cent sick in the Missouri herds.

Now I have also stated that in the early stages of this work we were short of hog cholera serum. We could not go to these hog cholera herds and treat them as quickly as we should have liked. Frequently the inspectors had half a dozen reports in one day to investigate; as many as half a dozen reports came in of sick herds, and the inspector could not take care of those all at once, consequently the herds had been infected some days, sometimes a week or more before he could get to them, or get any serum to use. That explains the high percentage of sick animals in these diseased herds. There are a good many more sick than there ought to be when the herd is treated in ideal work, that is when we could keep up with the disease instead of treating them as we had to do. If we could have treated them as we would have liked to do in most cases the herds would not have been so sick, and the loss would have been very much less.

Now in regard to the healthy herds which were treated for protection. For the most part serum-alone was used in Pettis county to protect the exposed herds, and the simultaneous method was used in Montgomery and Dallas counties. The chart on the left, at the bottom, is marked "Healthy Hogs." It should read "Healthy Herds," I think that would make it a little clearer. Those were healthy herds treated for the purpose of protection. In all 4,786 hogs were given serum-alone for the purpose of protection, and of these 39, or approximately 0.8 per cent died. In the case of the simultaneous inoculation out of 6,971 hogs treated 36, or approximately 0.5 per cent died. These figures indicate, in the first place, in my opinion, that the simultaneous method when properly carried out is not dangerous, and, on the other hand, if the work in Pettis County may be taken as conclusive, these figures also indicate that the serum-alone affords sufficient protection for practical purposes. Personally I do not consider that we have done enough work to warrant a decision irrevocably in favor of one method or the other at the present time. Certainly the serum-alone is to be preferred if it can be depended upon to give sufficient protection in practice. We know that it does not give the prolonged immunity of the simultaneous inoculation, but only by long experience in practice can we say whether the immunity conferred by serum-alone will do in a campaign for the eradication of hog cholera. If it will, then of course the serum-alone is to be preferred.
In the last table I have here the figures are obtained from the survey of the three counties in which we have been working. These surveys are now about completed, they are not quite complete, but sufficiently so, I think, to warrant the presentation of the figures which represent totals for the county, data from a census which has covered the greater portion of the county. Of course the year 1913 is not yet over. There is plenty of time for more hogs to die in these counties, but the facts are that the situation is pretty well in hand in the three counties. While there is disease still in them, conditions are such that our inspectors can well handle the outbreaks, and the losses in hogs will be extremely small from now until the end of the year, we feel sure of that, because we have plenty of serum now.

Now these figures, and I won't go over them in detail, show that in 1911 Dallas County lost 12.8 per cent of hogs; that in 1912 Dallas County lost 18.9 per cent of hogs; that in 1913 Dallas County lost 7.1 per cent. In Pettis County in 1911 there was a loss of 18 per cent; in 1912 a loss of 25.6 per cent; in 1913 a loss of 14.7 per cent. In Montgomery County in 1911 the loss was 21.6 per cent; in 1912 the loss was 24.3 per cent; in 1913 the loss was 6.2 per cent. Now I admit, of course, that it is questionable what weight should be given to these figures. We know that hog cholera varies greatly in prevalence from year to year in different sections, and it may be concluded, and possibly correctly, by any of you here, that the differences shown here are to be attributed to this normal variation of the disease, and not to any work that we have done. I think, however, on the other hand, it may be urged that the fact that in each one of these three counties there is a distinct lessening of the losses, is significant. It hardly seems likely that the disease would have retrogressed in all of these counties at once.

Now I might go into this further, particularly with regard to Pettis County and Dallas County. Before July the first in Dallas County, before Dr. Hess got there at all, they had lost 5,289 hogs. As you will see, more than half of the number they have lost in the entire year was lost before July first. Similarly, in Pettis County, Missouri, before July first they had lost 9,035 hogs. Since July first they have lost 1,341. Now I think you will all agree with me that in both of these cases it is perfectly clear that the disease was wide-spread; that there is every reason to believe that after the first of July the losses, without any attempt to control the conditions there, would have been much greater than they were before the first of July. I have not the figures for Montgomery County for that period.

Now, in the remarks that I have made I have tried to let you know clearly and exactly what we have done this year, and I hope that the information that I have tried to give will be of value to those here. I want to say that any success that has been secured, is in great measure due to the very careful, conscientious and hard work of the inspectors in the field. They are the ones who have done all of it. And I specially want to express my appreciation of the excellent work of Dr. Niles in getting our serum plant in such shape that we are able to turn out serum in large quantities now. Dr. Niles has made, since the first of July, probably a million and a half cubic centimeters of serum. That is, I think, a mighty good record. And, of course I feel that thanks are due to Dr. Murphy in Pettis County, Dr. Hess in Dallas County, and to Dr. Houck in charge of the work in Montgomery County. This year we have just gotten a good start. I hope that by this time next year when this Association meets, we may have at least one small area in the United States to tell you about that is free of hog cholera. Thank you,

(Applause.)
Dr. Torrance: I have been greatly interested in the remarks that have been made, and have been watching with a great deal of concern the efforts made in the United States in the control of hog cholera by means of the immunization method. In Canada we have adopted an entirely different method, and I would like to say that we will continue that method as long as we consider it the best method for our conditions. I am not going to criticise in any way the immunization method. I am glad for all the information that has been given about the subject. I would like to ask Dr. Dorset a single question, and that is whether a hog which has been immunized by the simultaneous method is capable of carrying infection to a non-immunized herd, and if so, for what length of time?

Dr. Dorset: I will say to the Doctor that I have been asked that question a great number of times. I don't think we have ever discussed hog cholera at any meeting when someone was not interested in that, and I regard it as a very important and proper inquiry. The first conclusive work done in regard to the development of this serum was in 1905. In 1906 we carried out various experiments, which are recorded in Bureau of Animal Industry Bulletin 102. If Dr. Torrance will consult that bulletin he will see that we treated many hogs by the simultaneous method, and that non-immune shoats were kept in the pens with the pigs so treated. In no case did we have the disease conveyed to the non-immune shoat in such cases, unless we used an impotent serum, or used too small a dose purposely, so that the simultaneous treated pig got sick. In fact, in many cases, the effect of the serum seemed to be to lower the "infectivity" of the disease. We noted oftentimes that even when the simultaneous treated animal would get sick he did not communicate the disease to the hog in the pen with him. These hogs were kept in the same pen. It seemed that the "infectivity" of the virus—whatever that is—was lowered by the serum. I can only reply to you in that way, that I have never seen a properly treated simultaneous pig give the disease to another hog. If the work is not properly done the disease might be disseminated in that way.

HOW MAY A STATE MOST EFFECTIVELY COMBAT HOG CHOLERA?

By J. W. Connaway, Columbia, Missouri.

Mr. Chairman and Gentlemen of the Association: The title that has been assigned me was not of my own choosing, but that of the Committee, and I may wander a little bit from it. "How May a State Most Effectively Combat Hog Cholera?" I would rather have spoken to the title: "How May We Eradicate Hog Cholera?" and not confine it to a State, but look at it from the bigger and broader viewpoint of interstate work. I thought probably there might be on this program some one to take up that phase, but I see there is not.

We cannot control hog cholera by state work alone. Hog cholera is not a respecter of state lines, it has a habit of getting over the state line. Some of our states—Missouri, for instance, that raises so much
corn—go down into Arkansas and into Texas even, and to Oklahoma and way out to Kansas to bring in hogs to feed. We bring along cholera with those hogs that we import, so to control hog cholera we must depend to a considerable extent upon the help of the Federal government, and we are not getting enough help from this Department in the control of these matters. It is not the fault of the Federal government that we are not getting enough help. It is largely the fault of the state, because they have not been demanding it, because they have not been co-operating with the government along these lines. As Dr. Dorset has shown to you, we are doing some things in Missouri in co-operation with the Government to show the feasibility of some of the plans for eradicating hog cholera, and I am glad that the Federal agencies that have charge of that part of the work have used that word "eradicate," and I hope they will stick to it. This is the thing that we have got to stick at our masthead if we are to make much progress. Control is a good thing, but eradication is better, and this is the end we must strive for.

But what can a state do? I think if we carry out as a state through wise laws and through the wise application of those laws, the suggestions that were given here in the paper presented by the Committee on hog cholera legislation, we will make much progress in the eradication of this disease. We have on our statute books laws that govern most of these things. We have them in Missouri, and no doubt in other states you have those laws. It is largely a matter of the enforcement of those laws, putting them into operation. It is a matter largely of having the right kind of machinery or a personnel, if you please, to care these things out. Those are problems which each state must work out for itself. The control of any contagious disease depends upon certain principles which we cannot get away from, wander from, if we are to have any success. Those principles are contained in the word "quarantine."

First, though, we must have a knowledge of this disease sufficient to detect it. Then next comes notification; next quarantine, and I would put last the use of hog cholera serum. The educational feature I believe is the most important in the work which a state can do. I think we must emphasized the serum side of this matter too much, and we must have led those agencies which we must depend upon for the cleanup end of this, that is the farmer, to depend too much upon the aid which the state can give him, and which he can get from serum. The fact that this will immunize a hog and save hogs in individual cases has led those very men that have used it to neglect the sanitary side of things, and so I think that the important work for us, as states, is to put more emphasis upon the sanitary side of this matter. We are doing it, or trying to do it in a small way in our state.

In our College, in co-operation with our Farm Management Department, we have started in certain counties, and one of these is adjacent to Pettis County—we have started there little groups of clean-up clubs; we call them "Anti-Hog Cholera Clubs." It is a part of the Farm Management work, a work that is supported in part by the United States government, in part by the Colleges, and in part by local agencies—the county. The County Court gives some money to this. In each one of these counties is a man called the "County Farm Adviser." In our state—I don't know what he is called in other states. Several states have these agencies. The principal business of this man is to teach the farmer how to conduct his own business more profitably than he has done in the past. He will have a little campaign on alfalfa raising. He will get all of those who are interested in alfalfa together in groups and teach them how they can raise better alfalfa, and so on. In live
stock matters, he will teach them better breeding and feeding, and all those things are discussed. And so as a part of that work we have put into these counties, or into some of these counties, a special man for our work, a man who knows farming and who can talk to these men about alfalfa and other things, but who also knows how to control hog cholera, and knows sanitation. We are starting a movement of that kind, a clean-up movement, and going to them with this appeal: “We don’t want you to buy serum; we have got it to sell to you, we have got a store there that you can draw upon whenever you want it, but the important thing for you to do is to clean up.” “Sanitation,” write that in big letters, and “serum” in small letters, and when we can do that we will accomplish more; it is a matter of the education of the farmer. We have been neglecting that side of it as states. I believe it is more of a farmer’s question than a veterinary question, however important the veterinary side of it is. We must have a veterinary police force to go to these places when it is necessary to take charge of these things, oversee those things, help out in every way we can, but the big job is the farmer’s job, and we must teach him how to do it.

Some of you probably expected me on this occasion to have an outline of specific things to do. I think that is largely a matter for each state to work out its little ways of applying these things, but I want to leave this thought with you, that it is largely a sanitary matter rather than a serum matter. (Applause.)

NECESSARY EQUIPMENT OF STATE LABORATORIES FOR THE PRODUCTION OF HOG CHOLERA SERUM.

By Paul Fischer, Columbus, Ohio.

Mr. President and Gentlemen: You have heard the subject that has been assigned to me. While I was sitting here I thought of starting out by making an apology for not having a paper, when it occurred to me that perhaps, after all, it is a matter of congratulation that I have not got one; I won’t have the floor so long. But I was asked by Professor Ferguson to write a paper on this subject and present it, and I promised him to do so, and I intended to do so in good faith, but an unhappy combination of circumstances prevented me from carrying out my plan.

I want to say, however, that in Ohio we have been in the State Serum Laboratory business and serum business for six seasons, and we have naturally had our ideals of what a State Serum Laboratory ought to be. Three years ago we asked our Legislature for a large appropriation to build our ideal laboratory. We asked them for $100,000 for that purpose. They gave us $25,000, and with that money we bought a farm, and waited for the rest. The next year we got $60,000, and last year we got our other ten or $15,000 to make up our $100,000, and to complete our ideal $100,000 serum plant. Now while we were building this plant our ideals naturally underwent a great many changes, but whatever those changes may have been, my belief was that in presenting this subject I could not do any better than to present my ideals as they were then and as they have been modified since. Instead of doing that, however, I will simply consume a few minutes in telling you how I intended to do it.

In the first place the thoughts uppermost in our minds were that a State serum plant ought to serve two purposes. One of these purposes was the preparation of good, effective serum. The other purpose was to study the hog cholera question, to study and to develop the best and the most economical methods of making good serum, and the best way of applying it for the control first, and finally for the eradication of hog cholera.
Now as a foundation for such a plant we had in mind, first the necessary grounds upon which to place the plant, and our ideal was a farm; and secondly, the necessary buildings, and lastly, the equipment to this farm and of these buildings. Now the point to consider in equipping this farm and these buildings came under two headings. In the first place provision should be made, and the thought should be constantly kept in mind, that the farm should be kept in a sanitary condition absolutely so as not in itself to serve as a center of infection to spread the disease, and then the laboratories should be so arranged and equipped that they could be kept in a sanitary condition, and lastly, the arrangements should be such that the work is facilitated, that the work can be carried on in a mechanical way.

This farm that we have is about 100 acres in extent; 13 acres are devoted to the serum plant proper, the buildings, and the rest of the farm is divided into ten eight-acre lots, and then there are four or five acres consumed in roadways and lanes. The buildings are fourteen in number, eleven of them are fireproof, of concrete and brick construction, and three of them are frame cottages. Our buildings are, briefly: First, a laboratory and office building; secondly, the large pen, large building for the accommodation of hyper-immune swine; third, a large enclosure for the keeping of virus pigs, for the infection of healthy pigs, for the production of virus, mortuary, crematory, post-mortem rooms attached; fourth, the test pen, that is a pen for keeping the experimental animals, the small animals, in which they can be absolutely separated from each other, and then we have another building that is not directly connected with this, although it is equally important, a pump house, which supplies all the buildings with plenty of water. Then we have four concrete manure bins in which all the manure from the farm and the animals is placed. These are air-tight, so that no flies can get in or out. The bins are very large, 16 by 60 feet, the width and length respectively, and 8 feet deep. Our idea is to keep the manure in those bins until the process of time destroys the hog cholera virus. How successful we will be in that time alone will tell. Then we have storage barns, farm barns, and lastly a large pen which we intend to use for keeping susceptible animals with which to test our serum. We have had great difficulty in getting pigs at this time of the year of the kind that we want, and to get them of the uniform type or the uniform grade of susceptibility. That, in a few words, is the building equipment.

In addition to that we have a sewage disposal plant which takes care of all the sewage of the dwellings and of the buildings. The sewage from the laboratory, from the hyper-immune pen, from the disease pen, from the infection yard; each flows into a separate settling tank. Those tanks are so arranged that all of the sewage from these buildings can be run into one of these tanks, or into any number of them, and divided up into any way that we choose to have it in such a way that we can do experimental work in the disinfecting of the sewage. After the sewage has collected in the settling tanks it can be disinfected, or if we find that it is not necessary it goes into two tanks finally, which, after they fill up, when the sewage has had a chance and an opportunity to settle and to decompose to a certain extent it passes off into a sand filter bed, and then is discharged into a ravine as drinking water. (Laughter).

Now my idea when I promised to present a paper was to show photographs of our plant and farm and buildings and of the equipment, but, you understand this plant is just nearing completion. We were disappointed in respect to our apparatus and equipment, and for that reason it was impossible to make those photographs. (Applause).
THE CONTROL OF HOG CHOLERA IN GERMANY.

By Kurt Schern, Ames, Iowa.

The control of hog cholera in Germany at the present time is brought about principally by the aid of veterinary laws.

In contrast to the United States where the vaccination with serum and the simultaneous treatment are made use of most extensively for the eradication of the prevailing disease, these remedies are applied only to a limited extent in Germany. There are various reasons for making slight use of vaccinations.

All competent veterinarians in Germany are convinced of the prophylactic effect of the single vaccination with serum. There is also however strong opinion that the vaccination frequently fails in practice.

The small amount of the serum (Virus anti-serum) used can also be explained by the comparatively high price of the serum, especially if you consider that very intensive methods of farming are predominant in Germany. The productiveness of the farms is so closely estimated, that the expense of vaccination against hog cholera cannot be borne at the present time. If hogs on a farm become diseased, it is impossible to consult veterinarians at once, much less use the very expensive vaccinations against the disease. The success of vaccination is rather uncertain, because generally at the appearance of the cholera in a herd not all hogs get sick at the same time, and the farmer is often tempted to wait during the first cases of death under the assumption and in the hope that it is perhaps a case of only a few deaths and that their number will not be increased in the future. Only after it has been shown clearly that a cholera-like disease has broken out which he cannot control alone, is the advice of a veterinarian sought. Then however, it is too late to vaccinate with serum because the infected hogs show mostly the mixed infection of virus and cholera bacteria. Consequently we have to deal in a general way less with the acute, hemorrhagic form of cholera caused by the virus than with the chronic cholera which consists of mixed infection resulting in fundamental, diphtheritic necrotic changes in the intestines and in a typical catarrhal pneumonia and against which the best anti-serum, which should be used almost exclusively as a prophylactic remedy, is naturally inefficient; for in this serum the anti-bodies for the bacteria which are important in the cause of the disease are not present.

Thus more attention is given to the bacteria observed in hog-cholera in as much as an attempt is being made to incorporate in the hog cholera serum anti-bodies against Bacillus suis pestis, its variations, and also certain other bacteria.

On the whole one is not inclined at this time to deal with the Bacillus suis pestis as a negligible bacterium of hog cholera as was done at the time when the filterable virus became known as the causative agent of the disease. The earlier, more general, experiments are recalled in which the Bacillus suis pestis caused hogs to become sick with symptoms of hog cholera and more recent experiments have again shown, that besides the Bacillus suis pestis and its variations, several other bacteria of minor importance are also capable of causing a disease similar to hog cholera. And we again approach the conception originally given by Salmon & Smith who considered the pestifer as a causative bacterium of the cholera. ;

The different etiological factors must be considered in the serum-therapy, if success is desired. Special attention should be given to the question of which etiological factors exist in the different countries and localities. One cannot in our opinion generalize summarily in this
respect. And the methods which succeed in a country by the use of a certain serum or by other means in the fight against hog cholera, cannot be generally recommended for the universal control of the disease. Therefore it would be wise to differentiate from now on between the various kinds of hog cholera.

In the case of the old "Classic" cholera according to many the conception has taken place that this hog cholera is caused by the virus and in the further course complicated by the Bac. suis pestis.

Others are of the opinion that the etiology of the classical hog cholera, at that time, was not fully understood, and was identical with hog cholera caused by the virus and Bac. suis pestis. For future classification we suggest that we recognize—

1. As "Cholera" (Pest) the disease caused by the virus and the pestifer, resp, by certain other bacteria.
2. As "Para-cholera" (Parapest) the disease caused by the Bac. suis pestis or certain other bacteria without co-operation of the virus.
3. As "Virus-cholera" (Viruspest) the disease caused solely by the virus.

In the clinic and pathological anatomy we must do without this classification, as it cannot be carried out in a practical way in these departments. However this division from the etiological standpoint must be adhered to in reference to the therapy and control of hog cholera.

The recognition of the importance of distinguishing etiologically between "Cholera," "Para-cholera" and "Virus-cholera" is spreading gradually in Europe and the attempt is being made to prepare the corresponding serum. In Germany we are at the present time in a transition period in reference to vaccinations and we must wait to see what results are obtained by the vaccinations with the new serums.

The simultaneous treatment is not used at all in practice. The German scientists are of the opinion that the simultaneous vaccination against hog cholera is a great danger in reference to the spreading of the disease. It is scientifically impossible to standardize the virus against the anti-virus serum. In this manner hogs may get the hog cholera after the simultaneous treatment, whereby a new center of contagion is created and the spreading of the virus is encouraged. This is guarded against and they will not employ the simultaneous treatment in Germany until this danger is removed in some manner.

The veterinary police regulations which are enforced in Germany for the control of hog cholera, are carried out on the basis of the ordinances for the control of animal diseases contained in the Laws of the Empire.

The ordinances, which each owner must follow in case of the breaking out of the disease by the order of the district veterinarian read about as follows:

"According to Par. 19 No. 4 of the law of animal plagues the owner of a quarantined animal must make such arrangements that the animal cannot leave the place during the quarantine and does not come into contact or communication with other animals."

"At the main entrance of the infected farm and on the doors of the infected barn signs which can easily be read are to be put up with conspicuous and permanent letters—'Hog Cholera.' Such places as contain diseased or suspected animals may be entered without special permission only by his representative, by persons who take care of the animals and by veterinarians except in exigencies. The owner has to take precautions that hogs of other owners are prevented from trespassing on his farm. Hogs on such a farm, which die, or are killed or slaughtered
must not be used nor removed from the farm without previous notification of the police authorities. The local authorities report in detail to the district veterinarian.

"The bodies of the dead hogs must be removed in a harmless manner. The dead bodies are to be transported on wagons or in receptacles which can be closed tightly. The wagons and the receptacles are to be disinfected after each use. Tools, vehicles, receptacles and other objects if they come into contact with the diseased or suspected animals or their manure must be disinfected before they are taken out of the yard. As a disinfectant diluted Calcium chlorid or 6 per cent Cresol water are to be used. The manure, straw and feed scrapings which are removed from the infected pens must be burned or buried. The aisles, the doorsteps and the ground in front of the barn doors, as well as the walks to the barn and in the yard, must be cleaned during the prevalence of the disease at least every eight days, either with diluted Calcium chlorid or 6 per cent Cresol solution. The diseased or suspected hogs can only be taken out of the quarantined farms with permission of the local police authorities and then only for immediate slaughter. The bringing in of hogs to the infected farms is forbidden. This can however be done under the condition that the new hogs are to be treated like the suspected ones.

"To act in opposition to these ordinances will incur penalties, according to Par. 74 No. B. of the law of animal diseases of imprisonment up to two years or a fine of from 15-3,000 Marks. The disease is considered as checked three weeks after the last case has died or recovered, following which a thorough disinfection of the houses is carried out. Following this the quarantine is removed."

By the aid of these ordinances it is possible to prevent the hog cholera from becoming a calamity in Germany. However it must be mentioned here that in Germany every Landkreis, which corresponds to a county here, is provided with a district veterinarian who has police authority. A large number of Kreisen (counties) probably from 10-15 form a province. At the head of the veterinary administration is an official veterinarian who is called the Provincial Veterinarian, and supervises the county veterinarians under him. The provincial veterinarian is under the Minister of Agriculture. In order to obtain a position of this kind it is necessary to pass examinations of an exceptionally difficult character on phases of veterinary medicine. Naturally this will insure that only very efficient men especially those well acquainted with methods of combating diseases are placed in the responsible positions of this kind.

On this basis the organization for combating diseases has been very highly developed in Germany and in the manner described above the campaign against the hog cholera is made.

Dr. Kinsley: There are a few things that are not quite clear to me. First, in Dr. Dorset's paper I suppose it was meant that the number of animals that died died of cholera. In the serum treatment alone it is possible to have a much higher percentage of death from other causes, so I assume that it was meant that the deaths occurred from cholera, although I don't believe Dr. Dorset so stated.

I was especially interested in Dr. Connaway's stand on the control and eradication of cholera. Last spring I had a slight opportunity of investigating this by correspondence only with state
authorities, and this fall still further opportunity of obtaining some of the data that were reported by the Committee this morning on hog cholera regulations, and in those reports it struck me that from general reports of the state authorities that cholera is more prevalent now than two years ago. In conversation with Dr. Dorset this morning I told him that that had been my impression, but he may have cleared my mind on that by stating that the people in general know more about it now, and it is reported much more commonly than originally. Now possibly that explains it, though to make it absolutely conclusive, to my mind, I think I shall wait until the Bureau report comes out and find the percentage of hogs having cholera that have been slaughtered. I believe this will give us a fair estimate of the percentage of cholera through our country.

One thing referred to by Dr. Dorset, and also in Dr. Schern's paper, and I think it was intimated by Dr. Connaway, that occasionally in giving this simultaneous method treatment it is possible that a hog may be so susceptible that it will contract cholera and die. Then the question is: How long after death will the virus remain pathogenic on the premises? In other words, in the simultaneous immunization it has been found that according to the age of the animal immunized the immunity period will vary from probably three months to life immunity, so that if an animal dies of cholera on premises where all other hogs have been immunized, and if there are some that were immunized that were suckling pigs, it is possible that in the course of eight months some of them may be susceptible to cholera and in this way continue that infection of those premises because we see, as was outlined by Dr. Dorset, with reference to the source of an infection, that there are a great many ways of distributing infection, so it seems to me to be necessary to have a clear understanding on that point, before we can absolutely accept the proposition of simultaneous immunization. At least it seems to me that good sanitarians must regard simultaneous immunization as a possible means of spreading of virus or infection, and establishing centers of infection possibly in communities where it did not exist.

I was much pleased to note that Dr. Dorset, and particularly Dr. Connaway, placed the use of serum as auxiliary. In the general opinion, I believe now it is found that sanitary regulations have largely been withdrawn or have not been enforced since the on-coming of anti-hog cholera serum. Now, as a matter of fact, and I believe as a matter of record, you will find that regulations, until very recently anyway, have been very lax. In order to eradicate cholera I believe that you will have to depend largely yet upon sanitation, using serum as an auxiliary. It seems to me that we should recommend some definite way for the use and distribution of serum. It is now well known that serum, in many instances is
improperly used, perhaps improperly prepared, so that it does not give the desired results, and as an effect of those improper results we have the establishment of centers of infection in various places in the country, and before this disease can be successfully eradicated is it not possible that we will have to depend largely on education, and in our states have a large force of veterinarians so organized, or controlled, anyway—so organized that each county will be represented by a man whose duty it will be properly to take care of all of the outbreaks of cholera? Our present plans are not co-operative in one county with another, and perhaps in one county with the state at large. In other words there is a very lax system in practically all of the states.

We have heard just a few words from Dr. Torrance in regard to the methods employed in Canada, where there is, I believe, no anti-hog cholera serum used; they are not limited by state rights, as we have them on this side, so our problem here is different from Dr. Torrance's problems in Canada. (Applause).

Dr. Mayo: Mr. President, I think all of us who have watched the progress of the handling of hog cholera see at the present time a swinging of the pendulum back towards many of the established methods that have been proven by time and experience to be very important factors in the control of all transmissible diseases. It is a fact that whenever a specific for an established disease is brought out there is a tendency, among the laity at least, to abandon all that has been proven profitable by experience, and to rely solely upon this one specific. I am not certain that the profession is free from this human frailty. And in contributions to the agricultural and live stock press I have repeatedly urged upon the farmers and stockmen the necessity of hygienic and dietetic measures in connection with the control of hog cholera. It is the fundamental law for the control of this, as any other disease. The point has been very clearly brought out that apparently—and I say it advisedly—that apparently there is more hog cholera in the country and has been in the past two years than we have known before. It may be apparent and not real—let us hope it is—but there is no question but that proper dietetic measures in connection with the handling of swine are exceedingly important. That is, a variety of food. Those of us who have struggled with this disease twenty years know that corn-fed animals are more susceptible, apparently, than those which are fed a variety of food. Sanitation is not necessary to touch upon, because we know the importance of this. But it is exceedingly important that we educate the farmer. In this country at least, before we can make great progress, we have to go through the country enforcing police methods in the control of this disease. And the plan outlined by Dr. Connaway of Missouri seems to be striking at the very foundation, where we have got to begin
controlling hog cholera, and we have got to teach them that the control of hog cholera begins right at home with themselves. (Applause).

Dr. DeVine: While hog cholera with us in the East, of course, is nothing compared with what it is to you people here in the West, still we have enough of it so that we would like to know something about it. Now I confess that I am very much confused, and with the hope that there is some one else in the room as stupid as I am, I would like to ask some questions. Now some two years ago or earlier still you made a classification or division of this hog disease. You had the hog cholera, swine plague and other diseases caused by the hog cholera bacillus. Now most of the gentlemen who have been speaking to-day, who are working in it, seem to be slipping right back into hog cholera, without ringing the bell on us fellows at all. I don't know: Are all cases that we are treating now, or are all affections of swine where we have epidemic outbreaks, hog cholera? Are we to apply the serum? I think some of us who don't know much about this are entitled to some enlightenment upon it by the men who work in it.

Now it is my custom in my private practice, if I am called to see sick hogs, or if one of my assistants is called, where there are a great number of hogs involved, I always send one of those live, sick hogs, or a dead one, to the laboratory, with the hope that they who are making a specialty of it will assist me in making a diagnosis. And they usually do. But then again they seem to make mistakes sometimes, or something happens that we cannot explain.

Now let me tell you about a case that I had on a State farm, an institutional farm where there were some three hundred head of hogs sick. They lost about eighty, and then they wanted us to look at them, and one of my assistants went out and looked at the hogs, and he thought it was hog cholera, it looked like it to him, and he sent a hog to the laboratory, and they thought it was hog cholera. Well, these hogs kept on dying. They thought it was hog cholera and injected the hogs, and still they kept on dying, at the rate of from three to ten a day. They asked me if I would see them. I said there wasn't anybody knew much less about hogs than I did, but I would look at them anyhow, and I suggested that we dip them. This was at the State Insane Institution. It was on a Sunday afternoon when I got there, but we had a lot of insane help that didn't know any more about it than I did. So we got some old bath tubs ready, and sent down to the office and got ten gallons of a coal-tar preparation to be used in the dip, scrubbed all the hogs and dipped all except two that seemed hopeless, and we killed them. About two weeks after that I got word that all the hogs were well, and that settled the hog disease, and no more of them died. We stopped it by that means. Now these hogs had
been subjected to serum ten days before. It might be that the argument would be used that the serum stopped the disease, but we had an outbreak similar in appearance four miles away on the County Farm, and I said “Let us dip them first.” They lost three hogs out of about forty. We dipped those hogs, moved them to a cow stable that had not been occupied by men or cows for several days, and no more died there. Now that seems to be some of those cases that you men call hog cholera, and still dipping or sanitation, or putting them on a diet seemed to stop the disease. Now I have had several smaller farms where that seemed to work well. But that does not enlighten me as to the diagnosis, what the trouble was. That is one of the conditions I would like to have you men who are making a special effort in this work tell me about.

Another thing I would like to ask Dr. Dorset is, I see he lost thirty-nine hogs among those apparently healthy hogs that were treated by the serum alone. What does the doctor suppose caused the death of those thirty-nine hogs that were apparently healthy, and with the serum treatment alone?

Another question I would like to ask is, on how young a pig would you recommend the use of serum or the simultaneous method? And how long an immunity will the serum alone give to the pig? I would like to have those questions answered.

Dr. Dorset: Mr. Chairman, Dr. DeVine has propounded quite a variety of questions here, and I am not sure that I have them all clear in my mind, nor am I sure that I can give a satisfactory answer, one at least that will be satisfactory to Dr. DeVine. With regard to the deaths and the stopping of the deaths in these two herds that he referred to after dipping, I think he said at the same time that he not only dipped, but that he moved the hogs and changed the food. I would suspect in both of those cases that the cause of the trouble was dietetic, and that the change of the food and not the dipping was the cause of the stopping of the loss. Dr. Moore reported a number of years ago some very interesting cases of apparent hog cholera in herds fed on slop or garbage from the table. These herds that Dr. DeVine referred to, I understood him to say were both institutional herds, herds that are generally fed on slop. And so I would be inclined to think that the trouble there was not hog cholera, but was this dietetic trouble with lesions in the carcasses that resembled hog cholera very strongly.

Dr. DeVine: Let me interrupt to say that my assistant had changed the diet the very first day that he went there.

Dr. Dorset: Of course I am not familiar enough with the circumstances, I can only hazard a guess as to the cause of the disease in those herds. It came to my mind when you asked the question, that that was a possible explanation.
Another question raised by Dr. DeVine was as to what is hog cholera, and what has become of swine plague and the diseases caused by the hog cholera bacillus? I have not had in recent years a great amount of experience in the field with hog cholera. I was in the field a number of years ago quite a little. It has been our experience in the field that when hogs are dying in large numbers, if there is an infectious disease in the herd, that the use of serum always stopped the disease. There may be, and I believe there are in the East conditions that differ quite a little from the conditions that we find in the Middle West. I believe that the great important disease among hogs in this country is hog cholera. There are undoubtedly other causes of death. Sporadic pneumonia, death due to improper feeding; in the case of very young pigs, some of them no doubt at times are killed by lung worms, and tuberculosis causes the death of a few, and yet it is my personal opinion that the great important hog disease that we have to deal with is hog cholera—I mean by hog cholera the disease caused by the filterable virus—that if we can control that, the greater part of our work will have been done, as far as infectious diseases of swine are concerned.

Now with regard to the causes of death in these healthy hogs on the second chart, or lower chart, I don’t know the causes of those deaths. I took those figures from reports that were sent in by the field inspectors, and I judge in many cases they wouldn’t know, that after the herd is treated they will go back and visit the farms and see what the conditions are, discover how many hogs have been lost. Some of them may have died from other causes than hog cholera, but all deaths that have taken place in the herds have been included in the charts. I am sorry that I can’t tell you specifically the cause of death there. Those thirty-nine hogs, as you will see, were in the case of the serum-alone. I believe that those six hogs recorded for Pettis County, that died, were cases of apparent hog cholera that developed about two months after the serum treatment. At least it was so diagnosed by the inspector in the field, and the herds were re-treated, and as you see there was very little loss. With regard to those in Montgomery County I cannot speak; I don’t know the cause and have no information about them. I happen to know about this occurrence in Pettis County, that there were two herds protected with serum that later developed the disease. The same with regard to the thirty-six lost in Montgomery County after the simultaneous treatment. I don’t know the cause of those deaths.

With regard to the serum immunity, we made very careful observation as to the length of time immunity from a serum injection persists, in the early part of this work. After the serum is injected you have got to keep that hog absolutely away from all infection,
otherwise his immunity may be reinforced, and you will apparently then get a very long immunity from the serum injection. We found in a very few cases the hogs became susceptible after serum treatment in about three or four weeks. Those were unusual cases. The usual time for that immunity to expire, as I remember it, was in the neighborhood of two months.

Dr. Kinsley: I would like to have Dr. Dorset answer the question about how long the infection will live on the premises when it is introduced there. That is quite a vital question.

Dr. Dorset: Mr. Chairman, I will say in reply to Dr. Kinsley that I don’t know. We have tried to find that out, and we have not been able to do it satisfactorily to ourselves so that we can reach a definite conclusion. We know that virus of hog cholera, if put away in a sealed tube in the laboratory will live for ten months. We have kept it a number of times for ten months. Now exposed, as it would be on the farm, to the influence of the weather and the sunlight, it is very problematical, it is very difficult to say, we don’t know just how long it will remain alive. I, myself, believe that that varies greatly. It depends on the climate, and possibly the amount of infection, and the conditions to which the virus is exposed.

Dr. Niles: I will say in answer to Dr. DeVine’s question in regard to treatment of young pigs that we don’t consider any pig too young to inject with serum if it is in danger, or if it is necessary to inject to prevent cholera. In young pigs treated simultaneously, a certain per cent of them will lose their immunity later on, but young pigs can be saved by serum injections the same as the larger and older animal. I believe in this county work that Dr. Dorset has described, that extremely young pigs have been treated satisfactorily, very satisfactorily. I do not consider any pig too young.

When very young pigs are injected simultaneously, a certain percentage of them will lose their immunity later on. A very young pig treated simultaneously should receive a comparatively very small dose of virus and a large dose of serum. It is more safe, no doubt, to inject the young pig with the serum alone, though Dr. Murphy tells me that in those 500 head shown on the chart, some were extremely young pigs injected simultaneously.

Dr. DeVine: Dr. Niles, we had about forty young pigs about three weeks old. If we injected them with serum-alone now and injected them with the simultaneous when three months old, do you think that a good plan?

Dr. Niles: I think that is a good plan, but I have no doubt you can do it now, if you inject with a small dose of virus and a large dose of serum.
Mr. Cutler: I represent the North Western railroad in the live stock interest. I have come down here to get some information on these subjects. I appreciate that a great deal of good has been done by you gentlemen along the lines of treating these diseases. But I would like to hear something from some of these men who have lost herds and hogs and had treatments of different kinds; I would like to hear from two or three of them. There are some now in the room. There is one right here beside me, Mr. Ames, from Iowa, who has been through it for twenty-five years.

Dr. Gaumnitz: Just before we get off this subject, I think there is one feature that has been referred to but overlooked, and that is the mortality in hogs under normal conditions. I think the laity in general do not take cognizance of the fact that mortality among all classes of stock from unknown causes, in many cases is much larger than we expect, sometimes running as high as 15 per cent perhaps in horses and sheep and cattle, or anything that we are feeding, and particularly in young hogs. I think Dr. Niles said many of these pigs that were vaccinated here with serum-alone were young pigs, so that those thirty-three possibly in the course of three months or four months might have died of other causes than cholera, and should not properly be charged to the inoculation of vaccine.

Dr. Houck: In Montgomery County it has been our practice to use the simultaneous treatment in all well herds with the exception of those individuals of the herds where we found recent castrations or temperatures for one cause or another, and in treating very young, weak pigs. In those instances we used the serum-alone. Now our losses in those well herds have been mostly the little suckling pigs that we have treated; in other cases it has been the high temperatures due to recent castration. In some instances animals have died within three or four hours after the operation, probably due to careless handling or rupture of some blood vessel and in others I know that they have taken the hogs off the premises and have performed operations, and I have known some cases where wagons have run over them or horses have kicked them, and in such cases the losses have not been due to cholera. The reports which we receive about a month after the treatment show a certain amount of loss, and as yet I have not had the opportunity to investigate to see what the losses were in each instance, but in most of the instances it has been due to other causes than the treatment.

Dr. Clarke: Mr. President, I would like to ask Dr. Dorset what percentage of abscesses he found in these hogs that he treated?

Dr. Houck: Mr. President, I can give that information for Indiana. Out of 9,215 treated between the 15th of July and the 26th of October, there were 55 abscesses reported that occurred within a month, that is about one-half of 1 per cent; 55 abscesses out of 10,000 hogs.
Mr. A. L. Ames: Mr. President and gentlemen of the Convention. I am one of those unfortunate laymen, farmer if you please, who happened to drop in here to learn something about hog cholera and the work of checking hog cholera. I am from Iowa and perhaps some of the gentlemen here present from Iowa will recognize me. I see a number of familiar faces in looking over the audience as belonging to men who have been doing something with the hog proposition in that state. I have been familiar with it in a business way for a number of years and have studied it as well as I might in a cursory manner for the past four years. I have been very much pleased in listening to the discussions here this afternoon to find that you have the same difficulty here that you lay to the farmer—you don't all agree. I see that you are divided on that question, and some uphold one method and some another, and still the farmers are losing their hogs by some disease commonly called "hog cholera," that is causing us worlds of trouble and loss of money.

Now the discussion is sifted down, this afternoon, to two methods, the serum method or the simultaneous method. Either one in its proper way probably would be effective and efficient. I want to ask you gentlemen this question. If all of the cholera of a certain locality or of a state were eliminated then perhaps your state—holding that the simultaneous method would cause trouble might be effective, but until you do eradicate all of that, of what benefit would it be not to use the simultaneous method? What greater danger would there be to the herds of that community if you have the cholera on the adjacent farm than if you have it on one fifty miles away if it is brought there by some outside agency, and 50 per cent of it, as has been shown here, is brought in that way? Now, gentlemen, I have been in the business of raising from four to five or six hundred hogs every year. I have lost hogs by cholera twice, and in both of those instances the cholera was brought to my place from a distance of many miles, because one of my neighbors lost no hogs through hog cholera, and in both instances I might say it was brought from a distance. And contrary to that, I have gone through the scourge, with a stream running through my farm, and with all my neighbors losing hogs around me, and I not losing one. Now it is not altogether one thing, it is not altogether another thing, but we have discovered a remedy for this disease, and it is the serum when it is properly made and properly used, and that has been demonstrated in every place where the serum or the virus has been used for the past two years. It has been proven time and time again, and it is only because we don't get together and use it simultaneously all over this country in an effective way and in an efficient way that we are losing hogs to-day, and we are losing them by the cholera. What is the reason we don't have it? Simply because you
don’t have the proper inspection of your serum plants. We send to a serum plant for serum and what do we get? Alcohol colored with blood nine times out of ten up to the past year, and that is going to stop, gentlemen, and we ask you—the farmers—we ask you as professional men to see to it that that inspection in these serum plants is so rigid that when a man sends to a plant for serum he is going to get potent serum, and not blood and alcohol. That is what we want. Whenever you go out to a farmer that is losing hogs, and you give him an impotent serum, and he uses that serum, that farmer is the loser and that herd suffers, not because of the fault of the man who administers the serum, but because of the fault of the man who made that kind of material, and you make that farmer your enemy forever, because he is skeptical from that time on—and we are a skeptical body, perhaps we are more skeptical as a body than any other class of men, we are from Missouri and we have to be shown that those things exist.

Now I agree with nearly everything that has been said here. Dr. Niles has been the forerunner in our state and has done much good. We had him down before our Committee last winter time and time again, as well as all the rest of the men that we could get hold of from our state, and from a distance, trying to find out the best method of procedure to stop this hog cholera, and gentlemen, it has come to my attention that we must have some Federal inspection, that is the main thing, we must have a Federal law that will compel the inspection in every plant that makes a serum, so that when we get that serum we know that it is potent. And then we have got to have a little education. Some of your profession have not all the education that you ought to have in the administration of serum. Why, I was out this fall, and I am nothing but a layman, and I found one of your profession mixing the serum and the virus together and giving it in an injection all at once. A very nice way, but it wasn’t very effective, except in killing that pig.

Now these things are up to you more than they are up to us, and I think that if you doctors would get behind a good Federal bill, encourage the men from your states to go to Washington and pass a bill there that will compel Federal inspection, and then assist the state with funds so that we can put a competent man in every county in all the states that raise hogs, it seems to me that we can get away from this hog cholera in a very short time.

I have to-day on my farm a herd of immune hogs, and every time that I see anything wrong with them I am going to take action to correct it. They are going to be immune if I lose half of them. I want to know what I have got, and the only way that I can get at it is to be sure that they are immune from hog cholera, and I am going to continue that, and I believe that it will work out just the same as it has with vaccination in any other disease. Take the
smallpox in the human family; why don't we have such epidemics of smallpox as we formerly used to have? Because we have vaccinated year after year and year after year until people get so they resist the disease. And you will have to do the same thing with regard to hog cholera. If you follow it up you will get results. The only thing is to immunize them right, immunize them properly. It doesn't make any difference if you do drop some of the virus on your farm. Suppose you do drop a drop of that virus on your farm—I would rather have a drop of virus on my farm than to have my neighbor without my knowledge bring a whole lot of cholera on to my farm, or have it come through the agency of crows or buzzards or pigeons. Why? Because I can stop that cholera right there, I can burn it up or do something with it. By means of sanitary measures and sunlight and all of these things that you lay stress upon, you can keep your farm clean. You can do that providing you use good judgment in cleaning up your herds and burning your sick hogs and not burying them. I think that is the most despicable thing a man can do to bury a disease ridden hog. It is just like having black-leg, bury black-leg on your farm and you will have it for twenty years. I will tell you, gentlemen, there are many things that you can give to the farmer, that you can find out that is of value to him, and he isn't so skeptical as you may think, if you will come to him with your mind unbiased. I thank you, gentlemen.

Dr. Peters: Mr. Chairman, I wish to say something in regard to Dr. DeVine's remarks. You remember he stated that he had lost eighty head of hogs prior to vaccination, and he wanted to know whether there might not be something else than hog cholera, because the serum did not immediately stop the ravages of the disease, and that he dipped his hogs and thereby effected a cure. Now I wish to say this, that my own opinion is that they did not take the temperature of the remaining hogs. Did you?

Dr. DeVine: No.

Dr. Peters: Well, there is where the trouble was. You had no other disease than cholera. The diagnosis no doubt was made correctly, but you injected a great many hogs that had high temperatures, and they still continued to die. Now there is where veterinarians make a great mistake in treating a herd. If you don't take the temperature in going into a sick herd and don't find out just how many hogs there are in that herd with a high temperature you will have just the trouble that you have had with this lot of serum. You are on the fence then, thinking that it is something else. Now of course we know that lice will debilitate the animal, and no doubt you would have known whether the animals were affected with lice, but I believe, Doctor, there is where the trouble was. That is one point that all veterinarians should take into consideration in
treating a herd of hogs, taking their temperature and knowing where they are at. Now after a few days, when you had done the dipping, you had lost probably all the infected ones, and there is where the solution comes in.

Dr. Craig: In our state at present we are carrying on a campaign of education among the farmers and I must say that I was very much surprised when I first entered the work to find that the farmers know so little about hog cholera. People on the Live Stock Sanitary Board and experiment boards have been sitting in our office writing bulletins and publishing little squibs in the press, and the farmers have been reading them and then throwing them in the waste basket. Now the only way to carry on educational work among the farmers is to go out and talk to them and allow them to ask questions and have really personal interviews with men who know more about the control of hog cholera than they do.

Regarding the vaccination work and the treatment of sick herds with serum, we have been carrying this on on a small scale in Indiana for about four or five years. Our loss had varied from year to year. Last year the loss was lighter than any year since we have been engaged in the work. From the herds vaccinated we received accurate reports from about one-third, and the reports last year show that in the healthy herds a little more than .6 per cent of the hogs died following the vaccination with the serum simultaneous method. In the diseased herds the loss was a little more than 6 per cent, but this does not indicate the loss in the badly diseased herds. We considered a herd diseased if any of the hogs in that herd showed a higher temperature than 104 or 103, so that in a large majority of the cases we were dealing with an outbreak at the very early stage of the disease. The supply of serum in our state has been so small that the people have not been satisfied at all, and we cannot consider that we have supplied sufficient serum to anywheres near meet the demand, or to give any idea as to the effect of the serum as a control measure. I am sure, however, if we hammer away at the educational work among the farmers we will be able to do a great lot of good. And I will tell you right now, the veterinarian needs this educational work just as much as the farmer. He needs education in a good many instances when he first begins his vaccination work. And I might say here that in our state we depend on the practicing veterinarian to administer the serum.

Now as to recording the occurrence of hog cholera, the State Statistician in our state has collected statistics on the occurrence of the disease in hogs for the past eighteen years. These statistics have been collected through the township assessor. Away back in 1897 the loss from diseased hogs, not perhaps altogether from hog cholera, was very great. It was not, perhaps, altogether from hog cholera, but I fully believe that practically all of this loss was from
hog cholera, because very few farmers reported to the assessor it
they lost but two or three hogs. In the year 1897 the loss in our
state from diseased hogs was 900,000 head, and Indiana is not a
very large hog state. The loss the next year was a little lighter.
In 1899 the loss was a little more than 500,000 head. Now we
ran through a series of years where the loss averaged something like
about 200,000 or 300,000 head a year. In 1911 the loss jumped
up to about 440,000 head. In 1912 the loss from the disease
amounted to about 560,000 head. Now we traced the prevalence
of the disease, or the origin of a large majority of the centers of
infection in our state to the shipping of the hogs, uninfected hogs
through infected stock yards, and unloading them in infected yards.
This infection of hogs in our state began four or five years ago, and
it was not until practically all of the local stock yards in the state
became infected that the disease became highly prevalent. And it
is in that way that you can trace the infection to the farms from
hauling the hogs to the market and there coming in contact with
the disease and bringing it back to the farm. And only last Satur-
day we had a very nice case of that sort of infection. (Applause).

Dr. Dorset: I personally feel that we ought to show our ap-
preciation of the interest shown by the representatives of the rail-
roads, who, I understand, are in attendance at this meeting. It so
happens that in Pettis County, Missouri, where we have been doing
some work, there have been arrangements made, and the railroads
have agreed to take certain steps that seem to me of great import-
ance and of great value in this campaign that we are starting on for
the eradication of hog cholera. I therefore want to ask Dr. Murphy,
our inspector in charge in Pettis County, to explain what action
has been taken by the railroads, the Missouri Pacific and the Mis-
souri, Kansas & Texas railways in Pettis County.

Dr. Murphy: When I arrived in Pettis County a great many
of the outbreaks of cholera were reported to have come from hogs
brought into the county. They ship a great many hogs from Okla-
homa and Arkansas, and they come up and are unloaded on the way
up there, and they claim they were infected in these unloading pens
and then brought into Pettis County and spread the disease. I took
the matter up with Mr. Fletcher, the live stock agent of the Mis-
souri Pacific, and Dr. Luckey and I discussed what we desired to
do, and we also discussed this matter with the agent of the Mis-
souri, Kansas & Texas railroad. They have agreed that all hogs
that come into Pettis County shall be reported to us. They have
agreed to notify us before they are unloaded. They have also
agreed to have these hogs unloaded through separate chutes so they
will not come into the regular loading pens in the stock yards. The
way this is done is to have the section hands make a temporary chute,
if there are only one or two loads a year coming in at a station,
whereas if they have a number of loads coming in at a station, enough to warrant it, they build a more permanent chute and run it right up to the side of the car, and these hogs are unloaded right there into the farmer's wagon, or on the road so he can drive them home. They have co-operated very nicely with us and agreed to do everything we have asked them to do, and in addition to that, as soon as they have a shipment on the way they notify us by wire when it is coming and we send a man up there, a state man, and he supervises the unloading of these hogs into the county, and under the proclamation issued by the Governor of Missouri these hogs are permitted to go to the man's farm where they are segregated and kept in quarantine for thirty days, and receive a serum injection at the expense of the owner.

Dr. Roberts: This matter of the co-operation of the railroad company appeals to me. The state of Indiana as a whole requires that all cars in which swine are shipped to market be disinfected, so you can see what it does to the railroad company. Now that entails an enormous expense to the railroad companies in the state of Indiana, and I will say that I have had earnest co-operation in every respect from every railroad company in the state, I think. At the same time, the quarantine method and the serum treatment have been used.

There are several things that I have listened to here to-day that I wanted to hear discussed more fully. I want to speak about this serum treatment by the Government. Now we have been in the field for eight months following up cholera herds. My assistant has been in the field all the time. We see the result of the treatment. We see the result after the administration by the simultaneous serum treatment; we see the bad results frequently from the administration of serum of inferior quality and the consequent breaking out in those herds, almost invariably, later on, six or eight or ten weeks later; we see the veterinarian that is careless in his work; we see all these bad results, and we see the good ones. Now as the gentleman from Iowa said, when we have good serum and careful administration we don't see any trouble. We quarantine the herd for thirty days after vaccination. Hogs that are shipped in are subject to vaccination and quarantine. They must be held and cannot be driven over the highways of the state.

I was wondering whether these serum treated herds reported by the Government were exposed herds, whether the farms were infected. If they were, we cannot report any results from Indiana in the field from serum treatment along that line, because, as our friend from Iowa has said, it has proved a failure where the veterinarian is using it in the field and where there is infection in the neighborhood. Of course the results are lovely when there is no infection present, and the owner thinks he is all right. The same
way with serums when a weak virus is used. A doctor who does a great deal of vaccination work asked Dr. Craig a short time ago "How do you account for the number of herds breaking that are vaccinated by the simultaneous method"? Dr. Craig said, "The state of Indiana is a great deal more exposed this year than commonly; we have got more cholera." Where you vaccinate with a weak virus, where they are not exposed, it comes out all right. We find the same trouble with the serum, and we have had them shipped into the state of Indiana, vaccinated, and they break. We have only one explanation, a weak virus or an improper dose of serum.

Dr. Dorset: There seems to be no further discussion on this subject. In closing the discussion I want to refer very briefly to the law that was passed by Congress last spring providing for the control of establishments which prepare viruses, serums, toxins and analogous products intended for use in the treatment of domestic animals. That is practically the title of the law. Dr. Mohler has already stated in his report on Legislation that that law was passed. I wish to say that the law became effective on the first of July. It has been like the hog cholera eradication work, it has taken time to get it in thorough working order, but this law provides that there shall be no serum shipped—and I will confine my discussion to hog cholera serum, though it applies to other biological products as well—that no hog cholera serum can be lawfully shipped from one state to another state unless the establishment at which the serum is prepared holds an unsuspended and unrevoked license from the Secretary of Agriculture. The law and the regulations further provide that no license shall be issued until the establishment has been inspected by an authorized officer of the Department of Agriculture. It provides further that if at any time a manufacturer, distributor or shipper of hog cholera serum, sends a worthless, contaminated or dangerous article from one state to another his license may be revoked, and furthermore, there is a provision for a heavy fine and imprisonment for the shipment of a serum or virus from one state to another without license from the Secretary of Agriculture.

That law is very strict. The amount of money set aside for the enforcement of it is not large. It is not sufficient to enable the Department to keep an inspector in every plant that does an interstate business all the time and supervise the manufacture. Up to the present time the Department has inspected a large number of proprietary serum producing establishments and has issued a limited number of licenses. These licenses all expire with the calendar year. The men that hold licenses now do not necessarily hold a license for next year. Their plant must be reinspected and license given only upon the result of the reinspection before the first of January.
I mention this because I want you to understand that the Bureau of Animal Industry has felt that the farming interests of the country should be protected, as the gentleman from Iowa has suggested, against worthless and contaminated articles.

Dr. Gibson: Dr. Dorset, I have heard that they are evading the spirit of that law that you were telling us about, that serum manufacturers who have no interstate license or permit to sell are having citizens of my state go across the Missouri River and buy what they term “untested serum” or serum that is not guaranteed, and carry it away with them. I was wondering whether this law would stop that sort of practice?

Dr. Dorset: I am sorry that I am not lawyer enough to answer that inquiry. I do want to say, though, that this Federal law does not protect the farmer in the state against a fraudulent material that is manufactured, shipped and sold wholly within the state. The states themselves will have to protect themselves against articles of that kind.

I think I might say further, as I have already stated, that the funds with which the Department is supplied are limited. The number of inspectors we can employ is limited. The Department will welcome and appreciate from State officers definite reports of shipments of any of these biological products into their state which do not bear a Government license number on the label. The details concerning the shipments should be forwarded to Washington when they are discovered.

INVESTIGATIONS WITH SWAMP FEVER.

By L. van Es, Agricultural College, North Dakota.

Mr. Chairman and Gentlemen: I have not prepared a formal paper on the subject of swamp fever, because two years ago we summed up in a bulletin most of the important features, as we found them to be up to that time, by our own investigation and by what others had done with that disease. In that bulletin we described the disease, stating that the disease as we found it was like the disease described in France; that it was due to a filterable virus, always present in the blood. In this bulletin you also find described experiments in which we confirmed the results obtained in France, inasmuch as the urine of the affected animal is probably one of the avenues, if not the sole avenue, through which the virus escapes from the body of the animal. We also called attention to the fact in that bulletin that we very rarely have at any time found that the most typical clinical features of the disease could be produced in the experimental animal; that it has only been in a few cases, three or four probably, where we could obtain a temporary anemia when the virus obtained was from a truly anemic horse. It led to the question whether it was not possible that in the field there were such animals that were truly infected with this virus and yet did not show any anemia, and had escaped detection. Since the publication of the bulletin—and that is what I wanted to speak of principally—we have been able to confirm that suspicion. We find that on farms where the disease has occurred in its anemic form and where it has caused great loss
there are horses the blood of which, injected into experimental horses, always produced the disease.

Now, without going into the scientific features of that, it seems to me that the crucial point in regard to swamp fever, instead of being its cure must be the preventive measures, and that the preventive measures entirely center upon a means of diagnosis; that is to say, in order to prevent this disease, in order to solve this problem—and it is a problem in a good many localities—we must be able to lay our hands on the animal that is the virus carrier. I could show you in our state today several horses on farms that are working every day, horses that are in apparently good health, and yet when you take a few c. c. of their blood and inject into another case it may give rise to a fatal septicemia.

I must admit that we have not made any headway in regard to the solution of this problem of diagnosis. We found that the precipitin method proposed by certain German workers could not be depended upon. We have made efforts to use the complement fixation method as a means of diagnosis, but have met with a most serious obstacle in the fact that the test serum always contains the virus (antigen) by which the usual immunity reactions are greatly influenced.

Another thing we have worked on more or less is the duration of infection in virus carriers. We have under observation now one of our original experimental animals, infected five years ago, which never for the last three years has given evidence of being affected; in fact, appears to be in the best possible state of health. However, in the last experiment made with the blood of this animal the disease produced was very transitory, and the initial fever has not been repeated.

We have also of late worked with a view of establishing any differences which might exist in virus obtained from different sources. There always was a suspicion in our minds that the various workers that are working on what we call swamp fever are working with different diseases, and hence through the courtesy of my co-workers in Texas, Drs. Francis and Marstaller on the one hand, and Dr. Watson in Canada on the other, we have been exchanging virus with the result that in all those cases which we have obtained there is fairly good evidence that we are all dealing with one and the same disease.

It is no doubt not a very encouraging statement to make, but circumstances compel me to make it. As it is we have at the present time no means of a positive diagnosis of this disease by any laboratory methods, and the possibilities are that if we ever find one we will have to act upon an entirely new principle. We have done some investigating with that point in view, but we have not far enough advanced to even suggest the line along which this will have to be worked out.

Dr. Torrance: I think this paper marks a step in advance in our knowledge in regard to swamp fever. Dr. Van Es has announced to us to-day that he has discovered the presence of what are apparently immune carriers of the disease. This, I think, is a matter which may previously have been suspected, but has never before been proved. It is a very interesting matter, not only from a scientific standpoint, but as regards the possible eventual control of it. He has mentioned that in Canada we have one pathologist working on this disease. This is our Dr. Watson of the laboratory at Lethbridge. And I would like to ask a question in connection with the work of Dr. Van Es, as to the amount of antigen he has been using in trying to work out the complement fixation test.
Dr. Hoskins: I would like to ask Dr. Van Es how he excludes the possibility of his test animals being infected?

Dr. Reichel: I would like to ask Dr. Van Es as to how he prepared his antigen.

Dr. Eichhorn: I am greatly interested in the statement of Dr. Van Es relative to the latent carriers which he found that exist, which carry this swamp fever. Now, this bears relation to our findings in regard to dourine. We were under the impression heretofore that dourine ordinarily runs a course which terminates within a reasonable length of time in a fatal paraplegia and general paralysis. Now from the description we obtained from the inspectors who are working in the field we find that at least fifty per cent of the horses are apparently clinically free of the disease. Nevertheless, they give a complement fixation of their serum of not more than .02 of a c. c. sometimes. Now there is no question in my mind but what we have to deal with that disease in latent carriers, as well as from swamp fever.

Dr. Miller: Mr. Chairman, I don't want to enter into a discussion on dourine at the present time, but I would like to ask Dr. Van Es if he thinks there is any possibility of differentiating between swamp fever and dourine by a clinical examination?

Dr. Van Es: Gentlemen, I first wish to answer the question of Dr. Hoskins regarding the possibility of test animals having the disease spontaneously. In former years we obviated that as much as possible by taking the blood of the test animals and injecting it into a horse before. There the same difficulty would present itself, but we largely obviated this by purchasing the test animal from cities where we have never had any knowledge of any swamp fever. That is about the only security that we have. The most of our test animals are horses that never have gone to pasture and always have been in a livery stable. We prefer to take the old hack horses of the city, that have always been inside the city for a great number of years. And then we also largely obviate this error by watching the results of the injection, and in the case that contracts the disease, in the horse that was not infected before, you will get very frequently a marked temperature reaction after the lapse of the period of incubation, and if you will give a horse an injection, that previously was infected, you will not find that so marked, you will find exacerbation, of course, but it is not so marked as in the other case. So while the methods that are used to prevent the error in our experiments are only relative, we find that the great number of horses that are used in the experiments—we have some 120—show that we are reasonably safe in our conclusions.

Now the question asked by Dr. Torrance was the method of preparing antigen. We first of all conceived the idea of using the urine as antigen. It is known that in the acute cases the urine constitutes the sole avenue of escape, unless it is by the blood taken from
the animals by blood-sucking parasites—we don't know about that as yet—but we found that in the urine was contained frequently a substance which very greatly affected the complement. Later on we had other disturbing factors, and we couldn't eliminate them by passing the urine through the porcelain filters. One day the same urine antigen on a certain serum with a certain complement would give you such and such a result, and the next day the same experiment would give you something entirely different, so we found it was necessary to obtain antigen from the blood, although I believe that in the urine we have the purest forms of virus, because certainly it will be lacking in any complementary substances that the horse's blood serum will contain. Then we also tried shake extracts made by the same method in the Wassermann test, and also there we found disturbing factors, until we conceived another idea, and that is this: In the course of our experiments we had one experiment that we designed in order to settle the question whether or not the red blood corpuscles of infected horses also would contain the virus. We find that the blood corpuscles properly washed and precipitated in physiological salt solution ten or twelve times, and washed three or four times after the supernatant salt solutions no longer contain a trace of albumen, that such washed corpuscles will transmit the disease just as regularly as the serum did, so we concluded that the corpuscles contain a virus. We make from these corpuscles the antigen that we are looking for, because we conceived the idea that next to the urine we would probably get the antigen there more free of any dominating antibody or any bi-products of immunity reactions, and we have used that method in our latter tests, and in a series of something like three or four hundred tests, sometimes with the same horse, we have used that antigen. In this way we take a given quantity of blood, and we shake it in order to secure defibrination in the centrifuge tube, and after that we strain out the fibrin and again put it in the centrifuge tube, and then we wash it a good many times as in the ordinary way to prepare the hemolytic antigen, and after the final washing when we are perfectly certain that there are no longer serum ingredients contained among the corpuscles, then we take the corpuscles and add to them distilled water, causing hemolysis. In the course of a day we shake it up several times and set it in the ice box, and in that time we find no longer any trace of the corpuscles. That would bring into solution the hemoglobin as well as the virus, as is proven by the injection experiments. Then we add to that enough of the ten times physiological salt solution—so as to make the solution again isotonic.

Then there was a question asked by Dr. Miller, I think, as to the clinical differential diagnosis between swamp fever and dourine. I think that if a clinical diagnosis of either disease is possible, that we should not have any difficulty in making it. We would have difficulty when we consider two non-clinical cases; I would not under-
take to differentiate between those two without the aid of the complement fixation test. It has been shown quite recently by the gentlemen of the Bureau that the blood of the swamp fever horse does not give any complement fixation reaction against dourine. We had a couple of dourine cases in our stable, and like so many of them, as Dr. Eichhorn said, they wouldn't make any progress, they wouldn't break down or become paralytic or show any disturbance that would make them interesting, and we were looking for an excuse to kill those horses and get rid of them, so I asked one of my assistants to send some of his blood to Washington, and he prepared it for shipment, and when he did he put in the blood from some swamp cases, and sure enough, the gentlemen of the Bureau without fail, picked out our two dourine cases, so I think there is the essential method in diagnosis.

Now, in swamp fever there is one phase of it, in the case that will break down that differentiates it quite distinctly from dourine, and that is that in swamp fever you never see a nerve paralysis, localized in one of the groups of nerves, while undoubtedly there is in our anemic cases this weakness of the hind quarters, but I think it is only because of the general inertia, that it is more easily shown in that part than anywhere else. I don't believe any true paralysis occurs in swamp fever. I don't think there is any true anesthesia, as occasionally you see in dourine, but otherwise I don't know that we are prepared to differentiate between the cases unless it shows the marked and clinical cases that would permit you to diagnose the dourine case per se and the swamp fever case per se.
MORNING SESSION, DECEMBER THIRD.

THE PURITY OF THE FARM WATER SUPPLY AND PRACTICAL METHODS OF INSURING CLEAN DRINKING WATER.

By H. A. Whittaker, Minnesota State Board of Health.

Water has been known for generations to produce disease or discomfort. More recently the agent has been shown to be organic or inorganic matter in solution or suspension. Studies on the relation of water to disease have demonstrated that the living flora which may inhabit drinking water play the most important role in this respect. It is now ancient history that water constitutes one of the suitable mediums for the transmission of certain disease-producing organisms from one human being or animal to another. Even though the life of most of the pathogenic organisms in water is relatively short, their longevity allows sufficient time to bring about exceedingly harmful results. The existence of many pathogenic organisms in water has been very carefully studied under conditions so far as possible comparable to nature, and quite definite conclusions have been drawn from the researches of many well known scientific workers. Laboratory experiments have been corroborated by actual observations and studies made in the field. In this way the relation existing between laboratory and field investigations on water supplies has been definitely shown. From these studies have developed the routine methods of field and laboratory investigation for determining the suitability of a water supply from a sanitary point of view. It was not until recent years that farm water supplies have been given much attention by sanitary authorities in this country. The principal cause for this has been a lack of public funds appropriated for sanitary work on water, which has limited the investigations to municipal supplies, as such supplies taken individually affect much larger groups of people. Recently several quite extensive investigations on farm water supplies have been made by the federal government, but rather from a standpoint of research in connection with some related problem, than as a matter of routine.

Common Types of Farm Water Supplies.

Practically every one is more or less familiar with the various types of water supplies used on farms in this country. These types can be very conveniently grouped under the most common classification for water supplies, namely, underground and surface. The former includes wells (dug, bored, drilled, driven) and springs, while the latter embraces cisterns, lakes, ponds, surface reservoirs, rivers and streams. In order to bring out certain features regarding these various sources of water it will be necessary to describe briefly each type.

Dug Well: The dug well is probably the oldest type of well known. It consists of a round or square excavation several feet in diameter, the depth usually varying with local underground water levels. A wide range of construction has been applied in different localities. The crudest form consists of a shallow hole in the earth's crust, which gathers water from the upper foundations and not infrequently from the surface. Such a well seldom has a cover to protect it from pollution. As it became necessary to construct the deeper dug wells, casings were required to hold back the earth, and various materials have been used for this purpose. In a modern sense the casing should serve the additional pur-
pose of excluding surface and shallow ground water. Casings include such materials as wood, stone, brick, cement, concrete and tile. To afford satisfactory protection to a dug well, the casings should be water-tight for a distance of 5 to 10 feet below the surface, the distance depending upon the character of the earth formations. It should also extend from 6 inches to 1 foot above the natural surface level, in order that drainage may be established away from the well. The covering of this type of supply is very important, and in order to afford the maximum protection, must be water-tight. Various materials are used, the most common being wood, cement and concrete. The latter two are much to be preferred, as wood will not remain water-tight when exposed to the weather for any considerable length of time. Water is usually drawn from the dug farm well by means of the ancient rope and bucket method, or by various types of wooden or iron hand pumps. The former is a dangerous practice, as it necessitates the handling of the rope and bucket by each individual using the well. Any infectious material on the hands of such persons is carried directly into the well when the bucket is again lowered for refilling.

**Bored Well:** The bored well, which is common in certain sections of the country, is installed by means of augers of various sizes, usually less than 1 foot in diameter. This type is cased with wood, tin, tile, concrete and, in rare instances, with iron pipe. Water is drawn from bored wells with slender tin or sheet iron buckets with loose bottoms or with the ordinary types of hand pumps. The rules mentioned for the proper protection and construction of the dug well apply to the bored well.

**Drilled Well:** The drilled well, as the name indicates, is installed by means of various kinds of drilling apparatus. This type is found most frequently in sections where water is reached only at a considerable depth and rock formations are present. The casing is invariably of iron, and in farm wells varies from 2 to 6 inches in diameter. In some it extends throughout the entire depth, while in others only to the rock formation. Sometimes the casing is brought up to the surface and attached to the base of the pump, but more often only to the bottom of the well pit. Well pits are sunk around the casing at the surface for the purpose of protecting certain parts of the pumping apparatus from frost; they are usually 8 to 12 feet in depth and 3 to 4 feet in diameter. Not infrequently these pits are factors in the pollution of the well, the pit serving as a catch basin for surface or shallow ground water, which later enters the well proper between the well casing and the pump casing. This is especially true where the well casing extends only to the bottom of the well pit and is not attached to the pump casing with a water-tight connection. Whenever possible, the well casing should be brought up to the surface and attached to the base of the pump, thus eliminating the necessity of a pit. In cases where the pit is used it should be made water-tight. Another way for surface water to enter this type of well is by following down the outside of the casing. This is made possible by the fact that the process of drilling in certain formations has a tendency to loosen the material immediately around the casing. This can be remedied by pouring concrete or sand around the casing at the surface. Water for farm use is usually drawn from these wells by means of the ordinary iron hand pumps.

**Driven Well:** The driven well is installed by driving directly into the earth successive lengths of iron pipe, usually from 1 to 4 inches in diameter, the first of which is armed with a sharp, perforated metallic point. This type is found where water is reached relatively near the
surface and the earth formations are of soft material. Well pits are even more common for this type than for drilled wells. On account of the similarity of the drilled and driven well, the same general rules can be applied to their protection and construction.

Springs: In comparison to the other underground types, springs are used to a very limited extent on farms. This is largely due to the fact that their location is not always convenient. Most rural springs consist of a small basin in the upper formations from which the water overflows into some natural water-course. Water is taken from such springs by dipping. This type is dangerous, as it is subject to contamination at all times. Certain of these springs can be made safe if protected against surface pollution by water-tight casings and covers. The overflow pipe should be arranged so that the water to be used for all purposes can be caught in receptacles and thus eliminate the dangerous practice of dipping. The general factors suggested for safeguarding dug wells can be applied to springs.

Cisterns: The cistern is an exceedingly common form of farm water supply. As a source of drinking water it is used quite extensively in localities where the underground waters are unfit for consumption on account of high mineralization. Cisterns are in reality simply storage reservoirs for rain water which is collected from the roofs of dwellings and other buildings. They are usually located underground and are constructed of brick, stone, mortar, concrete or cement. Some cisterns are constructed of galvanized iron and built in the form of tanks, which are located on the surface of the ground. Leaks offer one of the greatest opportunities for the pollution of a cistern, and this is especially true of the underground types. If a cistern is well located, and constructed of material which will exclude contamination from outside sources, it should provide a satisfactory means of storing water. Water is usually drawn from cisterns by means of ordinary pitcher pumps. This type of pump not infrequently requires "priming," which is an exceedingly dangerous practice from a sanitary point of view.

Surface Reservoirs: This type of surface supply is found in sections where the underground water is undesirable or difficult to reach. The construction of the ordinary type is quite simple. A portion of the soil is removed, thus forming a depression for the collection of water from a small natural or artificial catchment area. These reservoirs are usually located in a more or less impervious soil, but not infrequently clay is used to line those located in loose, earth material. Water is taken from such sources by dipping or with ordinary hand pumps. It is rarely, if ever, fit for drinking purposes. The use of surface reservoirs is usually confined to the watering of live stock and plant life on the farm.

Ponds, Lakes, Rivers and Streams: These natural types of surface supply are used to a very limited extent as sources of drinking water for human beings on farms, except in the pioneer sections of the country. Like surface reservoirs, their use is confined to watering live stock, plant life and for cleansing purposes. Their potability depends entirely upon their sanitary environment. Such waters practically never can be safely used for drinking purposes unless they have been artificially purified.
Principal Factors Responsible for the Pollution of Farm Water Supplies and Their Avoidance.

The principal factors responsible for the pollution of underground supplies are improper location, faulty construction and careless management.

Location: In locating a new underground supply the following points should be considered: Surface drainage, sanitary environment, underlying formations and convenience. Surface drainage should be such that a natural or artificial flow may be established away from the supply in all directions. In considering the sanitary environment the relation of the supply to cesspools, sewer wells, sewers, privies, etc., should be carefully observed. A knowledge of the underground formations is very important in determining the type of well to install or the particular spring to select. It further affords an index of the amount of natural protection by filtration to be expected from the various formations encountered. The convenient location of a supply deserves more serious consideration than it is often given. It not only lessens the labor which is involved in distributing the supply, but makes the use of water for all purposes more common, thus resulting in general cleanliness.

Construction: The question of proper construction of the underground supplies has been mentioned under each type. The importance of proper construction cannot be too strongly emphasized. Field observations made by the writer on over 100 underground water supplies in the State of Minnesota, which at the time of investigation gave analytical evidence of contamination, showed in every case the possibility of this pollution entering the supply through defects in construction.

Management: Careless management is the cause of many a good water supply becoming contaminated. Through carelessness any portion of the construction or protection may become defective and thus open avenues for the entrance of contamination. For instance, the iron casing of a well may become leaky through corrosion or the covering and pumping apparatus may get out of order from long usage. To make short, the supply should be kept in good repair at all times.

In discussing underground farm water supplies the writer would like to call attention to a most excellent bulletin prepared by the U. S. Geological Survey and published as Water Supply Paper No. 255, entitled, "Underground Waters for Farm Use." In this publication Mr. M. L. Fuller describes in detail the various sources of underground water for farm use and the proper methods of securing and protecting them from pollution.

The Purification of Farm Water Supplies.

It is unfortunate that at present there is no method for the removal of pathogenic organisms from water which can be safely placed in the hands of farmers for general use. Several methods suggest themselves for this purpose, but all must be under the supervision or direction of one familiar with this work. A method which is now being used by sanitarians for the temporary treatment of farm supplies under certain conditions is the application of hypochlorites. This treatment, which consists of adding infinitesimally small quantities of the hypochlorites (usually the calcium salt) is at present very generally used for the purification of municipal supplies. The writer has de-
vised a method* for dispensing the chemical for this use which has proven quite satisfactory and may be of interest here. It consists of diluting the small quantities of the calcium hypochlorite required to treat such relatively small amounts of water with sodium carbonate and enclosing this mixture in an amber-colored glass capsule. The chemical can be easily handled and its strength retained in this way, provided the capsules are protected from light and heat. For the convenience of the user these capsules are charged with amounts of chemical convenient to treat water in the more common containers, such as a glass, pitcher, pail, barrel, etc. These capsules cannot be given general distribution as various amounts are required for the purification of different waters or the same water under different conditions, therefore they must be dispensed by some one familiar with the treatment. This method can be used to great advantage by sanitarians in rural districts where they know conditions and can recommend the proper amounts.

Copper sulphate has been frequently used on farms for the purpose of removing certain vegetable growths from the surface supplies. It is especially useful for the removal of algae, which are very common in fresh water lakes, and render the water exceedingly objectionable from an aesthetic point of view. The U. S. Department of Agriculture, Bureau of Plant Industry, in Bulletin No. 76, by G. F. Moore and K. F. Kellerman, describes in detail the method of treating water for the removal of such vegetable growths.

Facts and Conclusions from Investigations on Farm Water Supplies.

Relative Safety of Types: With the wide variation in conditions encountered, it is very difficult to make a definite statement as to the relative safety of types. However, on examining the field and analytical results of a large number of investigations conducted in Minnesota, the writer has been led to draw the conclusion that the relative safety of the different types of underground supplies as they are actually found in rural districts, is as follows: First, the driven well; second, the drilled well; third, the bored well; fourth, the dug well; and, lastly, the spring. Investigations on farm water supplies conducted by the U. S. Department of Agriculture, Bureau of Plant Industry, and published as Bulletin 154, entitled "Farm Water Supplies in Minnesota," authors, K. F. Kellerman and H. A. Wittaker, tend to corroborate the above statement. The analytical results of these particular investigations on a varying number of underground supplies of each type show the percentage contaminated to be as follows: Driven wells, 21%; drilled wells, 46%; bored wells, 83%; dug wells, 85%; and springs, 100%.

The foregoing statements should in no way be taken to mean that any of these types cannot be made safe under most conditions if the proper precautions are taken in regard to their location, construction and protection. This same series of investigations, which also involved the study of rural surface supplies, showed all those examined to be unsafe sources from which to obtain drinking water without purification.

Some General Conclusions: In summing up the investigations of the U. S. Department of Agriculture (Bulletin 154), which has already been mentioned, the authors draw as one of their conclusions the following:

"Protection of farm water supplies by common sense methods obvious to any one who try to discover the dangers incident to his own

---

*This method is described in detail in a paper read before the American Public Health Association, 1928, and will appear later in the American Journal of Public Health.
water supply, should render same the majority of farm supplies which are now polluted. Exhaustive studies of rural conditions at the present time, therefore, are warranted only in connection with epidemiological studies."

Other studies by the United States Department of Agriculture, Bureau of Animal Industry, have been published by the U. S. Treasury Department, Hygienic Laboratory, Bulletin No. 56. This work embraced the survey of 290 dairy farms in Maryland and Virginia. In summing up this work the author, Dr. B. M. Bolton, states:

"The above analysis of the results seems to show that there are comparatively few water supplies on the dairy farms which were visited which are free from sanitary objection, but in spite of this fact it is, nevertheless, probable that in many, or most, cases, the faults can be rectified. In fact, the faults have already been corrected in some cases where they were pointed out to the owners of the dairies. It would seem advisable in some cases to close up the source of supply, but in most cases all that would seem necessary is to point out to the dairymen the sources of pollution, and to give them instructions in regard to their avoidance."

It is evident from the investigations cited that a relatively high percentage of farm water supplies are open to contamination. It is further seen that practically all the unsatisfactory underground supplies could be made safe by adding to or by changing certain features in their construction. Investigations of the writer and others have led to the conclusion that there is a lack of knowledge on the part of the farmer as to how to obtain a satisfactory water supply. Certain material on this subject has been published, but in nearly all instances deal more with the technical than the practical side of obtaining safe and satisfactory water supplies for farms.

Suggestions for the Improvement of Farm Water Supplies.

In order to improve present conditions in regard to farm water supplies, it will be necessary, as in other rural work, to educate the farmer.

This can be done by preparing and distributing printed material dealing with the subject of the farm water supply. This material should discuss the proper selection, location, construction, protection and care of the supply. It should be written in simple language and be well illustrated with pictures, drawings, etc.

The Minnesota State Board of Health is now preparing such material to be published in bulletin form for the instruction of the farmers of this state.

Dr. Connaway: Mr. President, it seems to me that this paper is one of the most important things that has been brought up, especially with reference to one disease that we have to deal with, and that is hog cholera. The spread of this disease through contaminated water is of common occurrence, and instruction along these lines to swine raisers is quite as important as many of the other things that we have to teach them. Recently, in going over one of our Missouri counties I had an opportunity to see some of the bad arrangements for watering the stock, especially from the open pump. It is not an uncommon thing to see these along the roadsides where the drainage may be from the road, the gutters on the sides of the road leading directly into this, and a large part of the water coming from that source,
and we know that in most of our states when the farmer's hogs get sick he tries to get them to market as quickly as possible to save what he can out of the herd. This has been a common practice, and is still a practice. It is easy to see how in driving a bunch of apparently well hogs which have been exposed, some of which are really infected, it may contaminate the water in these ponds situated along the roadside, and in our sanitary work this is one thing that we must put considerable stress upon if we are to have any success in eradicating hog cholera.

Dr. Way: I have been very much interested in Mr. Whittaker's paper from the standpoint of sanitation, as far as the disease-carrying medium is concerned, and also from the point of dairy sanitation. I believe that in the dairy field one of the most important points in connection with sanitary work is the water supply. As far as the health of the animals is concerned I believe it ranks second to ventilation in the dairy stable. The water supply in these flat countries is as a while insanitary. Of course, we cannot figure out the peculiar taste of animals. I have seen dairy cows who have had a fine tank of clean, apparently pure water for them to drink, leave this tank and drink out of a stagnant mudhole, or any slough, where, when they put their back feet down it would ooze out under their front feet, and the water would come out of these holes and they would drink it. But I do believe that in the dairy field the water supply is probably the most important point of sanitation, and it seems to me that the education of farmers and dairymen on the lines of proper methods of constructing and building wells, putting them down, and securing the water supply which is adequate and clean and pure is one of the most important things that can be considered, and I am glad to see this paper come up before this Association, and I believe it rightly comes in the field of dairy work, which is before us this morning.

DELAYED REACTIONS FOLLOWING INJECTION OF TUBERCULIN

By J. G. Wills and Charles Linch, Albany, N. Y.

In our work with bovine tuberculosis for the past few years our attention has been called to cases of tuberculous animals recurring in certain herds from time to time even after the disease was apparently under control. In some instances a considerable number of reactors have been found where one or even more prior tests had indicated comparative freedom from the disease. These unsatisfactory conditions occurred in herds where all reactors had been immediately removed and where no apparent source of infection was to be found, every precaution having been taken to minimize opportunity for tubercle bacilli being perpetuated by thorough disinfection and testing all animals added to the herd.

In the endeavor to minimize, if possible, the opportunity for error and to ascertain the cause for such discouraging results, it was determined to conduct retests in a more thorough manner than was customary, it being suspected that possibly sufficient care in this respect
Figure 2.—Lesions in lungs of cow No. 2.

Section of lungs, also section showing plugs in bronchi.
had not been exercised. To this end a number of retests were continued for a longer period of time than is customary using larger doses of tuberculin. Accordingly certain herds were selected in which reactors had been found at every test for several years, although the percentage of reacting animals had been quite variable, sometimes being reduced to very few, to be followed by a larger number of reactors at subsequent tests.

The method of conducting test was as follows: As many preliminary temperature readings as convenient were secured, in some cases being taken 24 hours prior to injection at 2 hour intervals. Temperature readings were begun 2 to 6 hours after injection and continued through a period of from 24 to 48 hours, the quantity of tuberculin varying from 4 to 6 c.c. being two to three times the ordinary dose. In one herd 72 animals gave indications of tuberculosis by the temperature rise. Of these over 20% showed the temperature rise beginning at or subsequent to the eighteenth hour after injection of tuberculin; 15% of these reactors showed a rise beginning at the eighteenth hour; 8% after the twentieth hour and one animal after the twenty-second hour. Six of these reactors showed their highest reading at the twenty-fourth hour, 5 at the twenty-second and the remainder varied from the twelfth to the sixteenth, none showing an early temperature rise.

In this same herd a retest made six months later and carried on as above disclosed few late reactors. Whether the fact that tuberculin had been used for many years in this herd was the cause for these unusual results is a question that remains to be answered. It is possible that the reactions were considerably affected by these circumstances.

In the records that will follow we have indicated the temperature readings of a number of individuals which had been tested many times and have also shown one or two cases which had never been previously injected with tuberculin so far as known, where a delayed reaction was recorded. This would tend to prove that delayed temperature rises were not entirely confined to animals tuberculin tested several times.

In the cases cited it will be noted that the temperature rise was in many instances less definite than usual and that cattle were condemned and slaughtered in some instances where the reaction was not pronounced and under ordinary circumstances might have classed as suspicious only.

Our experience in a great number of these so-called slight reactions has shown the necessity of great care being exercised in relation to condemning cattle not showing a pronounced temperature rise. It is not unusual to find animals that show a slight elevation of temperature exhibit on slaughter pronounced lesions of tuberculosis. Hutyra & Marek state that in cattle that have had previous injections of tuberculin the reaction passes over sooner than normally and in advanced disease it may set in very late. In our observations we have failed to find this to be the rule, but have found many delayed reactions and few early reactions even in cases where temperatures were taken for forty-eight hours, beginning two hours after tuberculin was injected. Our experiences indicate that the previous injection of tuberculin has a tendency to reduce the extent of temperature rise in a tuberculous animal and this observation would seem to support the theory of once a reactor always a reactor. Under such circumstances a history of the herd is of value to the examiner in determining what action will be taken, especially with individuals which do not show definite reactions. In badly diseased herds it is unquestionably necessary to consider a slight rise in temperature with more suspicion than in cases where few reactors are found.

The illustrations here given are not intended to convey the idea that delayed reactions occur frequently or that they are confined more par-
Figure 3.—Cow No. 2.
particularly to herds which have been tested continuously. No doubt failure to find late reactions in animals not previously tested may be due to the fact that but comparatively few tests are carried over a sufficient period to detect such cases should they be present.

In the succeeding charts attention is called to several instances where animals finally reacted and where the previous temperature records indicate that possibly a reaction would have been detected if the temperature readings had been continued longer.

It is to be hoped that those who are in position to study this question further will lose no opportunity to avail themselves of any information that may be gained by the continuation of temperature readings, and while it is to be desired that further observations will not indicate the necessity of continuing sub-cutaneous tuberculin tests over a period of 24 to 30 hours, yet if more accuracy is secured by such a method the expenditure of the additional time would be fully justified.

It should be remembered that one or more tuberculous animals which remain undetected by an ordinary test may be the means of the perpetuation of the disease in the herd, and from the standpoint of both the owner and the veterinarian it is important that every possible means should be used to eliminate such cases.

When tuberculin was first introduced as a means of diagnosing tuberculosis in cattle the method of testing seems to have occupied longer time than many now think necessary. The tendency seems to have been to gradually decrease the number of temperature readings both before and after injection, with a corresponding decrease in accuracy.

In the case of the following records tuberculin was injected at about 9 P. M. The amount of tuberculin used in earlier tests was 3 c. c., N. Y. State tuberculin. Post-mortem findings were verified by microscopical examinations and animal inoculation in several cases.
# RECORDS OF EXPERIMENTAL ANIMALS

**Number 1.**

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>A.M.</th>
<th>A.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp.</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Jan. 28 and 29, 1909</td>
<td>101.8</td>
<td>101.7</td>
<td>102.4</td>
<td>101.6</td>
<td>101.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 17 and 18, 1909</td>
<td>102.0</td>
<td>102.3</td>
<td>101.7</td>
<td>101.3</td>
<td>101.6</td>
<td>101.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug. 17 and 18, 1909</td>
<td>101.7</td>
<td>102.0</td>
<td>101.3</td>
<td>101.6</td>
<td>101.4</td>
<td>101.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 17, 19 and 20, 1909</td>
<td>None</td>
<td>101.4</td>
<td>101.4</td>
<td>102.0</td>
<td>101.6</td>
<td>100.4</td>
<td>100.8</td>
<td>100.4</td>
<td>101.2</td>
<td>101.2</td>
<td>101.6</td>
<td>99.6</td>
</tr>
<tr>
<td>May 26 and 28, 1910</td>
<td>101.0</td>
<td>101.4</td>
<td>101.8</td>
<td>102.0</td>
<td>101.8</td>
<td>101.0</td>
<td>101.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 24 and 25, 1910</td>
<td>102.2</td>
<td>101.6</td>
<td>101.8</td>
<td>102.0</td>
<td>101.8</td>
<td>102.0</td>
<td>102.4</td>
<td>102.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 15 and 16, 1910</td>
<td>101.0</td>
<td>101.8</td>
<td>102.0</td>
<td>101.6</td>
<td>101.4</td>
<td>101.0</td>
<td>101.6</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan. 17 and 18, 1911</td>
<td>100.6</td>
<td>101.6</td>
<td>101.8</td>
<td>101.8</td>
<td>101.8</td>
<td>101.0</td>
<td>100.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 26 and 27, 1911</td>
<td>101.2</td>
<td>101.6</td>
<td>102.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.4</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912</td>
<td>102.0</td>
<td>101.4</td>
<td>101.8</td>
<td>101.8</td>
<td>101.0</td>
<td>101.0</td>
<td>100.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 10, 11 and 12, 1912</td>
<td>102.2</td>
<td>101.6</td>
<td>101.0</td>
<td>102.0</td>
<td>101.6</td>
<td>101.6</td>
<td>102.2</td>
<td>102.2</td>
<td>102.4</td>
<td>105.0</td>
<td>105.0</td>
<td>*104.8</td>
</tr>
</tbody>
</table>

**POST MORTEM RESULTS**

- Killed Dec. 21, 1912.
- **Bronchial X** 10 P.M.
- **Mediastinal X** *12 Mld.
- **Localized** 1 A.M.
- **Passed**

Reaction began at the 20th hour but was not pronounced until the 22d hour, the temperature returning to normal at the 29th hour. It will be noted that in the July test in 1910 this animal gave a similar rise of temperature at the 20th hour and had the temperature been carried out, possibly a reaction would have been indicated at that time. The lesions in this case were apparently quite old.
Number 2.  

Date of birth, June 1, 1906.

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial A.M.</th>
<th>Temp.</th>
<th>A.M. 3</th>
<th>A.M. 5</th>
<th>A.M. 7</th>
<th>A.M. 9</th>
<th>A.M. 11</th>
<th>P.M. 1</th>
<th>P.M. 3</th>
<th>P.M. 5</th>
<th>P.M. 7</th>
<th>P.M. 9</th>
<th>P.M. 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 24 and 25, 1909...101.2</td>
<td>101.8</td>
<td>101.7</td>
<td>101.8</td>
<td>101.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 19 and 20, 1909...101.7</td>
<td>102.3</td>
<td>101.7</td>
<td>102.3</td>
<td>101.2</td>
<td>101.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug. 17 and 18, 1909...102.0</td>
<td>101.5</td>
<td>101.5</td>
<td>101.1</td>
<td>100.4</td>
<td>101.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 22 and 23, 1909...101.0</td>
<td>100.6</td>
<td>101.2</td>
<td>101.2</td>
<td>101.2</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 23 and 24, 1910...101.0</td>
<td>101.2</td>
<td>100.4</td>
<td>101.6</td>
<td>101.2</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 24 and 25, 1910...102.0</td>
<td>101.6</td>
<td>101.4</td>
<td>101.6</td>
<td>101.0</td>
<td>101.4</td>
<td>101.8</td>
<td>102.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 13 and 14, 1910...101.4</td>
<td>101.0</td>
<td>101.8</td>
<td>101.4</td>
<td>100.8</td>
<td>101.0</td>
<td>100.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan. 19 and 20, 1911...101.0</td>
<td>100.6</td>
<td>101.0</td>
<td>101.0</td>
<td>100.4</td>
<td>100.4</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 19 and 20, 1911...101.0</td>
<td>101.2</td>
<td>101.0</td>
<td>101.4</td>
<td>100.4</td>
<td>101.0</td>
<td>101.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 25 and 26, 1911...101.4</td>
<td>101.4</td>
<td>101.4</td>
<td>101.8</td>
<td>100.8</td>
<td>100.6</td>
<td>100.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug. 25 and 26, 1912...101.4</td>
<td>101.4</td>
<td>102.4</td>
<td>101.8</td>
<td>101.8</td>
<td>101.6</td>
<td>102.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 9 and 10, 1912...†101.1</td>
<td>101.4</td>
<td>102.4</td>
<td>101.8</td>
<td>103.4</td>
<td>105.0</td>
<td>102.8</td>
<td>101.6</td>
<td>100.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

POST MORTEM RESULTS

Killed Dec. 20, 1912.

Cow tested 12 times. Reaction quite typical; highest at the 16th hour. It will be noted that in the April, 1912 test this animal was possibly about to react when temperatures were discontinued at the 18th hour, a rise of one degree having then been recorded but no further records made. Post mortem disclosed considerable pus in the bronchi and animal was a pronounced spreader. Note lesion, fig. 2, showing particles of tubercular material in lumen of bronchioles. Bacteriological examination of this material proved tubercle bacilli present. This case illustrates the possibility of an animal showing but slightly advanced tubercular lesions yet capable of eliminating tubercle bacilli; in other words a localized case but a spreader. Fig. 3 shows animal. Note fine physical appearance,
Number 3.  

**Date of birth, November, 16, 1909.**

<table>
<thead>
<tr>
<th>Highest TEMPERATURE AFTER INJECTION</th>
<th>DATE OF TEST</th>
<th>Initial</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 20 and 21, 1910...103.0</td>
<td></td>
<td>102.4</td>
<td>102.4</td>
<td>102.0</td>
<td>101.6</td>
<td>101.2</td>
<td>101.4</td>
<td>101.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan. 19 and 20, 1911...101.0</td>
<td></td>
<td>102.6</td>
<td>102.4</td>
<td>101.4</td>
<td>101.4</td>
<td>101.0</td>
<td>101.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 19 and 20, 1911...101.8</td>
<td></td>
<td>101.8</td>
<td>101.4</td>
<td>100.8</td>
<td>100.4</td>
<td>100.4</td>
<td>100.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 26 and 27, 1911...101.6</td>
<td></td>
<td>102.0</td>
<td>101.4</td>
<td>101.4</td>
<td>101.0</td>
<td>101.6</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912...101.8</td>
<td></td>
<td>101.4</td>
<td>101.8</td>
<td>101.2</td>
<td>100.4</td>
<td>100.0</td>
<td>101.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 10 and 11, 1912...101.6</td>
<td></td>
<td>100.8</td>
<td>101.6</td>
<td>102.0</td>
<td>101.2</td>
<td>102.0</td>
<td>102.0</td>
<td>103.6</td>
<td>105.0</td>
<td>105.2</td>
<td>104.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**POST MORTEM RESULTS**

Killed Dec. 21, 1912.

- Bronchial
- Posterior Mediastinal
- Lungs
- Localized
- Passed

Tested six times. Highest temperature shown at 22nd hour. At the 16th hour animal practically normal but rising at the 18th. Lesions quite pronounced.
Number 4.

Date of birth, September 30, 1902.

TEMPERATURE AFTER INJECTION

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>A.M.</th>
<th>M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Temp.</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Jan. 25 and 26, 1909</td>
<td>. . .</td>
<td>. . .</td>
<td>101.6</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>May 17 and 18, 1909</td>
<td>. . .</td>
<td>. . .</td>
<td>101.5</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>Aug. 17 and 18, 1909</td>
<td>. . .</td>
<td>. . .</td>
<td>102.6</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>Dec. 17, 19 and 20, 1909</td>
<td>None</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>May 25 and 26, 1910</td>
<td>. . .</td>
<td>. . .</td>
<td>101.4</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>July 24 and 25, 1910</td>
<td>. . .</td>
<td>. . .</td>
<td>101.0</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>Oct. 19 and 20, 1910</td>
<td>. . .</td>
<td>. . .</td>
<td>101.4</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>Jan. 18 and 19, 1911</td>
<td>. . .</td>
<td>. . .</td>
<td>101.0</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>May 25 and 26, 1911</td>
<td>. . .</td>
<td>. . .</td>
<td>100.8</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>Oct. 27 and 28, 1911</td>
<td>. . .</td>
<td>. . .</td>
<td>101.2</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912</td>
<td>. . .</td>
<td>. . .</td>
<td>101.6</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
<tr>
<td>Dec. 10 and 11, 1912</td>
<td>. . .</td>
<td>. . .</td>
<td>101.0</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
<td>. . .</td>
</tr>
</tbody>
</table>

**POST MORTEM RESULTS**

Killed Dec. 19, 1912.

- Bronchial: X †10 P.M.
- Lungs: X *12 midnight
- Localized
- Passed

12 tests. Animal practically normal at the 18th hour, rising at 20th. Highest at 22d. Note the uniformity of temperature readings up to and including the 18th hour. Lesions in this case were small but positive.
**Number 5.**

**Date of birth, September 20, 1904.**

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial Temp.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 24 and 25, 1909</td>
<td>100.0</td>
<td>100.9</td>
<td>102.0</td>
<td>101.3</td>
<td>101.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 19 and 20, 1909</td>
<td>101.2</td>
<td>101.7</td>
<td>101.6</td>
<td>101.1</td>
<td>101.1</td>
<td>101.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug. 17 and 18, 1909</td>
<td>101.6</td>
<td>101.1</td>
<td>101.7</td>
<td>100.5</td>
<td>101.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 20 and 21, 1909</td>
<td>102.2</td>
<td>101.4</td>
<td>102.2</td>
<td>101.6</td>
<td>101.0</td>
<td>102.0</td>
<td>101.4</td>
<td>102.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 24 and 25, 1910</td>
<td>100.2</td>
<td>101.4</td>
<td>101.0</td>
<td>101.0</td>
<td>100.6</td>
<td>100.0</td>
<td>100.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 24 and 25, 1910</td>
<td>102.6</td>
<td>101.2</td>
<td>101.2</td>
<td>101.4</td>
<td>101.4</td>
<td>101.2</td>
<td>102.4</td>
<td>101.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 13 and 14, 1910</td>
<td>102.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.6</td>
<td>100.6</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 19 and 20, 1910</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.6</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 25 and 26, 1910</td>
<td>101.2</td>
<td>101.0</td>
<td>101.4</td>
<td>101.6</td>
<td>101.2</td>
<td>101.4</td>
<td>101.0</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912</td>
<td>101.8</td>
<td>101.8</td>
<td>101.4</td>
<td>101.4</td>
<td>101.0</td>
<td>100.4</td>
<td>101.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 10 and 11, 1912</td>
<td>101.8</td>
<td>101.0</td>
<td>100.4</td>
<td>101.0</td>
<td>101.0</td>
<td>100.8</td>
<td>101.0</td>
<td>101.0</td>
<td>101.2</td>
<td>102.4</td>
<td>103.4</td>
</tr>
</tbody>
</table>

**POST MORTEM RESULTS**

- Bronchial: X
- Posterior Mediastinal: X
- Lungs: XX
- Localized: Passed

Killed Dec. 20, 1912.

Normal at the 20th hour. Slight rise at the 22d. Reaction not pronounced but 1.6 degrees Fahrenheit rise at the 24th hour. Lesions probably old.
Number 6.

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temp.</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Jan. 24 and 25, 1909...101.2</td>
<td>101.6</td>
<td>101.5</td>
<td>100.9</td>
<td>100.8</td>
<td>......</td>
<td>......</td>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>May 19 and 20, 1909...102.3</td>
<td>101.6</td>
<td>101.7</td>
<td>101.7</td>
<td>101.8</td>
<td>101.3</td>
<td>......</td>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>Aug. 17 and 18, 1909...101.1</td>
<td>100.8</td>
<td>101.9</td>
<td>101.4</td>
<td>101.2</td>
<td>100.8</td>
<td>101.0</td>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>Dec. 22 and 23, 1909...101.4</td>
<td>100.0</td>
<td>101.4</td>
<td>101.6</td>
<td>101.0</td>
<td>101.0</td>
<td>100.8</td>
<td>101.0</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>May 24 and 25, 1910...100.8</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>100.8</td>
<td>101.0</td>
<td>101.0</td>
<td>100.4</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>July 24 and 25, 1910...102.0</td>
<td>101.0</td>
<td>101.4</td>
<td>101.2</td>
<td>101.0</td>
<td>101.6</td>
<td>101.8</td>
<td>101.4</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>Oct. 13 and 14, 1910...102.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>100.8</td>
<td>101.4</td>
<td>100.6</td>
<td>101.0</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>Jan. 17 and 18, 1911...102.4</td>
<td>101.8</td>
<td>101.4</td>
<td>102.0</td>
<td>101.6</td>
<td>101.2</td>
<td>100.4</td>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>May 19 and 20, 1911...100.8</td>
<td>100.6</td>
<td>101.0</td>
<td>101.4</td>
<td>100.4</td>
<td>101.0</td>
<td>100.8</td>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>Oct. 25 and 26, 1911...100.8</td>
<td>101.0</td>
<td>101.2</td>
<td>101.6</td>
<td>100.6</td>
<td>101.2</td>
<td>101.0</td>
<td>101.4</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912...101.0</td>
<td>100.8</td>
<td>101.0</td>
<td>100.6</td>
<td>100.8</td>
<td>101.6</td>
<td>100.4</td>
<td>......</td>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>Dec. 10, 11 and 12, 1912.101.6</td>
<td>100.6</td>
<td>100.0</td>
<td>101.4</td>
<td>101.4</td>
<td>101.6</td>
<td>102.2</td>
<td>102.6</td>
<td>102.8</td>
<td>104.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

POST MORTEM RESULTS

Killed Dec. 29, 1912.

*Dec. 11th, 10 A.M.
Bronchial X
Posterior Mediastinal X
Lungs X
Localized
Passed

Tested 12 times. Slight rise at the 16th hour. Highest at the 24th hour. Had never shown any suspicious temperatures at previous tests so far as record shows.
Number 7.

Date of birth, May 19, 1905.

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial Temp.</th>
<th>TEMPERATURE AFTER INJECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 24 and 25, 1909</td>
<td>101.5</td>
<td>102.4 101.3 102.3 100.6 101.8 101.8 100.6 101.8 101.8 101.8 100.6 101.8 100.6 101.8 101.8 100.6</td>
</tr>
<tr>
<td>May 17 and 18, 1909</td>
<td>101.7</td>
<td>102.1 101.9 101.3 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8</td>
</tr>
<tr>
<td>Aug. 16 and 17, 1909</td>
<td>101.1</td>
<td>100.4 101.8 101.5 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8</td>
</tr>
<tr>
<td>Dec. 22 and 23, 1909</td>
<td>100.6</td>
<td>100.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6</td>
</tr>
<tr>
<td>May 24 and 25, 1910</td>
<td>101.0</td>
<td>101.0 101.2 101.4 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6 101.6</td>
</tr>
<tr>
<td>July 24 and 25, 1910</td>
<td>101.6</td>
<td>102.0 101.8 101.8 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0</td>
</tr>
<tr>
<td>Oct. 19 and 20, 1910</td>
<td>102.6</td>
<td>102.6 102.4 101.2 101.8 101.4 103.0 102.4 102.4 102.4 102.4 102.4 102.4 102.4 102.4 102.4 102.4</td>
</tr>
<tr>
<td>Jan. 19 and 20, 1911</td>
<td>101.6</td>
<td>101.0 101.2 101.0 100.8 100.6 101.0 101.0 101.0 101.0 101.0 101.0 101.0 101.0 101.0 101.0 101.0</td>
</tr>
<tr>
<td>May 19 and 20, 1911</td>
<td>101.0</td>
<td>101.0 101.2 101.4 101.2 101.4 101.2 101.4 101.4 101.4 101.4 101.4 101.4 101.4 101.4 101.4 101.4</td>
</tr>
<tr>
<td>Oct. 27 and 28, 1911</td>
<td>101.4</td>
<td>102.0 101.8 101.6 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8 101.8</td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912</td>
<td>101.4</td>
<td>101.4 101.8 101.6 100.8 101.4 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0</td>
</tr>
<tr>
<td>Dec. 9, 10 and 12, 1912</td>
<td>102.0</td>
<td>101.4 101.6 101.0 101.4 101.4 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0 102.0</td>
</tr>
</tbody>
</table>

POST MORTEM RESULTS

Killed Dec. 21, 1912.

*Dec. 11th, 10 A.M.

Tested 12 times. Normal at 20th hour, same as highest preliminary. Was highest at the 24th hour after injection. Temperature readings were discontinued through misunderstanding. Temperature taken 10 A.M. following morning. Lesions were definite.
Number 8.

Date of birth, November 13, 1908.

Highest TEMPERATURE AFTER INJECTION

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>A.M.</th>
<th>A.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temp. 3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>June 7 and 8, 1909</td>
<td>102.8</td>
<td></td>
<td>100.5</td>
<td>100.7</td>
<td>101.0</td>
<td>101.6</td>
<td>101.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 23 and 24, 1909</td>
<td>103.2</td>
<td></td>
<td>102.6</td>
<td>101.8</td>
<td>101.4</td>
<td>102.4</td>
<td>102.4</td>
<td>103.4</td>
<td>103.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 26 and 27, 1910</td>
<td>101.8</td>
<td></td>
<td>101.2</td>
<td>101.4</td>
<td>101.2</td>
<td>100.8</td>
<td>101.0</td>
<td>100.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 13 and 14, 1910</td>
<td>102.2</td>
<td></td>
<td>101.8</td>
<td>101.0</td>
<td>101.4</td>
<td>101.0</td>
<td>101.8</td>
<td>101.0</td>
<td>101.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 25 and 26, 1911</td>
<td>102.6</td>
<td></td>
<td>101.4</td>
<td>101.0</td>
<td>102.4</td>
<td>101.6</td>
<td>101.0</td>
<td>102.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 26 and 27, 1911</td>
<td>101.4</td>
<td></td>
<td>101.6</td>
<td>101.8</td>
<td>101.6</td>
<td>100.4</td>
<td>100.6</td>
<td>101.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912</td>
<td>102.2</td>
<td></td>
<td>101.0</td>
<td>101.8</td>
<td>101.4</td>
<td>101.0</td>
<td>101.0</td>
<td>102.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 9 and 10, 1912</td>
<td>103.0</td>
<td></td>
<td>99.8</td>
<td>101.2</td>
<td>101.2</td>
<td>101.8</td>
<td>101.4</td>
<td>101.4</td>
<td>101.8</td>
<td>101.6</td>
<td>100.8</td>
</tr>
<tr>
<td>Apr. 22, 23 and 24, 1913</td>
<td>102.0</td>
<td></td>
<td>100.8</td>
<td>101.4</td>
<td>104.4</td>
<td>106.6</td>
<td>106.2</td>
<td>105.4</td>
<td>105.6</td>
<td>105.0</td>
<td>105.0</td>
</tr>
</tbody>
</table>

POST MORTEM RESULTS

Killed June 13, 1912.

Typical reaction: remained high for 28 hours. Note this animal showed a somewhat suspicious temperature rise in December, 1909, and in the December, 1912 test some rise was shown at the 24th hour, possibly the beginning of a reaction. In both 1909 and 1912 the preliminary temperature was high.
Number 9.  

Date of birth, July 27, 1905.

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial</th>
<th>TEMPERATURE AFTER INJECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. M.</td>
<td>A. M.</td>
</tr>
<tr>
<td></td>
<td>Temp.</td>
<td>3</td>
</tr>
<tr>
<td>Jan. 24 and 25, 1909</td>
<td>101.6</td>
<td>101.8</td>
</tr>
<tr>
<td>May 19 and 20, 1909</td>
<td>101.7</td>
<td>101.7</td>
</tr>
<tr>
<td>Aug. 17 and 18, 1909</td>
<td>101.2</td>
<td>101.6</td>
</tr>
<tr>
<td>Dec. 17, 19 and 20, 1909</td>
<td>None</td>
<td>100.8</td>
</tr>
<tr>
<td>May 25 and 26, 1910</td>
<td>101.2</td>
<td>101.6</td>
</tr>
<tr>
<td>July 24 and 25, 1910</td>
<td>101.0</td>
<td>101.0</td>
</tr>
<tr>
<td>Oct. 13 and 14, 1910</td>
<td>101.8</td>
<td>101.2</td>
</tr>
<tr>
<td>Jan. 19 and 20, 1911</td>
<td>101.4</td>
<td>101.2</td>
</tr>
<tr>
<td>May 19 and 20, 1911</td>
<td>101.0</td>
<td>101.0</td>
</tr>
<tr>
<td>Jan. 13 and 14, 1912</td>
<td>100.8</td>
<td>101.0</td>
</tr>
<tr>
<td>Apr. 24 and 25, 1912</td>
<td>101.6</td>
<td>101.2</td>
</tr>
</tbody>
</table>

10 A.M.

Dec. 9, 10 and 11, 1912 | 102.2 | 101.6 | 101.2 | 101.9 | 101.8 | 101.0 | 100.4 | 102.2 | 102.2 | 103.4 | 104.2 | 102.4 |       |

POST MORTEM RESULTS

Killed Dec. 20, 1912.

- Bronchial: X
- Posterior Mediastinal: X
- Lungs: XX

Tested 12 times. Reaction beginning at 22d hour. Highest recorded at 24th but through misunderstanding test was discontinued. Last temperature taken 10 A. M. following morning. Lesions were very definite.
Date of birth, November 7, 1910.

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>A.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
<th>P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temp.</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Oct. 25 and 26, 1911</td>
<td>101.0</td>
<td>101.2</td>
<td>101.4</td>
<td>101.8</td>
<td>101.4</td>
<td>101.8</td>
<td>-101.6</td>
<td>-101.6</td>
<td></td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912</td>
<td>101.4</td>
<td>101.4</td>
<td>102.0</td>
<td>101.6</td>
<td>101.4</td>
<td>101.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 11 and 12, 1912</td>
<td>101.6</td>
<td>101.6</td>
<td>101.4</td>
<td>101.5</td>
<td>100.6</td>
<td>101.2</td>
<td>101.6</td>
<td>100.0</td>
<td>101.4</td>
</tr>
<tr>
<td>Apr. 23, 24 and 25, 1913</td>
<td>101.8</td>
<td>102.0</td>
<td>101.4</td>
<td>101.8</td>
<td>101.6</td>
<td>101.6</td>
<td>101.8</td>
<td>101.6</td>
<td>101.0</td>
</tr>
</tbody>
</table>

April 25, 1913.

1 A.M. 3 A.M. 5 A.M. 7 A.M. 9 A.M. 11 A.M.
103.8 103.2
104.8 104.2 104.0 103.6 102.0 101.8

POST MORTEM RESULTS

Killed June 13, 1912.

- Bronchial: X
- Lungs: X

Animal tested four times. Test carried through 38 hours, rise beginning at the 22d hour. Highest temperature recorded at the 28th hour. Lesions small. Presence of tubercle bacilli proven microscopically.
Number 11.

Age 6 years

Highest

TEMPERATURE AFTER INJECTION

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial Temp.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>A. M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 16, 17, '13, 9:40 A.M.</td>
<td>100.3</td>
<td>101.1</td>
<td>101.1</td>
<td>101.2</td>
<td>101.1</td>
<td>100.3</td>
<td>102.2</td>
<td>102.2</td>
<td>.....</td>
<td>.....</td>
<td>.....</td>
<td>.....</td>
</tr>
<tr>
<td>11:40 P.M.</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>101.0</td>
<td>.....</td>
<td>.....</td>
<td>.....</td>
<td>.....</td>
</tr>
<tr>
<td>3:40 P.M.</td>
<td>101.2</td>
<td>101.2</td>
<td>101.2</td>
<td>101.2</td>
<td>101.2</td>
<td>101.2</td>
<td>101.2</td>
<td>101.2</td>
<td>.....</td>
<td>.....</td>
<td>.....</td>
<td>.....</td>
</tr>
<tr>
<td>Aug. 17, 18, '13, 2, 4 P.M.</td>
<td>103.0</td>
<td>102.0</td>
<td>102.4</td>
<td>102.4</td>
<td>102.4</td>
<td>102.4</td>
<td>102.4</td>
<td>102.4</td>
<td>103.0</td>
<td>103.0</td>
<td>102.4</td>
<td>102.4</td>
</tr>
</tbody>
</table>

POST MORTEM RESULTS

Retro Pharyngeal X
Bronchial XXX
Posterior Mediastinal XXX
Lungs XXX
Mesenteric XXX
Portal X
Uterus X

Killed Sept. 25, 1913.

Animal tested twice at four weeks' interval. The reaction in August test very slight. Animal condemned on physical appearance. Generalized case. Note the temperature in the July test at the 18th and 20th hour was highest shown. Possibly animal would have reacted if temperatures had been carried forward.
Number 12.

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Initial A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>10 A.M.</td>
<td>101.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 3 and 4, 1913</td>
<td>101.8</td>
<td>101.6</td>
<td>102.7</td>
<td>102.0</td>
<td>102.6</td>
<td>103.0</td>
<td>104.8</td>
<td>105.0</td>
<td>104.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 P.M.</td>
<td>103.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

POST MORTEM RESULTS
Not yet killed.

Animal never previously tested so far as known. Reaction began at 20th hour but high preliminary recorded. Highest temperature 22d hour.

Number 13.

<table>
<thead>
<tr>
<th>DATE OF TEST</th>
<th>Highest A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>A. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
<th>P. M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 20 and 21, 1910</td>
<td>102.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan. 19 and 20, 1911</td>
<td>103.0</td>
<td>102.2</td>
<td>100.6</td>
<td>100.8</td>
<td>101.6</td>
<td>101.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 27 and 28, 1911</td>
<td>101.4</td>
<td>101.4</td>
<td>101.0</td>
<td>101.0</td>
<td>100.2</td>
<td>100.6</td>
<td>101.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr. 25 and 26, 1912</td>
<td>101.4</td>
<td>102.0</td>
<td>101.6</td>
<td>101.4</td>
<td>102.2</td>
<td>101.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 9 and 10, 1912</td>
<td>101.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

POST MORTEM RESULTS
Killed Dec. 20, 1912.

Lungs X
Localized
Passed

Reaction typical. Disease not advanced but lesion encapsulated and apparently old. Note record of test made in November, 1910, where suspicious reaction is shown and irregular temperatures are recorded. Possibly rise at that time caused by tuberculosis and subsequent failure to react until 2 years later due to encapsulation of lesion which is quite clearly shown in fig. 4.
Dr. Dorset: I did not understand Dr. Wills to indicate the doses of tuberculin used in these tests. He may have done so, but I didn’t hear it. I would like to know what dose of tuberculin was used?

Dr. Wills: In the cases of the tests just made in 1912 and 1913 we used 4 c. c. in all cases; in some as high as 6 c. c. It is the tuberculin manufactured by the New York State Veterinary College. We used it largely in these latter tests. We have no definite data as to the tests made back in 1910, but I understand from information that we can get that at least 2 c. c. were used, and in some cases 4 c. c.

Dr. Reynolds: It might be interesting to the Association to recall a bulletin published by the Wisconsin station of perhaps ten years ago, possibly twelve years ago, in which Dr. Russell reported a reaction in the fortieth hour, a case in which had the test been abandoned in the thirty-second or thirty-sixth hour a very typical reaction would have been lost entirely.

Dr. Gilliland: I was very much interested in the delayed tuberculin reaction. My own experience in testing has been that we miss a great many more reactors by not taking the temperature a sufficient length of time than we do by not taking them early enough. I had tried to make a study of the cause of delayed reaction, and on autopsy I do not find or have not found anything that would explain a delayed reaction; I mean by that the lesions have not been different from those found in animals that react within the regular length of time. I then have tried to make some investigation as to the tuberculin, the doses and the character of the tuberculin, the type of the tubercular bacilli used in making the tuberculin, and therefore I would like to ask D. Wills if the tuberculin that was used in these tests was made from tubercular bacilli of the bovine or human type; whether such tuberculin was of recent proof, and whether the tubercle bacilli that were used were virulent.

Dr. Wills: I might say, gentlemen, that the tuberculin used in all these tests, the official tests, was of very recent manufacture, not more than two weeks old at the very most, and in most cases it was forwarded from the laboratory and reached the premises where the test was made about a day or two before the test had begun. In reference to the strain of tubercle bacilli used, I think Dr. Moore can tell you more about that than I can, because he has used the New York State tuberculin, and it is manufactured under his direction.

Dr. Moore: I would say in regard to the organisms used, in regard to the use in this tuberculin, it was of the human type. We found after a great deal of study with a good many different cultures that the strain of human bacteria that we had gave better
organisms than the other, and that was the one from which this was made. The virulence of that is not great. It will kill guinea pigs in three to six weeks.

Dr. Dorset: Mr. Chairman, I think it might be well to refer at this time to the question of the tuberculin itself. I don't know whether most of you are aware or not that tuberculin, as far as any standard of potency or strength is concerned, is a very uncertain article. As you know, tuberculin is made by taking cultures of tubercle bacilli, first killing them by heat, filtering them, and then evaporating the filtrate to a small volume. Now the dose of tuberculin which we speak of ordinarily indicates the amount of that evaporated filtrate, and in the case of the Koch tuberculin, a gram or a cubic centimeter of that concentrated tuberculin furnished you represents ten cubic centimeters of the original culture medium. Now the strength of the tuberculin, the active principle of the tuberculin, I think all are agreed is derived from the tubercle bacilli that grow on the culture medium, so it has seemed to me for a long time that we are using a false basis for determining the strength or the dose of tuberculin, for the dose is determined by the volume of the culture medium used and not by the amount of growth of the tubercle on that medium, though the tubercle bacilli are the things that furnish the active principle. It seems to me, therefore, that it is perfectly clear there is some need for change in the method of producing tuberculin and of standardizing tuberculin. I am a member of the Committee of the American Public Health Association on standard methods for the production of tuberculin and mallein. This Committee, of which Dr. Moore was a member and chairman some years ago, has recommended a standard method of producing tuberculin. I think that that recommendation was a distinct advance, but it still leaves us in the same position that we were before, namely, that if we in Washington make our tuberculin in a certain way our cultures may grow very rapidly and we may get very luxuriant growths, while the opposite may occur in another laboratory making tuberculin; their cultures may not grow so rapidly as ours. Therefore the resulting products must differ in strength or potency. I simply bring this to your attention to let you know that you ought to take into consideration the tuberculin and the strength of the tuberculin, and realize that there is no very definite standard of strength for tuberculin. Two cubic centimeters of a tuberculin produced by a given laboratory may be quite a definite thing, but two cubic centimeters of tuberculin produced by one laboratory is not necessarily of the same strength as the same amount of tuberculin produced in another.
SOME EFFECTS OF POOR VENTILATION.

By C. C. Lipp, Brookings, South Dakota.

During the past ten years it was the writer's privilege to be a member of the Veterinary Division of the Minnesota Experiment Station, in immediate charge of a somewhat extended investigation into the Physiologic Effects of Poor Ventilation.

In this paper all the details of this work will be omitted, but it is hoped the matter will be made sufficiently clear and full to indicate a part of the progress and make new applications of old theories.

Older Theories for Need of Ventilation.

It has been the belief and teaching of all persons interested in sanitary matters, that proper ventilation is an absolute necessity for the maintenance of health and working efficiency. So numerous are the apparent proofs of the correctness of this theory, that many scientific men have accepted the matter as settled. Indeed, many days have been spent estimating the oxygen needs of our domestic animals. Likewise, the apparent harmfulness of the body excretions has been measured in a most painstaking manner. Many expensive ventilation systems have been devised and installed, with what seem to be very good results. Actual demonstration has shown, however, that farms without these expensive ventilation systems are housing animals that are equally healthy and in as high state of working efficiency.

New Work Planned.

Stall Structure: Briefly, the plan of work in the Minnesota Experiment Station was as follows: Healthy steers several months old and weighing several hundred pounds each, were confined in box stalls having cement floors and metal lined walls and ceilings. Each stall was light enough to make the print in the average newspaper easily legible. The stall doors, while not air-tight, fitted snugly and were secured with heavy refrigerator clamps on the outside. These stalls were not air-tight, but the air could easily be kept in a foul condition, fouler in fact than in the most poorly ventilated farm stable. To eliminate the effects of overcrowding, each steer had not less than 400 cubic feet of air space. During most of the work the steers were brushed every morning and the stall was cleaned twice daily.

Steers: The steers were confined in these stalls for periods varying from six hours to six months. Other steers of the same age and weight, used as checks, were kept in well ventilated stalls. All of the steers were given the same feed and care; the only difference was in the ventilation of their stalls. At regular intervals the clinical condition of all the steers was compared. Likewise a laboratory examination and comparison was made of blood and urine, at intervals sufficiently close to permit following the variations of metabolic processes.

Stall Conditions: The steers confined in the unventilated stalls breathed and were surrounded by air varying from 50° to 80° F. The humidity of these stalls was near 60 per cent. of saturation at the time of their occupancy. In a few days it increased to full saturation, where it remained nearly all the time. Outdoor air contains from .03 to .04 of one per cent carbon dioxide. In the unventilated stalls the per cent of this gas varied from .2 of one per cent to 2.5 per cent and occasionally more. Various volatile body excretions were doubt present in very much larger quantity than in the ventilated stall, but no attempt was made to measure them.

Steers in the ventilated stalls breathed in air that rarely exceeded 60°, and had a moisture content remaining near 60 per cent of
full saturation. A sufficient number of analyses of the air of ventilated stalls were made to show an average carbon dioxide content of from .06 to .07 of one per cent.

Steers' Clinical Condition: The steers in unventilated stalls maintained as good appetites at all times as those in the ventilated stalls. Both groups of steers ate with equal relish and digested their food equally well. Both groups made steady and equal gains in weight. Both groups gave every evidence of complete comfort and content. Of course it is to be remembered that the above conditions cannot be as accurately measured as most of the other conditions, and that the individualities of the steers must also be taken into consideration. With these limitations on accurate methods the writer feels the above statements are as accurate as present methods for their measurement make possible.

Steers' Metabolic Processes: Repeated examinations failed to show any constant variation in capacity for oxygen distribution between the blood of steers confined in ventilated and unventilated stalls. Both groups of steers were supplied with as much oxygen as their tissues required, and similarly both groups excreted waste products through their lungs with equal facility. Reference to these conditions will be made again in the next paragraph.

A complete 24 hour sample of the urine of each steer in both ventilated and unventilated stalls was made once or twice each week. This analysis included a laboratory search for a diminished or excessive quantity of practically all urinary constituents representative of metabolic processes. In addition a search was also conducted for the purpose of discovering any abnormal urinary constituents that might result from deficient oxygenation, incomplete or perverted metabolism, or faulty excretion. As a result of this search no appreciable or constant variation from normal could be found. Indeed, every organ and tissue of each steer in unventilated as well as in ventilated stalls seemed to be performing its normal function.

Autopsy Findings: When work was completed with each group of steers they were sent to a slaughter house and dressed. Careful examination of all internal organs failed to show a trace of abnormality. Microscopic examination of practically every organ was negative except in one steer, which showed a partial disintegration of the tubules in one kidney. Since this condition was found in but one steer, it is a question whether the lesion was caused by lack of ventilation. Further than this no microscopic lesions could be discovered in any of the steers.

Some Conclusions.

Basing conclusions on the foregoing evidence, the following seem warranted:

First: Healthy steers kept as long as six months in unventilated but well lighted stalls, free from pathogenic bacteria, continued in as good health and made as good gains as other similar steers kept in well ventilated stalls.

Second: It was impossible in these unventilated stalls to reduce the oxygen content of the air, by the respiratory processes of the confined steers, to a degree incompatible with their health and normal development.

Third: Carbon dioxide and all other so called harmful excretory products failed to have injurious effect on our steers when confined for six months in the stalls before described.

Fourth: With the limitations already mentioned, lack of ventilation did not injuriously affect the comfort or clinical condition of these steers.
Additional Evidence.

But this is not all. It was observed that after the stall temperature had reached 80°F, there was unmistakable evidence of discomfort. When the temperature had climbed to 85°F, the discomfort had increased to actual distress and at 90°F there was danger of collapse and death. When the air of the unventilated stall was suddenly cooled and its moisture content lowered, after having reached 90°F, and full saturation respectively, all symptoms of collapse and distress disappeared in a very short time. All this leads to the further conclusion that lack of ventilation, instead of being injurious in the usually accepted manner, is harmful for another reason, namely; that excessive stall temperature and humidity interfere with the elimination of heat from the skin, and water from the respiratory organs.

A third cause of injury has also been suggested, namely: lack of air movement. Dr. Leonard Hill of London, working on this subject at the same time work was in progress in Minnesota, suggests that lack of air movement permits animals' bodies to become surrounded by a film of dead or motionless air which further prevents the elimination of heat and moisture. He further finds that if the air be set in motion at the time of greatest distress, all symptoms rapidly disappear, because both heat and moisture can again be completely eliminated.

Final Conclusions.

Indeed, all present available information leads to the final conclusion that ventilation is but a matter of air movement, for the proper elimination of body heat and water. Work done in Minnesota fully corroborates Dr. Hill's statements. Any satisfactory system of ventilation secures these three requisites; namely, air movement, and proper regulation of stable temperature and humidity. These requisites lacking, all the evil effects of poor ventilation or lack of it at once become evident.

Other Work Completed.

There is still another and most important side to this question of ventilation, namely, its effect on disease resistance. This has also come in for its share of investigation in the Minnesota Experiment Station. Results have not all been fully tabulated and compared so that a complete report cannot be made at this time. The writer feels reasonably safe in making the statement, however, that disease resistance so far as it can be measured by laboratory methods, is not materially lowered in steers confined for periods of six months in the stalls herein described.

Before closing the writer wishes to express his indebtedness to Dr. M. H. Reynolds, Chief of the Veterinary Division of Minnesota Experiment Station, and to all members of that staff for assistance and suggestions in conducting this work.

Dr. Reynolds: Way back about 1903, or something like that, I heard Dr. Salmon make the remark while discussing some question with regard to the facilities furnished by steamships in carrying cattle across the ocean, that there was practically nothing known that was of any help to them; he spoke of the harmful effects of unventilated stables, and that there was practically nothing known that was at all reliable, nothing that was helpful, and when I went home the thought occurred to me that perhaps that was a field worthy of
pretty careful study and investment of state money, and in that con-
nection now I want to especially bring out the fact that I think
that we are all very much indebted to a man like Dr. Lipp, who has
spent ten years in patient, long-continued work of this kind that is
not very spectacular, rather the reverse of popular, because it tends
to go contrary to the accepted opinions and accepted standards of
things. We have all been criticised a great deal, and very severely,
for this work, and we have been criticised very severely for the one
publication that we have made, but that one publication was not
made until after about two or three years' work. The opinions ex-
pressed in that were specifically stated to be tentative and not in any
sense final, and since that time, for about eight years more the work
has been continued on that same line. I would call attention to the
fact that the opinions expressed by Dr. Lipp, or the conclusions, are
not the result of any hasty generalizations or superficial cases. They
rest on a definite amount, an enormous amount, of detailed work.

Now, another point that I think may possibly be misunderstood,
as it has been misunderstood a great many times, we have never said
in this work that stable ventilation was useless, so far as I know.
I have never said that, and I don't think Dr. Lipp has said that, and
I don't think it can be found in any of our publications or communi-
cations to the agricultural press or any place else. The position in
general has been all the time that the teachings all the way down
have been perhaps correct, as to the need of ventilation, but the rea-
sons for the need of ventilation have been all wrong, and there have
been some other things in connection with stable and house ventila-
tion that have been evidently wrong, placed on a wrong basis; for
instance, that CO₂ should be taken as the standard of the efficiency
of a stable or a house ventilation. It seems to us now to be alto-
gether untenable. As to the harmfulness of a great excess of CO₂ or
a deficiency of oxygen, there is no question on that point, that with
any probable condition of stabling, the amount of CO₂ is a matter
that is absolutely negligible, or the reduction of oxygen below the
point where it is perfectly satisfactory to the animal economy is
negligible, but that does not show that given a pathogenic micro-
organism or given a stagnant atmosphere or high humidity, or high
temperature in the presence of humidity, that those conditions are
not normal. In the work of investigation in the human field that
has been brought out in recent years, there is no question about
that, it seems to me. All we need to do is to revise our reasons.
The trouble has been we have known too much that was not true
in stable and house ventilation, just as we know now too much that
is not true in many lines of research. We have been accepting
things for generations, we have been accepting things because some-
body has said so. Now, here is a tendency to tip over the standard
along scientific lines that never did rest on any scientific basis.
Dr. Mayo: I think that most of you who have had experience in shipping animals at sea, particularly in the tropics, and especially horses and mules, will realize the important point made by Dr. Lipp in regard to changing the air, not necessarily supplying fresh air. As soon as the holds become hot and the animals show signs of distress, the attendants get a fan, and they use the fan to blow them up a little, when they begin to get distressed. Now, they do not supply any pure air in those cases, but they do supply a current of fresh air to that animal. They keep the air in motion. And it is particularly noticeable in a string of horses' and mules that the animals at the exit of the air current, whatever they may be, suffer much less than those nearer the entrance, not because the air is any purer, because as our ordinary standards of pure air go it would not be so pure, but simply because there is a freer movement of air about the animal.

Dr. Connaway: I would like to ask Dr. Lipp a question. In regard to the effect on the respiratory movements of these animals, is there a greater increase in the movements?

Dr. Lipp: An increase in the number of them.

Dr. Connaway: You made no measurements of these?

Dr. Lipp: Not enough to have any data that would have any value.

Dr. Connaway: Well, in the work, with regard to the respiratory movements, has any work on this particular line been done to show the result, with the calorimeter, with reference to the volume of CO₂?

Dr. Lipp: The number of respirations is increased, but we did not make any great number of measurements. I don't think that the depth of the respiration is increased. And, concerning your other point, I think it was Dr. Atwater who did some work with his calorimeter on a man inside. He gave him a current of air that had a very high per cent of CO₂, and the man inside did not know it; he came out feeling just as well as when he went in, and couldn't notice any difference.

Dr. Connaway: That is, there was no increase in the respiration?

Dr. Lipp: I don't believe that any record was made of that. I don't recall any statement concerning that.

ELIMINATION OF SOURCES OF CONTAMINATION IN MILK.

By W. D. Frost, Madison, Wisconsin.

Meaning of Contamination. In considering this subject it seems necessary at the very start to define the sense in which the word contamination is to be used. It may be used to mean the entrance into milk of any and all foreign matter, such as dirt or bacteria. In this sense all milks are contaminated, except some of the certified, or, as we might call them, aseptic milks, but such milks are impractical for general use. On the other hand, we may consider contamination in a broader sense to mean the pollution of milk with material that is likely to endanger the health of those who use it; such a milk has a dan-
gerous taint; its consumption jeopardizes the health of those who par-
take of it. The word is used in the latter sense in the present paper.
According to our present knowledge it is not possible to produce milk
on a large scale that is uncontaminated, in the narrow sense, but it is
possible and profitable as well to produce a milk that is free from
danger to those who use it.

It is now quite generally recognized that milk as it comes from
the udder of the healthy cow is not germ free, but contrariwise, may
contain a considerable number of bacteria. Such a milk, however,
gathered with reasonable care, should not be considered contaminated.
A contaminated milk contains either disease-producing bacteria or an
excessive number of harmless bacteria, which, though harmless in
themselves, may be harmful in large numbers. This form of con-
tamination, because of its frequency, is most serious, especially where
such milk is fed to infants.

The contamination of milk needs to be considered not only from
the standpoint of public health, but also in regard to its keeping quali-
ties. If a milk could be secured with no greater contamination than
it has in the udder of the cow its keeping power could be measured
in days, where contaminated milk might keep only as many hours. A
milk so contaminated that its keeping power is short disgusts the con-
sumer and, like a "boomerang," comes back to both producer and pur-
veyor in decreased sales. The production of an uncontaminated milk
is a subject worthy of the most serious consideration and of sufficient
importance to engage the attention of the ablest workers.

The Cow as a Source of Contamination. The diseases transmitted
from the cow to man through milk are anthrax, malaria, foot and
mouth disease, milk sickness, mammitis, septic sore throat and tu-
berculosis. Most of the diseases in this list are, nowadays, fortunately
only remotely serious, but deserve a word in passing. Anthrax readily
affects cows but, due to the rapid course of the disease, which ends
in death in a few hours, the milk is suppressed or rendered so abnormal
that it is not likely to be used. The anthrax bacillus has, however,
been recovered from cow's milk. That the dangers from this disease
are within the range of possibilities was shown by an epidemic of this
disease which occurred among the herds supplying the City of Chicago.
In 1910 five hundred cows were exposed and eighty-seven became in-
fected. All milk from the farms where the disease existed was de-
stroyed and great care was taken to prevent the sale of milk from the
suspected districts, and as a result no human cases were attributable
to milk infection.

Cows are susceptible to the germ of malaria, and this germ has
been found in their milk. The infection of man, however, from this
source is not recorded, although goat's milk is the usual means of
transmission in this disease.

Foot and mouth disease, which occurs in cattle, can be transferred
to man, especially children, through the milk, and five epidemics of this
kind have been reported in this country. The disease is widely preva-
 lent in Europe and Asia.

Milk sickness was formerly important, but is now practically un-
known in the United States, except in sparsely populated portions of
North Carolina, Tennessee and Texas.

Mammitis, mastitis or garget, is a common and well recognized in-
fec tion of cows. It is caused by various germs, but especially by strep-
tococci and staphylococci. The milk from an infected cow can give
rise to gastro-intestinal disorders, especially in children. The milk
from such cows can usually be detected by a microscopical examination of the sediment. A milk sediment containing an excessive number of leucocytes, particularly when they are associated with streptococci, is regarded by some workers as almost invariably coming from infected herds. Some milk firms make routine sediment tests and report pus and streptococci to the producer, who, it is claimed, can usually locate the difficulty without trouble. If the gargetty udders are not readily found the milk from each individual cow is then tested, with the usual result that the offending cow is found. Savage of England has carefully studied this condition and fortunately is able to come to the conclusion that "The great majority of cases of bovine mastitis are due to an organism which is not harmful to man."

Closely associated with mammitis in cows is the question of the relation of septic sore throat to milk. Savage and Trask have collected the histories of twenty outbreaks of milk-borne sore throat, which have occurred in England. Most of these epidemics have occurred in recent years. In this country we have all been startled by the appearance of several frightful epidemics. This disease appeared first in Boston in 1911, and since then in Baltimore, Concord, N. H., Chicago and elsewhere. The evidence is not sufficient to warrant a dogmatic statement in regard to the way in which the milk becomes infected in this disease, but until we know differently we are bound to regard mammitis and other streptococcus infections of the udder as a possible if not a probable source of infection. The tremendous morbidity and mortality among the consumers as well as the financial loss among the producers of such an infected milk make the relation of septic sore throat to milk one of the great problems of the day.

Tuberculosis is a chronic disease of both the cow and man. That these diseases are intertransmissible there can not be the least shadow of a doubt. The only question is what per cent of human tuberculosis is of bovine origin. We know that in all probability milk from infected cows is responsible for from a fifth to a fourth of the tuberculosis of infancy and childhood and that it is the source of from five to seven per cent of all human tuberculosis. Some believe that it is even more important than that. Certain it is that its eradication is of sufficient importance to demand the best endeavors of all who love humanity and own cattle.

The elimination of these animal sources of contamination can be accomplished by testing with tuberculin all cows used in the production of milk and removing from the herds the reacting animals. Garget should be constantly in mind and when present the entire milk of the infected animal should be discarded so that it does not become human food. Sick cows, from whatever cause, are not proper sources of food for man. The danger from this source of contamination, namely the cow, can only be eliminated by eternal vigilance.

Health Tone of Cow. The early idea that milk from a healthy udder, with proper care, could be obtained in a sterile condition is not in keeping with the facts as we know them. As a matter of fact experience has shown that the most extreme care will not assure a milk with less than several hundred bacteria per cubic centimeter. It is further known that certain cows give an excessively high count in freshly drawn milk, i.e., upwards of a hundred thousand. Whether such cows are in a perfectly normal condition or not is perhaps a matter of doubt but one worthy of further study. Frost and Meyer have already made some suggestive observations in this direction. They made a study of bacterial content of the milk from a series of cows from a certified herd, in which it was shown that the only cow
of the group studied having an excessively high count was the one which had been continuously stabled for a period of six years. This work needs confirmation, but it does not seem unreasonable to suppose that unnatural conditions such as continuous stabling and forced feeding would lower the health tone of an animal so that the natural germicidal properties of its body fluids would be subnormal thus permitting the development of an abnormally high bacterial flora.

Contamination Through Handling. In the handling of milk, opportunity for serious contamination occurs at several points. The sources of this contamination are: the exterior of the cow; the barn dust; the utensils, and the milker.

Fecal Bacteria in Milk. From the coat of the cow come a great number and variety of bacteria but perhaps the most dangerous are the fecal bacteria, or those belonging to the colon group and the Sporogenes capsulatus group. The presence of these bacteria in milk is significant not only because they indicate manurial contamination, which in itself is undesirable, but because they may themselves at times at least possess pathogenic properties.

This source of contamination can be largely eliminated by comparatively simple precautions. The hind quarters of the cow should be brushed or curried at least one half hour before milking. The udder and flanks should also be washed with clean or sterile water and wiped with a clean towel. Under all conditions milk produced for direct consumption should be gathered in narrow topped milk pails which reduce this source of contamination to a minimum.

Barn Dust. The bacteria which come from the barn dust are of comparatively little importance to the careless producer, since in his case the lactic acid bacteria almost invariably overrun the air bacteria, but to the more careful producer they become a greater problem. These bacteria, in so far as they affect milk, are usually digestors, i.e., they act on the protein rather than on the sugar of milk. The better grades of certified milks usually have these digestors in relatively large enough numbers to determine the character of the fermentation, as it has been my experience that such milks digest rather than sour on standing.

This source of contamination can be minimized by observing reasonable care in conducting the affairs of the barn. These particular bacteria are abundant in the dust from the feed. This should then be so handled and at such times as to avoid dust at milking time. The same is true of the bedding and the dust from the currying of the cows.

Milking Utensils. The care of the milking utensils is a matter of very considerable importance, since from this source come enormous numbers of lactic acid bacteria, as well as other kinds, whose presence in milk are of the greatest significance so far as the keeping qualities or the milk are concerned. This factor also is not without its sanitary significance, since many epidemics are on record as having their origins in the fact that bottles have been returned from infected households, refilled and distributed without being properly sterilized.

Contamination from this source can be easily eliminated where steam is available, since the effect of even a few minutes exposure to live steam is sufficient to kill pathogenic bacteria. In other cases much the same result can be obtained by the use of hot water. In the absence of hot water, treatment with a suitable solution of chlorinated lime will be efficient.

The water supply of the dairy is a matter of the gravest concern. Its quality should be above reproach.
It should be stated in this connection that the handling of milk is a great multiplier of bacteria, and as a corollary that on this account milk should be handled as little as possible.

The Milker as a Source of Contamination. The milker is no doubt the most serious source of contamination, since through him come the pathogenic germs which produce the most dangerous and widespread epidemics attributable to milk. These epidemic diseases are typhoid fever, scarlet fever, diphtheria and septic sore throat. There is no reason to doubt that the cause of these diseases in milk epidemics always enters through the handling of the milk by diseased persons, by “carriers” of these diseases, or through the water supply. To show that the danger from this source of infection is not simply theoretical but has its practical importance, one has only to turn to the literature of the subject. Our knowledge of milk-borne epidemics was summarized by Trask, in 1908, and from him we learn that upwards of 500 epidemics have occurred and that 317 of these were typhoid fever, 125 were scarlet fever, 51 were diphtheria and 7 were sore throat infections. The number of cases in these various epidemics have ranged from one or two to over 800. The largest number of cases in any one epidemic of typhoid fever was 362, in scarlet fever 813, in diphtheria 264 and in septic sore throat 7 (but it should be remembered in this connection that there were over 2,000 cases in the Boston epidemic of 1911).

The elimination of this cause of contamination is the most serious problem confronting the conscientious dairyman of today. It is quite easy to debar from milk-handling workmen who are actually sick and it would seldom happen that well marked cases of disease would be the source of infection, especially in the larger plants. One trouble comes from the fact that during the prodromal stages of diseases, such as scarlet fever, they are quite as infectious, if not more so, than when these diseases are well advanced. Still more difficult is it to detect the “bacillus carriers” which are common in all these diseases. In the present state of our knowledge their detection is impossible.

What should be done—and the public can reasonably expect that it will be done—is to minimize the danger from this source by allowing only well people to milk: to temporarily debar from milking or handling the milk any who are ill, especially if such indisposition be in the nature of a sore throat and particularly if this symptom appear in a young person who has not had diphtheria or scarlet fever. A person should not be allowed to milk who has a fever or who has diarrhoea. Nor should one be allowed to handle milk who comes in contact with anyone sick of an infectious disease. Where possible all employees should be periodically examined by a competent physician and while ill an employee should receive the usual compensation, otherwise he will not report slight but nevertheless dangerous indispositions.

It seems also well within bounds to require that all milkers should have reasonably clean clothes, clean hands and good habits, such for example as would keep him from wiping his nose on his hands as I have seen men do in capping bottles.

Flies should be kept out of milk and the dairy if possible. Cans and bottles should be so sealed as to prevent infection during delivery, for it must not be supposed that all of the contamination occurs on the farm—it may occur enroute to the city, in the city plant and on the premises of the consumer.
Finally, fine equipment of farm, dairy or pasteurizing plant is always to be commended, but by the same token, it is always to be remembered that intelligent and painstaking care are the important essentials in the handling of milk.

Dr. Dalrymple: I would like to express my appreciation of Dr. Frost's paper. I think it is of great importance. There was one point that attracted my attention, and that was in connection with the anthrax organisms being found in milk. We have never been able to find the organism in the cow until after death. We had an instance of a dairy herd of some seventy odd, and they including all ages, and something like nineteen deaths. We found the organisms in horse flies an hour before the animals died, horse flies which had been sucking on the animals, but in that case the milk was examined microscopically and we could not find the bacillus until after death. In that particular herd we took the precaution to suggest that every cow giving milk should have her temperature taken before each time of milking, morning and night, and everything that showed the slightest rise was eliminated from the stable, and that milk supply went along providing our people with milk, I might say supplying milk to our town, and there wasn't a single case of any trouble amongst the people who were getting milk from that herd. I think some years ago McFadyean made that statement, that the germ of anthrax has not been found in the live animal, it has been found after death. That has been my experience. I would like to know for my own information of the cases where the organism has been found in the living cow, or in the milk of the cow before death.

Dr. DeVine: Another thing that Dr. Frost said attracted my attention. He said that it does not seem to be generally recognized that the udders of animals are always infected, and that sterile milk should not be expected. We have a farm in New York State known as the Stewart farm, which I believe has the record of making the cleanest milk in the world, and they frequently get sterile milk. I wonder if there is anything in the technique of making those examinations.

Dr. Connaway: I wish to add this point to Dr. Frost's paper. A suggestion, I believe, that was not included in his paper, as to the elimination from handling of milk of all persons who have been affected with typhoid fever; I believe that would be a good thing, because of the difficulty of detecting carriers of typhoid germs. I don't know that it is so difficult if examinations were made, as nearly everyone knows, or the physicians of the town know, these cases of typhoid. It seems to me from the clinical records that these physicians have, that much good could be done by keeping such persons out of the milk-handling business.
Professor Frost: In regard to anthrax bacilli being found in milk before the death of the animal, I have had no experience, and my information came merely from the literature, where I find statements that the bacilli have been found in the milk.

In regard to producing a sterile milk of the certified kind, I have considerable doubts on that, and I think the experience of all workers has been that it is quite impossible in any large way to get milk from the udder of the cow without some bacteria. Very frequently we run onto these cows that have a very high bacterial count, such as where it runs up to 100,000 per cubic centimeter. Why it is not possible to get the results that have been reported we cannot fully understand. It may be that we do get milk with a small number of bacteria per cubic centimeter, but I think a good many times these bacteria are rather slow growing, and in laboratories only twenty-four hours given for the development, so the colonies do not appear. And another thing, clay tops are used, which allow evaporation. Clay tops are all right if the moisture in the incubator is saturated, but I found that in twenty-four hours, with a clay top, it will lose 50 per cent of its weight, and in forty-eight hours a good deal more. That means that if the organisms do not grow into colonies visible to the naked eye in the twenty-four hours, the changes are such that it would never develop, and in almost all cases it is possible to find a larger number if a little different method were used.

THE PRESENT STATUS OF THE CONTROL OF BOVINE TUBERCULOSIS BY VACCINATION.


An attempt to produce immunity in animals against tuberculosis may be said to have commenced with the discovery of tuberculin by Koch in 1890. Numerous experiments with tuberculin as a preventive and as a cure for tuberculosis were made for a number of years following the discovery of this substance. It was at last established that while tuberculin has a specific effect upon the lesions of tuberculosis and in some cases causes the lesions to become encapsulated, to recede, or to disappear, this effect is by no means constant and is not sufficiently frequent to make this mode of treatment of any practical value. The insufficient protection and the insufficient healing effect following the use of tuberculin led to efforts to discover other toxins that might give better results. The outcome of this work was the production of tuberculins such as Tuberculin Residue (T. R.), Tuberculin Bacillen Emulsion (B. E.), Tuberculin Filtrate (B. F.), Watery Extract of Tubercle Bacilli, etc. All of these tuberculins, as their names indicate, consisted of the products of the tubercle bacillus in some form. However, none of them contained active living tubercle bacilli. Following the efforts of a large number of investigators to obtain a distinct immunity by the use of the various tuberculins, dead tubercle bacilli killed by heat or other means were injected with the object of obtaining a greater immunity than was conferred by any one of the tuberculins. Such injections appear in some instances unques-
tionably to confer a marked amount of resistance to the attacks of virulent tubercle bacilli, but such resistance has not been found to be sufficiently great and regular to be of any practical importance.

Later, such investigators as Maragliano, Burnheim, Niemann, McFarland, DeSchweinitz and others, endeavored to produce immunity experimentally in animals by the use of blood serum of animals that have been treated with various products of the tubercle bacillus. The work that was done by all of these investigators may be summed up by saying that it is well established that by the use of a tuberculosis toxin or tuberculin it is possible to immunize an animal against this toxin and to produce an increased resistance against tuberculosis above the normal resistance of the animal. But the immunizing or curative results of such toxins or anti-toxins resulting from the injection of toxins, while sufficient to be definite and measurable, are not considered sufficient to be of much practical value so far as the protection of an animal against tuberculosis is concerned. Evidently their effect was to produce a toxic but not a bacterial immunity.

Further progress along the lines of immunization of animals did not occur until efforts were made to produce a bacterial as well as a toxic immunity by the injection of living tubercle bacilli. In 1889 Samuel G. Dixon published in the Medical News "The Possibility of establishing tolerance for the Tubercle Bacillus" in which he announced that avirulent and atypical tubercle bacilli when injected into rabbits gave rise to a more or less marked resistance to tubercular infection. In 1892 and 1893 Trudeau found that by subcutaneous inoculation of living cultures of avian tubercle bacilli he was able to increase the resistance of rabbits to infection by living virulent mammalian cultures.

In 1894, E. A. deSchweinitz of the Bureau of Animal Industry reported in the Medical News some experiments made upon guinea pigs in which these animals were inoculated with tubercle bacilli of the human type considered to be of low virulence. These animals with controls were afterwards injected with tuberculous material from a cow. The treated guinea pigs remained free from tuberculosis, while the control animals inoculated with the same tuberculous material from the cow, died of tuberculosis within seven weeks.

This brings us up to the point where attempts were made to increase the resistance of cattle against tuberculosis infection. In 1900, the late Dr. Leonard Pearson and the writer started some experiments upon the immunization of cattle against tuberculosis by the intravenous injections of tubercle bacilli of the human type which were known to be non-virulent for cattle. The result of this work was published in November, 1902, and the authors at that time concluded:—

First, That after repeated intravenous injections of cultures of tubercle bacilli from human sputum, the resistance of young cattle to virulent tubercle bacilli of bovine origin may be increased to such an extent that they are not injuried by inoculation with quantities of such cultures that are capable of causing death or extensive infection of cattle not similarly protected.

Second, That intravenous injections of much larger quantities of cultures of human tubercle bacilli than are necessary to confer a high degree of resistance or immunity may be administered without danger. About that time McFadyean of England and von Behring of Germany reported work along similar lines. McFadyean concludes in part that "The immunity was not absolute, but it may be doubted whether a degree of resistance that will merit this term is obtainable by any method in cattle." Since that time many investigators have put forth...
efforts to produce immunity in cattle of such a degree as to withstand natural infection by exposure to or association with tubercular animals.

For the past twelve years this work has been vigorously pursued at the Experimental Farm of the State Livestock Sanitary Board of Pennsylvania, where more than four hundred cattle, hogs, rabbits and guinea pigs were used. The results of these experiments were reported in detail by Gilliland and Marshall before the American Veterinary Medical Society in New York City in September, 1913. The various experiments were outlined with the object of determining:

First, the number of intravenous injections of non-virulent tubercle bacilli of the human type required to confer a serviceable degree of immunity.

Second, The best interval between such vaccinations or injections.

Third, The duration of the immunity conferred.

Fourth, The outcome of the living non-virulent tubercle bacilli of the human type which was injected in the blood stream of the animals.

The culture used for the experiments by the State Livestock Sanitary Board was known as Culture M and was obtained from the sputum of a young adult that had a constant cough, though no involvement of the lungs could be detected on physical examination. This culture at the time it was isolated in 1899 and for several years afterwards was found to be virulent for guinea pigs in ordinary doses, but not virulent for rabbits, goats or calves. The vaccine was prepared by taking a quantity of tubercle bacilli from a three to four week old glycérin bouillon culture and grinding them in a flask with bronze balls. These ground tubercle bacilli were suspended in normal saline solution so that 1 cc. of the suspension represented 1 milligram of dried, ground tubercle bacilli.

In the brief time allotted me for the presentation of this subject, it is not possible to give in detail the treatment of the animals in the various experiments. However, the early experiments in which the immunized animals were given from three to ten vaccinations at intervals from one week to six weeks, the success was all that could be desired. These animals, with their controls, were kept in non-infected stables. In some of the later experiments, where animals were vaccinated during the period that they were exposed to infection, the results were not so encouraging, and it was afterwards learned that an animal during the period of vaccination was more liable to infection than at any other time. One very interesting and valuable experiment may be summed up as follows:

In 1904 an experiment was started on thirty yearling calves to determine the quantity of vaccine required to produce a serviceable degree of immunity to tuberculosis from natural infection, and second, to determine the length of time this immunity is retained by the animal. Twenty of these animals were vaccinated and ten were kept as controls. The twenty vaccinated animals were divided into five lots of four animals each; the first lot receiving two vaccinations with an interval of twenty days; the second lot receiving two vaccinations with an interval of sixty days; the third lot receiving three vaccinations with an interval of twenty days between the first and second vaccinations and an interval of thirty days between the second and third; the fourth lot receiving three vaccinations of an interval of thirty days between each vaccination; and the animals of the fifth lot receiving ten vaccinations with an interval of from twelve to eighteen days between each vaccination. The dosage in these instances being increased on each subsequent vaccination except for the last lot, receiving ten vaccinations, where from 15 to 20 cc. of the suspension was given at
each injection. A few weeks after the vaccinations had been completed, the vaccinated animals with their controls, were exposed to natural infection by association with badly tubercular cows. The exposure of the animals in the experiments to infection was as even as possible under the conditions. Each animal was stabled next to a tubercular cow and at certain intervals these animals were changed in regular order, so that every animal came in contact with all the tubercular cows used for infection purposes. In analyzing the results of this particular experiment we find:

First, That the controls were more extensively diseased. The lesions were more widely distributed. Three of the controls died within two years from the time the exposure to infection began, showing that the degree of exposure was rather severe. All of the vaccinated animals lived until killed.

Second, Six of the vaccinated animals showed no macroscopic lesions of tuberculosis. Three of the remaining vaccinated animals had very slight lesions, in some instances a calcified nodule less than one-fourth inch in diameter.

Third, The lesions in the controls were active and progressive, while those in the vaccinated animals had the appearance of being latent or retrogressive.

Fourth, It seems very probable that the animals in the first two vaccinated lots had lost their immunity before they were killed, for the animals in these lots received only two vaccinations. It was the experimenters' belief in some instances that certain of the vaccinated animals in Lots 3, 4 and 5 were exposed to infection too soon after the vaccination or before they had attained an immunity from the injection of the tubercle bacilli of the human type.

About this time the late Dr. Leonard Pearson decided to try to rear a tuberculosis-free herd from the offspring of tubercular cows. The animals used for this purpose were the offspring of the tuberculous cows used for infection purposes, and as soon as the calves were dropped they were vaccinated and allowed to remain with their mothers. It was some time before we found that these calves seemed to contract tuberculosis more readily than their controls, and further experiments were started which proved that the animals vaccinated at a time when they were exposed to infection, were more susceptible during the period of vaccination and for a few weeks thereafter to the disease than unvaccinated calves. We therefore took the calves away from the dams at the time they were dropped, sponged them off with a solution of creolin, placed them in a stable that was free from all infection and fed them on pasteurized milk. After this method was adopted of removing the calves from the dam during the period of vaccination and keeping them away from infection for at least four to six weeks following the last vaccination, we had most remarkable success. In eleven calves treated this way and afterwards exposed to infection with tubercular cows for a period of from two to three years, only two of this lot at time of autopsy showed any evidence of tuberculosis, and in these the lesions were very small and not progressive. It is the belief of the writer that the immunity in these two animals had been lost during their three years of exposure following the vaccinations.

Many others, both in this country and abroad, have devised methods of immunizing calves against tuberculosis with living tubercle bacilli from different sources and varying degrees of virulence. Von Behring's method of immunizing with bovo-vaccine consisted of human tubercle bacilli dried in a vacuum and injected into the blood stream.
The first test conducted after this method showed that two intravenous injections of bovine-vaccine resulted in a considerable and immediate increase of their power of resistance to artificial infection. Calves thus treated would as a rule resist successfully four months later, intravenous injections of virulent bovine bacilli that were fatal to untreated calves. Further experiments showed that resistance thus artificially increased was of short duration, suffering considerable reduction at the end of one year and disappearing entirely six months later. It was suggested that it might be possible to prolong this immunity indefinitely by annual vaccinations. The objections to this plan lies in the fact that the bacilli introduced by the act of vaccination may remain alive and active in the bodies of the animals, thus making the products from such animals as well as their meat for food purposes of doubtful safety.

Eber tested the resistance of four animals immunized by the Von Behring method by repeatedly exposing them to animals with experimental tuberculosis. Two years later, when they were slaughtered, they were without exception found to be affected with focal tuberculosis of a more extensive nature than that affecting the control animals. There were a number of others carried on experiments after the method suggested by Von Behring with varying results. Weber and Litze report on the vaccination of 206 cattle the results of which are summarized by the statement that while some of the animals become more resistant by the treatment, the experiment was by no means a conspicuous success.

Koch, Schuetz, Neufeld and Miessner suggested the possibility of immunizing cattle against highly virulent bovine bacilli by means of a single injection of 10 to 30 milligrams of human tubercle bacilli. The results of this method showed that a certain degree of immunity could be given, but the duration of said immunity is not as long as when a double injection is given.

There have been other methods advocated, such as the Dresden method of Klimmer, which consists in the immunization with avirulent human tubercle bacilli, such bacilli having been attenuated by heating at 52° to 53° C., or the pure cultures of avirulent tubercle bacilli that have passed through salamanders. Again, Heymons encloses human or bovine tubercle bacilli in a gelatinized sac and introduces the same under the skin.

After making a careful study of the various methods devised by others as well as carefully analyzing the work done by the State Livestock Sanitary Board of Pennsylvania, the writer has reached the following conclusions upon this most interesting subject:—

Conclusions.

Intravenous injections of tubercle bacilli from human sources, non-virulent for cattle, are capable of conferring an immunity in cattle against tuberculosis sufficient to withstand natural infection by association with tubercular cows.

The length of immunity has not been determined accurately, though it is believed to gradually diminish after two and a half years. It is necessary that the animals, during the period of vaccination, and for at least eight weeks following the last vaccination, be kept in a manner that they are in no way exposed to tubercular infection.

The normal resistance of the animal is apparently lowered during the period of vaccination.

The number of vaccinations and the amount of vaccine administered, have a direct relation to the degree of immunity conferred.
The interval between vaccinations should be of sufficient length to allow the reaction following the previous vaccination to entirely subside.

The results of the experiments lead us to be hopeful that the day may come when animals can be immunized against tuberculosis in common practice.

Until further knowledge is obtained in regard to the destruction or outcome of the living tubercle bacilli injected in the animal with the vaccine, no practical method for the immunization of animals under ordinary conditions can be advocated.

AFTERNOON SESSION, DECEMBER THIRD.

Dr. Haring: Mr. President, and gentlemen. Before reading the paper which has been assigned to me, I would like to point out a few mistakes that we have made in our work in applying the intra-dermal tuberculin test, which may explain some things which I say in the paper. The manner of applying this test is so well known that it is not necessary to describe the technique. The first mistake which we made was in attempting to inject the tuberculin as near the surface of the skin as possible. The tuberculin should be injected into the lower layers of the skin, into the derma. It is not an inter-dermal test, it is an intra-dermal test, and an injection into the epidermis or between the layers of the skin is not as efficient as if the tuberculin is injected into the lower layers separating the connective tissue fibers and that part of the skin, or even into the sub-dermal connective tissues. If it is injected into the sub-layers under the skin, the reaction will be better than if injected so that a blister is formed. The object should be to inject so that a lump is formed and not a blister. If a needle of proper length is used, of the length of one-quarter of an inch, there is no danger of going too deep, and in the extensive tests we have made on the hides of slaughtered cattle, we believe that this needle may be inserted without fear of going too deep. In the back of the room are some photographs showing the position assumed in the intra-dermal work. If the skin fold is pinched tightly between the fingers, pinching tightly, the animal does not seem to feel the prick of the needle as much as if it were inserted without pinching the skin. The dose of the tuberculin can be felt after leaving the syringe, and should be left as a lump in the sub-caudal folds.

Another mistake that has been made is in inserting the needle too close to the base. The needle should be placed where the swelling will be backed up by the muscles and the bone of the tail, and the reaction thrown into prominence. If the injection is made into the flabby part of the sub-caudal fold, it is obscured by the soft tissues there.

We also made the mistake of disinfecting the skin. Somebody had suggested that it would be nice to put a drop of lysol on the
part which we intended to inject, but experience has shown that lysol placed on the tail that way will produce a swelling of considerable size, which will be confusing. We do not disinfect the skin of the tail, but wipe it off with alcohol if it is soiled, and dip the needle into a strong disinfectant.

We have great difficulty in obtaining uniform tuberculin. We obtained tuberculin from six different firms, and in no two cases was the intra-dermal tuberculin which they recommended the same.

Perhaps I may be pardoned if I mention by name these different firms, but I think it would add personal interest to what I say. Parke, Davis & Company recommend an intra-dermal tuberculin for intra-dermal use which they say has seven times the strength of the original culture, with a 35 per cent glycerine solution. We have found that this tuberculin is not absolutely valueless, but it is negligible for the intra-dermal test. Thirty-five per cent solution of glycerine has been found to produce swelling four inches in size in healthy cattle, which persisted for forty-eight hours.

Mulford & Company have an intra-dermal tuberculin consisting of one-half of 1 per cent of alcoholic precipitate tuberculin, which is too weak, we believe, for good results, but I understand that that firm is now distributing stronger tuberculin.

The Cotter Laboratory distribute a tuberculin which is essentially the same as the ordinary veterinary tuberculin distributed by the Bureau of Animal Industry. We have tested about 2,000 head of cattle with this tuberculin and have obtained fairly satisfactory results, but we believe that it is inferior to the strong solution of alcoholic precipitate tuberculin.

Bishop & Company distribute a tuberculin especially recommended for intra-dermal use, the content of which they are not able to tell us, but they think that it contains 25 per cent glycerine, which would be objectionable. They also furnish a purified tuberculin, the contents of which they do not know, because it is manufactured in foreign laboratories. We have tried this, but it has not proved satisfactory.

The Pasteur Institute distribute a tuberculin which they recommend for that test. They are not able to tell its contents, because it is manufactured in a foreign laboratory.

We made the mistake of examining the cattle but once after the intra-dermal method on the forty-eighth hour, and we found it necessary in order to get good results to examine them at least twice, preferably on the thirty-sixth and the seventy-second hour. The seventy-second is preferable to the forty-eighth.

Now, in the paper which I have prepared, I have attempted to confine myself to the topic of the possibilities and limitations of the intra-dermal method, and not the discussion of the technique.
THE POSSIBILITIES AND LIMITATIONS OF THE INTRADERMAL TEST FOR BOVINE TUBERCULOSIS.

By C. M. Haring, Berkeley, California.

The method of administering the intradermal test to cattle is now so well known that it is unnecessary to give a detailed description of the technic of this test. The questions of its comparative accuracy and its acceptance as an approved method are still unanswered and it is hoped that the data which we have been collecting in California may be of value in answering these questions.

The intradermal or intracutaneous method of applying the tuberculin test to cattle is now regularly used by several veterinary practitioners in California and reports from other states and from foreign countries indicate that the method is rapidly gaining favor among veterinarians elsewhere. The test possesses such advantages in economy of time and materials that it has been widely accepted by practitioners as a substitute for the subcutaneous method, without waiting to determine whether it is sufficiently accurate to warrant such a procedure. The data concerning its accuracy, as compared with that of the usual subcutaneous method, are not sufficient, however, to convince many state officials of the advisability of accepting the intradermal test as a substitute for the subcutaneous. In regard to the acceptance of this method for the admission of cattle into states requiring a tuberculin test certificate, the following information is of interest. Statements have been received from the livestock sanitary authorities of thirty-nine states. In two of these the intradermal test is accepted, if performed by an approved veterinarian. The state veterinarian of another state wrote us that he would not recommend the livestock sanitary board to recognize the method indiscriminately, but under certain conditions, when the test is made by an unusually well qualified veterinarian, and a certificate for physical examination accompanies a report of the test, he would recommend the board to accept it. Another veterinarian writes: "We are using the intradermal test exclusively in our state work, but for interstate shipments we are using the thermal method, for the reason that the intradermal leaves no record, therefore until such time as an agreement can be made between the different states and there is a better system for the control of the veterinarians, it will be necessary for us to require the thermal test and a record of the same filed in this office immediately after the inspection is made. We have the greatest confidence in the intradermal test and would not hesitate to accept shipments where it has been applied, except for the fact that only a very small per cent of the veterinarians doing interstate work are familiar with the intradermal test, therefore I see no possibility of our accepting the intradermal test in the near future."

Most of the state authorities agree, however, that they can not officially accept the intradermal method and do not think there is a possibility of their doing so in the near future. The consensus of opinion seems to be that the test is fairly satisfactory when administered by a careful and experienced operator, but that it is unsafe to accept such tests from veterinarians indiscriminately, until the method has come into more general use and has been accepted by the United States Bureau of Animal Industry.

*For description and photographic illustrations see an article by Haring and Bell in the Proceedings of the American Veterinary Medical Association for 1913.

The terms intradermal and intracutaneous are synonyms. Custom renders the word intradermal preferable when mentioned in connection with the testing of cattle.
In human practice the intradermal method is used to some extent. Many physicians consider this method too delicate for routine diagnosis in man. Their objection is that the test is so searching in its scrutiny that it causes reactions in latent cases which would probably never develop active tuberculosis.

In veterinary practice, however, this “searching scrutiny” is usually desired and from data already available there is reason to believe that this test when combined with the thermal reaction furnishes a more accurate means of diagnosis than the usual subcutaneous method of testing cattle, in which no attention is paid to the local reaction and no attempt is made to select and prepare the field injection and to inject in such a way that if the local reaction occurs it will be easily detected.
The Thermal Reaction to the Intradermal Injection in Cattle.

Moussu and Mantoux state that no thermal reaction follows their method of performing the test. On the contrary we have found that tuberculous cattle usually do show a marked temperature reaction when injected intradermally with the dosage and strength of tuberculin recommended by these investigators. Moussu and Mantoux used tuberculin brute (Koch's old tuberculin) diluted with ten volumes of physiological salt solution. Their dose was from one-tenth to one-fifth cc.

We have used this kind of tuberculin in testing two hundred and seven (207) cattle when frequent temperature readings were taken after the intradermal injection. One hundred and twenty-four (124) showed a local reaction swelling. In one hundred and one (101) of these (124) cases distinct temperature reactions also occurred. Three cows which showed a local, but no thermal reaction, were autopsied and found to be tuberculous. These cases are described in detail in a paper by Haring and Bell (Proc. Am. Vet. Med. Assoc., 1913).
Accuracy of the Intradermal Compared With the Subcutaneous Method.

Investigators are very evenly divided on the question of which is the more accurate test. Moussu and Mantoux in their original work compared the intradermal and subcutaneous tests on 70 reacting animals. They found that the two methods agreed in every case. In most instances they verified their findings by autopsy and concluded that the intradermal equals the subcutaneous test in accuracy.

Vallee, Declaire and Herbert tested 521 cattle by both methods; 494 reacted to the intradermal and 506 to the subcutaneous. That is, 12 cattle with positive thermal reactions gave no intradermal reaction.

Ward and Baker tested 157 head using the ten per cent dilution of Koch’s old tuberculin recommended by Moussu and Mantoux. They verified their decisions by autopsy and concluded that the intradermal compares favorably in accuracy with the subcutaneous method.

Zschokke tested 300 cattle and found that 85 per cent of known tuberculous cattle reacted to the intradermal test. He considered the neck and tail injections of equal value.

Longley and McKenna tested about 1500 cattle using one-half per cent solutions of precipitated tuberculin and decided that the intradermal test equals the subcutaneous in accuracy.

Romer and Joseph using 50 per cent tuberculin solutions found that one out of 79 tuberculous animals failed to react to the intradermal test.

Norgaard and Case after testing several thousand head decided that the intradermal test was more satisfactory than the subcutaneous and stated that its substitution for the old method was fully warranted.

Zwick and Tietze admit no advantage for either the intradermal or ophthalmic test and have not found them as accurate as the subcutaneous. Tietze finds the intradermal more reliable than the ophthalmic. His conclusion is that the intradermal test is not as accurate as the subcutaneous.

Luckey, Sheldon, Brown, Kinsley and others in Missouri report, after having tested over 30,000 head by the intradermal method, that this test is preferable under average conditions when applied by a skilled operator. Hutyra and Marek state that it is desirable in practice where large herds are to be tested to apply a local test first, preferably the intradermal or ophthalmic test, and after the great majority of tuberculous animals have been recognized the remainder of the herd may be subjected to the subcutaneous test. Martin recommends the intradermal test for general practice.

Melvin, of the United States Bureau of Animal Industry, reports that the ophthalmic and intradermal tests for the detection of tuberculosis in cattle have received attention. He says: “These methods thus far have not proved sufficiently superior to the subcutaneous injection of tuberculin to warrant their general application in practice, although they are still being tested whenever suitable opportunities are offered. A special preparation known as ‘phymatin’ has been used in the ophthalmic test and has given better results than the alcoholic-precipitated tuberculin. The ophthalmic and intradermal methods of applying the tuberculin test possess so many advantages, especially in the simplicity of reading the results, that the absolute acceptance of either would be a great aid in the eradication of tuberculosis. Both methods obviate the laborious operation of taking temperatures repeatedly during the day after the injection, and no preliminary temperatures are required.”

Littlejohn advocates the application of several local tests simultaneously. Lignieres recommends the simultaneous use of the intra-
dermal, ophthalmic, and subcutaneous tests. Foth reports that he was able by the intradermal method to detect only about one-half the tuberculous individuals in Danish quarantine cattle. He states that the subcutaneous injection has a modifying effect on local tests applied simultaneously.

Figure 7.—Reaction to ophthalmic test.

Assmann has observed in certain cases, where ophthalmic and thermal reactions occur at the same time, that the local reaction weakened as the thermal reaction gained strength.

The results of our own comparative tests on a thousand cattle are of interest in connection with the question of the comparative value to the intradermal and subcutaneous tests*. Somewhat more than half of the intradermal tests on these cattle were made with 10 per cent, and a few with 35 per cent. Koch’s old tuberculin, the remainder being made with different strengths of alcoholic precipitated tuberculin varying from one-half to 10 per cent solution. The total reactors to all tests numbered 326; 291 reacted to the intradermal test, besides which there were 12 that gave a doubtful reaction to this test: 282 reacted to the subcutaneous test, and there were 14 that gave a doubtful reaction to this test: 44 reacted to the intradermal and not to the subcutaneous test, and 35 reacted to the subcutaneous and not to the intradermal test. In some of the herds tested it is necessary in judging the results to take into consideration the possibility of a modifying effect upon the subcutaneous test from an intradermal test just preceding. From a consideration of all the results obtained we believe that they should be interpreted as indicating that the two tests are about equal in accuracy.

Cases Which Reacted to the Intradermal But Did Not React to the Subcutaneous Test.

In a paper by Haring and Bell in the Proceedings of the American Veterinary Medical Association for 1913, the detailed history is given of seven cows which reacted to the intradermal but not to the sub-

*The Publication Committee has found it necessary to omit a detailed tabular statement. Certain other tables and several illustrations presented at the meeting by Dr. Haring have also been omitted.

118
cutaneous test, and this was submitted as proof that cattle having latent slight or inactive lesions of tuberculosis may fail to react to the subcutaneous but may react to the intradermal test.

Cases Which Reacted Thermally to the Subcutaneous But Showed No Local Reaction to the Intradermal Test.

We have observed thirty-five cases which showed a thermal reaction to the subcutaneous method, but no local reaction to the intradermal method. This should be considered in judging the comparative value of the intradermal test. Fourteen of the above mentioned thirty-five cows were tested by both methods on the same day. One of these was afterwards autopsied and found to contain a few active tuberculous lesions.

The failure of this and 34 other cows to react locally might be accounted for by the theory that a local reaction is weakened, or disappears, when it occurs simultaneously with a temperature reaction. The observations of Foth and Assmann already quoted are of interest in this connection. However, we have observed so many instances in which marked thermal and intradermal reactions occurred simultaneously from an intradermal injection that more evidence is desirable before accepting this theory. We are inclined to attribute the failures of the intradermal test to the well supported theory that no form of the tuberculin test will detect every case of tuberculosis in cattle, and that the maximum number of reactors can only be determined by applying the various tests simultaneously or the local tests first and following them by the subcutaneous method after an interval of at least seven days. Assmann has pointed out that the proportion of questionable, or faulty, diagnoses amounts to over 13 per cent for the thermie, while he admits only 9 per cent of failures with the ophthalmic test.

Hastings states that probably in fifteen per cent of the animals examined in badly infected herds the test subcutaneous is in error. By far the greater number of errors is due to the non-reaction of tubercular animals. Both the thermic and intradermal tests occasionally fail to produce reactions in tuberculous cattle under circumstances that exclude an explanation on the ground that the disease was either latent, or so advanced that the cattle would not react. The possibility of the animals having been rendered insusceptible by previous injections of tuberculin can also be eliminated.


Six state veterinarians have recently written us that they consider the intradermal method preferable to the ophthalmic. Hutyra and Marek also indicate a preference for the intradermal over the ophthalmic. Our data on this point are rather meager. In tests on a number of known tuberculous animals with 10 per cent solutions of Koch's old tuberculin our results were unsatisfactory, being negative in all instances. Five per cent solutions of precipitated tuberculin, however, proved very satisfactory. In one instance a cow reacted to the ophthalmic test, but failed to react to either the intradermal or subcutaneous test. On autopsy this cow proved to be tuberculous. In testing range cattle we have found it easier to apply the intradermal than the ophthalmic test.
Use of the Intradermal Tuberculin Test on Swine.

At the University of California Hog Serum Laboratory the intradermal test is used as a matter of routine on all hogs purchased. The test is very satisfactory, the reactions usually being larger in size than in cattle. A dose of at least one-fifth cc. should be used. We are undecided as to the best place to make the injection. Injections into the skin of the edge of the ear are very easily seen. However, when the injection is made at the base of the ear the swellings are often larger. Tubercular hogs often show a thermal as well as a local reaction to one-fifth cc. doses of a ten per cent solution of alcoholic precipitated tuberculin.

Conditions Under Which the Intradermal Test Is Preferable.

Since the reaction to tuberculin when injected by the intradermal method depends on a swelling at the point of injection and not on thermal manifestations, it is to be preferred to the subcutaneous injection under all conditions that are liable to modify the tuberculin temperature curve. In testing wild range cattle, even if it is possible to restrain them, no reliance can be placed on the reaction as shown by the tuberculin temperature curve.

In calves under six months of age there is liable to be a difference of two or more degrees in the normal temperature on two consecutive days. The temperature of some cows is easily influenced by variations in the weather and also by changes in handling and feeding. We deem it advisable to test by the intradermal method, if the temperature of the air where the cattle are confined exceeds 100 degrees F., or in cold weather if the animals will be compelled to stand in a draught. Cattle from a long journey by road or rail are apt to have an abnormal temperature.

If an animal reacts locally there is a record left at the point of injection in the form of a swelling, this swelling being discernible in some instances three weeks after injection.

The local intradermal reaction is not affected by advanced pregnancy, recent parturition, or the period of estrum. We hesitate to mention this as an advantage over the subcutaneous method, however, for in our experience in testing numerous cows in this condition we have not observed that the reliability of the subcutaneous test was affected.

Although we have reason to believe that the intradermal method modifies to some extent the results of a subsequently performed subcutaneous test, its effect is certainly not as pronounced as a previous subcutaneous test. When cattle are to be retested a weak solution (one-half per cent precipitated tuberculin) can be used. We believe that the intradermal test can always be satisfactorily substituted for the subcutaneous provided a strong tuberculin (5 per cent solution of precipitated tuberculin) is used for the intradermal injection and temperatures taken as if it were a regular subcutaneous test. We believe that when performing the test in this way it would be necessary to take temperatures only on those cattle that do not show a local reaction by the eighth hour. In testing large numbers this would be a great saving of labor without any injury to accuracy. In fact, we are convinced that when performed in this way on large badly infected herds more tubercular animals will be detected than when dependence is placed on temperature reaction alone.
Objections to the Intradermal Method.

The first objection is that it requires an expert and experienced man to successfully use this method. We will admit that the test requires some experience, but have pointed out how any veterinarian can obtain that experience when applying the usual subcutaneous method. On the other hand it is not a test which can be as readily used by the layman as the subcutaneous method. I mention this fact knowing that it may appeal to many as a favorable argument, although it is to be regretted that as yet no test of bovine tuberculosis has been devised so simple and accurate that it can be used by any dairyman on his own herd. I believe the ophthalmic comes nearer to this than either the intradermal or subcutaneous methods.

The second objection is one voiced by Dr. Sheldon, former State Veterinarian of Missouri, who has objected to the official use of the test for interstate shipments on the ground that no test records can be submitted in documentary form. Would not a description of the swelling accompanied by exact measurements with calipers be an acceptable record?

The third objection and a very just one is that as yet we do not know if the test is as accurate as the subcutaneous method. More data are needed on this point. Comparison should be made by autopsy and I regret in California we have been able to make only 116 autopsies on the 3,789 animals tested. To be of any value such autopsies should be made on the nonreacting as well as the reacting animals. The intradermal test is so easily applied that it would be possible for federal or state officials to arrange with abattoirs to permit them to apply the test to thousands of cattle and follow them up with careful autopsies on the killing floor.

If it were eventually found that the test failed to cause a reaction in 10, or 15 per cent of the cattle that had lesions would it necessarily imply that the test did not equal the subcutaneous in accuracy? The paper by Dr. Wills this morning on delayed reactions shows us a high percentage of failures by the subcutaneous method when temperatures are not taken after the eighteenth hour.

The fourth and best objection to the intradermal method seems to be that as yet a standard tuberculin for this test has not been perfected. With the six leading biological firms of this country each dispensing a different kind of "intradermal" tuberculin, some of which to say the least is unsuitable for the purpose, uniform results are impossible.

We have advocated in this paper the combination of subcutaneous, intradermal, and ophthalmic methods. The objection made by many is that this requires too much time and work. There is the crux of the whole bovine tuberculosis situation. When a man tests 80 or 100 cattle by the subcutaneous method and finishes up the entire test within a period of 24 hours he can't take time to do justice to the work. By combining with the intradermal method he must visit the herd again on the seventy-second hour and should take time to give each animal a thorough physical examination.

The combined tests add accuracy by confirming the many questionable reactions that occur and by detecting cows that react to but one test. At present it would be a backward step to abandon the subcutaneous method for official work. Combining the two tests gives time for thorough physical examination. More thoroughness in testing and physical examination is sadly needed in this country.

121
Summary.

In all 4,310 intradermal tests have been made on 3,789 cattle, 1,410 of which reacted, and there has been an opportunity to check these results by autopsy in 116 cases and by the discovery of lesions on physical examination in 54 additional cases.

To 291 cattle that reacted to the intradermal test the subcutaneous test was subsequently or simultaneously applied and 282 cattle reacted. Forty-four (44) cattle with a positive intradermal reaction gave no thermal reaction to the subcutaneous test. It was possible to autopsy only nine of these which failed to react to the subcutaneous method, but in eight out of nine tuberculous lesions were found. Thirty-five (35) cattle which failed to react to the intradermal test subsequently reacted to the subcutaneous test. Three of these cows that reacted to the subcutaneous method, but showed no swelling at the point of intradermal injection were found on autopsy to be tuberculous.

Cattle which react to the intradermal test with local swellings usually have also a thermal reaction similar to that produced by the ordinary subcutaneous injection.

The intradermal test is unreliable when applied a few days after a subcutaneous injection. The time limits under which this holds true have not been determined.

The intradermal test appears to have some modifying effect on a subsequent test by either the intradermal or subcutaneous methods, but this is not so pronounced as that produced by the usual subcutaneous injection.

The thermal reaction which accompanies the intradermal injection usually subsides in twenty (20) hours, but it seems desirable not to apply the subcutaneous test for several days after the intradermal, the longer the interval the better.

The subcaudal fold is a more suitable point for the intradermal injection than the neck.

Our results with Koch's old tuberculin in 10 per cent solutions and with alcoholic precipitated tuberculin in one-half per cent solutions compare favorably in accuracy with the usual subcutaneous method. A more satisfactory method, however, is to use one-fifth cc. intradermal doses of alcoholic precipitated tuberculin in 5 per cent solutions (50 milligrams of dry tuberculin to the cc. of physiological salt solution) or stronger solutions and take temperatures as in the usual subcutaneous test. With this kind and strength of tuberculin the local reactions are more pronounced and the thermal reactions are as characteristic as those that occur from subcutaneous injections.

Solutions of alcoholic precipitated tuberculin of at least 5 per cent strength should be used. The tuberculin ordinarily used for the subcutaneous test will not give as good results.

The procedure in injecting cattle is not difficult, provided needles of the proper length are used. To obtain the best results the tuberculin must be injected into the lower layers of the skin or into the subdermal connective tissue. The application of strong disinfectants to the site of injection should be avoided. It requires considerable experience to correctly interpret the local swellings. This is especially true when tuberculin containing glycerin is used.

We do not advocate the substitution of the intradermal for the subcutaneous method by a veterinarian until he has become skilled in its use by practice and observation. The practitioner can easily accomplish this in the routine of his work by applying the two tests simultaneously. Such a procedure can not injure the accepted subcutaneous method in any way, although it may modify the local intradermal swellings to some extent.
Our observation of the fact that cattle having small, latent, or arrested lesions will sometimes react to the intradermal and not to the subcutaneous test suggests the possibility of differentiating between latent and acute infections by combining the two tests, but we have not been able to put this to practical use. When 5 per cent solutions of precipitated tuberculin are used both the ophthalmic and intradermal methods equal the subcutaneous test in accuracy, but we have found the ophthalmic method unsuitable for use in routine testing under California conditions. The intradermal method has proven very satisfactory in the out-of-doors tuberculin testing frequently necessary in this state and for the nonofficial testing of large numbers of cattle, is preferable to the subcutaneous method. It requires more experience to apply the test and interpret the intradermal reactions than is required in testing by the subcutaneous or ophthalmic methods.

Some tuberculous cattle react locally to the intradermal test but fail to react thermally to the subcutaneous test, while others which react thermally fail to react locally. Obviously then, it is necessary to use both tests in order to detect the maximum number of reacting cattle. By administering the ophthalmic, intradermal, and subcutaneous tests simultaneously a higher percentage of tuberculous cattle will be detected than if dependence is placed on one test alone.

The intradermal test is especially adapted to the testing of swine and has proven of value in the routine work of the California Hog Serum Laboratory.

BOVINE TUBERCULOSIS IN ILLINOIS.
MODERN METHOD OF HANDLING IN PURE BRED HERDS.

By O. E. Dyson, Chicago, Illinois.

For many years a coterie of cow dealers of the parasitic type have controlled and directed the policy of Illinois in dealing with the problem of bovine tuberculosis.

A change in this order of procedure, however, has recently been made and with the support of Governor Dunne and the State Board of Live Stock Commissioners I feel assured that live stock sanitation in Illinois will soon be placed on a par with that of any other state. With this object in view an effort will first be made to eradicate tuberculosis in pure bred cattle herds. While I have nothing new to offer, I trust that you will bear with me while the principle of a plan of dealing with bovine tuberculosis, presented before this Association three years ago, is presented in another form adapted to state control. While I considered the plan to be modern three years ago, I consider it more modern today, principally for the reason that cattle owners are willing and anxious to take advantage of the opportunity offered to secure official recognition of their herds as being free from tuberculosis. In order that this plan might be promoted the cattle breeders in Illinois have been addressed as follows:

To Pure Bred Cattle Breeders in the State of Illinois.

To promote confidence in the healthfulness of cattle herds within the state and to fully meet the requirements of live stock sanitary regulations which govern the shipment of cattle to various other states, from which such shipments are now practically barred; also to satisfy the minds of many prospective purchasers that high-class cattle of the
various breeds can be safely purchased from the herds of many reputable breeders in Illinois, the State Board of Live Stock Commissioners of the State of Illinois is anxious to render to cattle owners and breeders within the state very possible assistance with the hope of re-establishing Illinois at the head of the American cattle-breeding industry.

With this object in view the Board has decided to officially recognize as being free from tuberculosis, every herd of pure-bred cattle within the state coming within the provisions set forth in the form of an agreement between the owner and the State Board of Live Stock Commissioners, under which a fixed and authoritative standard of health can be permanently established and easily maintained, without deprecating in the slightest degree the actual value of any herd. On the other hand, under the operation of the proposed plan, all progressive cattle breeders within the state will be afforded an opportunity to realize an appreciation of at least 25 per cent over the present value of their herds.

In the event of pure-bred cattle owners being willing to adopt the proposed plan of official recognition and certification as to the health of their herds, the State Board of Live Stock Commissioners of the State of Illinois will endeavor to secure by co-operation with other State Live Stock Sanitary Boards, the privilege of an unrestricted movement of all such cattle throughout the United States. This would enable the owners of all officially recognized herds to sell and deliver cattle from such herds into many other states without the annoyance, needless expense and delay now occasioned by being required to subject all cattle intended for breeding or dairy purposes to the tuberculin test, immediately before making such sales and shipments.

BOARD OF LIVE STOCK COMMISSIONERS, STATE OF ILLINOIS.

Application for Official Recognition by the State Board of Live Stock Commissioners of Herds of Pure-Bred Cattle Free From Tuberculosis.

AGREEMENT.

Section 1.

In consideration of the assistance of the Board in enabling me to establish and maintain my herd of cattle FREE FROM TUBERCULOSIS, I, ..............................................................
Address ..............................................................
owner of ..............................................................head of pure-bred registered
..............................................................cattle, none of which have been subjected to the tuberculin test within ......................... days,
do hereby agree as follows:
1. I will cause to be subjected to the tuberculin test, at my own expense, every animal in my herd exceeding the age of six months.
2. I will cause all cattle in my herd entitled to official recognition by the Board to be annually subjected to the tuberculin test, or as often as may in the discretion of the Board be considered necessary for the maintenance of such a herd.
3. I will cause all cattle which react to the tuberculin test and which show physical evidence of the tuberculosis to be slaughtered within a reasonable time under the United States Meat Inspection Regulations.
4. I will cause all cattle which react to the tuberculin test, but which show no physical evidence of tuberculosis, either to be slaugh-
tered and disposed of as herein provided, or I will cause all such ani-
imals to be removed from the herd and thereafter to remain segregated
under quarantine to be established by the Board.
5. I will add no cattle to said officially recognized herd which have
not passed a tuberculin test administered by an authorized agent of the
Board within a period of thirty days and for which an official transfer
has been issued.
6. I will cause infected premises to be thoroughly cleaned and
disinfected as directed by the Board.
7. In the event of my failure to fully comply at all times with
any of the provisions embodied in this agreement, I hereby agree to
forfeit all rights to claim official recognition of my herd of cattle by the
State Board of Live Stock Commissioners.

Section 2.

I hereby further agree that all cattle in my herd which may react
to said official tuberculin test, shall be placed in perpetual quarantine
by said Board and be handled therein as follows:
1. I will permit all cattle reacting to the official tuberculin test
to be marked in such manner as to enable their identity to be perma-
nently retained and I will not change the location of or slaughter any
reacting cattle without permission of the Board.
2. When segregated reacting bulls are used for breeding healthy
cows I shall see that the cows bred to such bulls are not unduly exposed
to infected premises or to other diseased cattle.
3. I will cause all calves from segregated reacting cows to be
promptly and permanently removed from said infected premises at
birth.
4. In all cases where the milk from segregated reacting cows is
to be used for any purpose whatever, I will cause said milk to be
pasteurized at a temperature of not less than 140 degree F., for not less
than twenty minutes.
5. I will add no cattle to said herd of reacting cattle without
permission of the Board and with the understanding that all cattle
so added shall become a part of said herd until released by permission
of the Board.
6. In the event of my failure to fully comply at all times with any
of the foregoing provisions embodied in this Agreement, I hereby agree
to forfeit all right to claim official recognition of my herd of cattle
under Section 1 of this Agreement.
7. It is hereby further agreed that the State Board of Live Stock
Commissioners will, upon request of the owner of cattle reacting to the
tuberculin test and placed in quarantine under this Agreement, issue
permits under which said cattle may be sold and delivered within the
state under quarantine restrictions embodied herein.

IN WITNESS WHEREOF I have signed this...

day of.......................one thousand nine hundred
and...........................

.................................................
Owner.

Witness:

................................................
CLASSIFICATION OF PURE-BRED CATTLE HERDS ENTITLED TO OFFICIAL RECOGNITION AS BEING FREE FROM TUBERCULOSIS:

All cattle, including calves exceeding the age of six months, in a herd eligible to official registration, shall be subjected to the tuberculin test, officially administered, in addition to which each animal must pass a thorough physical examination by a competent veterinarian. Each herd will 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.

Shall consist of cattle, all of which exceeding the age of six months must successfully pass the initial tuberculin test and physical examination, each of which shall be repeated annually. 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) shall 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), shall be designated as a “Free Herd, Class C,” and thereby become eligible to Class B under the foregoing provisions prescribed for that class.

All applications for official recognition of cattle herds as being FREE FROM TUBERCULOSIS must be filed with Dr. O. E. Dyson, State Veterinarian, under whose direction all tuberculin tests shall be administered and upon whose recommendations all certificates will be issued.


SUMMARY.

For many years I have contended that a solution of the bovine tuberculosis problem in pure-bred herds depended upon official recognition of all herds free from tuberculosis as demonstrated by an official tuberculin test. By this method every breeder would be afforded the privilege and have the option of either firmly establishing himself as a breeder of healthy cattle or have suspicion cast upon the health of every animal in his herd. Some of the advantages offered by the plan now being presented to cattle breeders in Illinois are:

1. That the value of a “free herd” would be increased in exact proportion to the lessened risk taken by a purchaser in search of healthy cattle of the various breeds.

2. That it would obviate the present necessity of the owner of healthy herds being compelled to meet in competition with the owners of diseased herds.
3. Official recognition of state accredited herds will unquestionably establish a new era in the cattle breeding business. A distinction between healthy and diseased herds will become as clearly defined as now exists between the various breeds.

If livestock sanitary conditions throughout the United States are to be improved, co-operation of livestock sanitary authorities is absolutely necessary. A modern standard of health must be established which will permit a free movement of cattle in interstate trade. The breeder of healthy cattle should be exempted from every restrictive measure now utilized in dealing with the owners of diseased herds.

In requesting co-operation of the various state livestock sanitary boards I fully realize that many states have established a quarantine against livestock originating in Illinois and that other states have been contemplating taking similar steps. I know that these steps were taken to protect the livestock interests of your state and under the conditions which have heretofore prevailed you were fully justified. Under the present conditions, however, I feel that the State of Illinois can offer you as much protection as you can possibly secure from any other state. We have many reputable cattle breeders and will soon have many herds entirely free from tuberculosis. It is in the interest of the reputable breeder that your co-operation is desired and I trust that this request will soon be granted.

Dr. Mayo: In connection with the eradication of tuberculosis from pure-bred herds, there are some problems that come to one from experience, and I think to those who have worked for years in eradicating—and I use the term “eradicating” in the sense that we are endeavoring to do it as completely as possible—tuberculosis in a pure-bred herd, there are serious setbacks that almost invariably follow. After one has worked with a herd for several years and feels that the herd is free, he is chagrined to find in a comparatively short time that he has some more cases on his hands. Now, I am convinced that in many cases the secondary outbreaks occur from non-reactors, that the ordinary processes of tuberculin testing do not eliminate from the herd. And in this connection, the question may be raised when you certify to a free herd, whether it is. Gentlemen, I hate to certify to a free herd, even if I stayed with it for five years, as I have in some cases, and made an earnest, conscientious effort to free that herd from disease. It may be that we can combine the words “tuberculin tested” and “certified.”

I was greatly interested in the report on delayed reactors. I think that there is one of the weaknesses of the present method of testing herds, particularly where the effort is made to eradicate the disease from the herd, and in that paper the author said, “If it were justified.” Gentlemen, anything is justifiable in getting a reactor out of a herd that you want to make clean; if you have to stay with them a week, it is certainly economy to do so. If you do not, you will wish you had stayed with them longer.

Now, I think another mistake that we sometimes make is the adoption of the Bang system. There is a tendency, particularly
among breeders of pure-bred cattle, to segregate the reactors and keep them on hand. I have had some experience recently, extending over four years, with a segregated herd of pure-bred cattle, which were put on the Bang system, on a strictly financial basis. We wanted to find out if it would pay to keep this herd separate, with the necessary labor connected therewith, and get the income from the calves; whether this proposition would pay. The calves were isolated immediately after birth and were fed on pasteurized milk, and they were healthy calves, but after four years' experience we found that we barely made expenses, and when you consider the risks that you run, the necessary buildings and added labor, I believe that, excepting a few rare instances of exceptional individuals, it does not pay.

Then I believe, too, in testing herds to eradicate tuberculosis from them. After the first two or three tests, that may be at six months intervals, it is better to test only once a year, and preferably in the spring, before the cattle are put on pasture, if that is the system which is employed, which is the usual one. It has been my experience that we get more reactors in the spring after the cattle have been confined in the stable and yards through the winter, than in the fall. For the past three years in a free herd we got the reactors only in the spring, although they were tested in the fall, showing that the animals evidently contracted the disease through the winter. It gives one too a much better opportunity of studying the animals carefully before the test is made, and enables one sometimes to form opinions. I regret exceedingly that the delayed reaction test was not made on the herd that I have been associated with, because it may account for the apparent discrepancies that so frequently occur in tuberculin testing, discrepancies sometimes that are charged to the bad faith of the individuals taking the tests. While we do have evidences of bad faith, I think we should be exceedingly cautious in making charges of bad faith on tuberculin tests, because personally I am convinced that animals will react at some time under some conditions to the tuberculin test that will not react to the same individuals by a similar test, by an equally competent individual with the same quality of tuberculin, as far as can be determined. What those conditions are that modify the reactions or the susceptibility to reactions, I am not prepared to say.

Dr. Dunphy: I want this Association to go on record as to what is considered a proper tuberculin test, especially for interstate shipment. Now, as State Veterinarian, in the short period that I have been in the office, I find a good deal of trouble from having to reject charts that come in with perhaps two preliminary temperatures, and from three to four after-injection temperatures, some of those not more than fourteen or sixteen hours after the tuberculin has been injected. Well, naturally a veterinarian from some other state thinks that I am a little too exacting when I send back the certificate stating
that the chart is not sufficient, that the test has not been carried out for a sufficient length of time. Now, I would like to get the sense of this Association in regard to what is considered a proper tuberculin test, a proper record of tuberculin test for interstate shipments. I do not wish to accept certificates from other states unless I am willing to authorize the same kind of a certificate to go out from my state. When we are shipping cattle from our state veterinarian with whom I am acquainted, and whose reputation I know, etc., will often send me certificates to be endorsed by the State Veterinarian, as that is required in interstate shipments to a great many states, and I would like to know what this Association would deem a sufficient length of time to carry out the tuberculin test; what would be considered a reasonable time to carry on a tuberculin test before we would accept that test for animals entering our state?

Dr. Melvin: I think probably Dr. Hickman can answer that question. He was at one time on the Committee of this Association with the purpose in view of establishing a certificate that would be acceptable and uniform between the states. I was under the impression that the Association adopted the Committee's report, but he informs me that it was not adopted. He can tell you the exact status in which this Committee left that particular subject.

Dr. Hickman: In the work of the Bureau of Animal Industry we consider that there should be at least three preliminary temperatures, one of those preferably to be taken in the forenoon, and not more than ten hours should elapse between the injection and the taking of the first temperature, preferably eight hours, and that the after temperatures shall be continued not less than eighteen hours, two hours apart following the injection, and if at the expiration of the eighteenth hour there is a tendency to a rise in temperature, the temperature taking shall be continued until it can be definitely determined whether the animal is a late reactor.

I am sorry I did not have the privilege of hearing Dr. Wills' paper this morning—I was otherwise engaged—but I have been very much pleased with the paper presented by Dr. Haring. To me it was practically convincing, and he showed that he had by careful work covered every feature given in his paper.

With regard to the maintenance of tuberculosis free herds, in our work in Washington we have plenty of evidence that such herds can be maintained. We have maintained such herds now for several years, herds in which we have not had a single reaction for at least three years. When we commenced testing those same herds six years ago we had as high as 50 per cent of reactors in them.

One feature I would like to emphasize is the necessity for careful cleaning and disinfection following the slaughter of animals which react to the test. We have one herd of about 100 head of working cows in which tuberculosis developed, a few cases each year, for three
years after we commenced making the test. The owner was very thorough in all matters pertaining to the management of his herd or his dairy, and the quality of milk dispensed, and considered that he was fully competent to clean up and disinfect without our assistance. We finally persuaded him that there must be some fault in cleaning and disinfection. The following year we insisted on doing that work ourselves, since which time—now three years—there has not been a single reactor in that herd.

In the District of Columbia we commenced in 1910 with 18.87 per cent of reactors among the cattle there; that percentage has now been reduced, notwithstanding new cows are being brought in there all the time, subject to the tuberculin test, to 1.29 per cent. So the District of Columbia is practically free from tuberculosis. We have another pure-bred herd of 235 head that we have maintained free from tuberculosis now for three years, in which there were previously a number of reactors.

In our experience I think there is no doubt but by careful work a herd may be maintained free from tuberculosis by the present methods of tuberculin tests in cattle. Possibly in some cases by the adoption of Dr. Haring's suggestion, the application of all three tests, we might rid the herd of tuberculosis sooner than we do by simply the subcutaneous test.

Dr. Gibson: Mr. President, regarding the form of test, as inquired of by Dr. Dunphy, this Association is already on record with a form of test, and it has been distributed among the members in print. One of the gentlemen here is chairman of the Committee. I happened to be on that Committee. That called for three free temperatures at least two hours apart, five post-injection temperatures two hours apart, ten hours after injection, which covered the period from the tenth to the eighteenth hour.

I was very much interested in Dr. Will's paper this morning, on his belated reactions, and I think almost all of them could have been detected at the eighteenth hour by a rise in temperature. I have always understood that it was never safe to leave an animal in a test with a rise in temperature unless you had already sufficient evidence to condemn, and to be satisfied, but I think there is quite a large per cent of the belated reactions that Dr. Wills gave a history of this morning, that showed that the highest temperature that they had given was on the eighteenth hour, and if in previous tests they had followed that time-honored injunction that you don't quit on a rise in temperature, they would have got several of those before they had made this prolonged observation and test.

The general standard that was adopted by this Association and reported by our Committee is being followed by all the Western states now and represent a big improvement in the test of cattle for interstate shipments compared with what took place previous to the
adoption of that report. I have always referred to it as the judgment of this Association. It might be well for us to add a little or to specify a little more particularly about what the proper tuberculin and mallein test is. And as far as our report in that committee was concerned, we reported for the same form of test for both the mallein and the tuberculin test.

With reference to Dr. Dyson's paper, he is aiming at the right conclusion, but I am afraid he is putting too much expense on the owner to get a hearty co-operation. We have been thinking in Iowa of suggesting some such method, but we were going to give an official test free of charge. We were going to suggest a central Bang farm for each breed, the reactors considered valuable for breeding to be consigned to the central farm on appraisal, by appraisal of the Board of the Breeders' Association and the calves fed on pasteurized milk and offered at public auction, the original owner of the cow to have the same right to bid as anybody else. We thought of making a proviso that a man who had an exceptional cow from a breeding standpoint might be allowed to consign that cow to the central farm as a boarder, and not leave her offspring subject to open bids in the market, but be reserved for the owner. There isn't any question, if you go to any breeder of any breed of cattle to-day and ask him if he would like to clean all the tubercular animals out of his herd without any very pronounced expense, but what he would say, "Sure I would like to do it, and tell me how it can be done and I am with you." The only part of Dr. Dyson's suggestion that I am afraid of is that he is putting all the expense on the owners, and if he hits them pretty hard on the first test I am afraid he will have a revolution. (Applause.)

The President: In regard to Dr. Dunphy's inquiry, I will say that on page 164 of the last annual proceedings you will find it answered.

Dr. Dunphy: It escaped my memory that they were in the proceedings, but at the same time I have been carrying out those regulations to a considerable extent and have not been satisfied with them. As Dr. Gibson says, they require three preliminary temperatures, two hours apart. Now I have had a great deal of experience along these lines and I really think we should have at least one of those temperatures in the forenoon. I don't believe that by beginning at two or three or four o'clock in the afternoon and getting three preliminary temperatures two hours apart we are scarcely safe. I have always been very skeptical of quitting on the eighteenth hour, and after hearing Dr. Wills' paper here to-day I am satisfied that we really should not accept a certificate under all conditions, that had been discontinued at the eighteenth hour. Now if the rules as laid down in these proceedings are specifically for a forenoon test, and cover the fact that if in the afternoon there is a rise in temperature we should not quit at the eighteenth hour, then I would be better satisfied.
Dr. Mayo: Mr. President, one word, and that is on the question of disinfection. I am very glad that Dr. Hickman has emphasized that as much as he has because I am firmly convinced that in the average tuberculin testing work many have considered that the removal of the reacting cow terminated their work, when as a matter of fact, it has only begun.

Dr. Reichel: Mr. President, I would like very much to ask Dr. Haring a question. I understood him to say that he applied the intradermal test on hogs, and that he finds it very satisfactory in testing hogs that are used in the preparation, say, of hog cholera serum. I have been in a position to see it used on hogs tested for that purpose, and we have found one-half per cent of alcoholic precipitate solution very satisfactory for that purpose. The question I want to ask Dr. Haring is, did you raise the strength of that tuberculin from one-half per cent to 5 per cent?

Dr. Haring: No sir, the tuberculin which we have used for testing hogs has been the one-half per cent, five milligrams per c. c. And my criticism regarding that tuberculin as used on cattle does not apply to hogs. However, our data on that are rather meager. I don't care to make any very positive statement except to say that the routine testing of hogs from which anti-hog cholera serum is made is to be recommended particularly in communities such as the one where our laboratory is situated, where we are constantly buying in infected hogs, only to discover that they were tuberculosed, after we had used them as hyper-immune. I think that the hogs from which anti-hog cholera serum is made should be tested by the intra-dermal method before they are considered hyper-immune.

THE PRESENT AND FUTURE ATTITUDE OF THE RAILROADS TOWARD LIVE STOCK SANITARY CONTROL WORK.

By F. S. Brooks, Kansas City, Missouri.

Mr. Chairman and Gentlemen of the United States Live Stock Sanitary Association: The western railroads in general, and the Santa Fe system in particular, are deeply appreciative and are sensible of the honor accompanying the invitation to address this Association on the "Present and Future Attitude of the Railroads Toward Live Stock Sanitary Control Work." It is our view that this Association is dedicating its time, thought and labor to one of the most noteworthy causes confronting our national life as related to an industry of paramount importance. Your problems are admittedly perplexing, but we feel that good, great good, can only result from the free interchange of thoughts and experiences at these annual sessions.

It is the earnest desire of the railroad companies to co-operate with the state and federal commissions charged with the enforcement of the sanitary regulations. And, gentlemen, accept our sincere assurances of support to the limit of our ability in your campaign looking to the eradication of the ills peculiar to the diversified live stock of
commerce so well known to the distinguished membership of this Association.

As illustrative of the co-operation of the western railroads, it is recalled reminiscently that when tick eradication was informally discussed in connection with a certain portion of Osage county, Oklahoma, the Santa Fe reviewed the situation, and as a result of an analysis found that the work would cause a curtailment in its business resulting in a loss of revenue of many thousands of dollars. However, we accepted the conditions with equanimity, as I believe our state and federal friends will attest, and placed such of our facilities as were needed at the disposition of our state and federal friends to try to aid with the actual work. The campaign proceeded rapidly, and today, gentlemen, that portion of Osage county, Oklahoma, stands as a monument to the untiring vigor, zeal and intelligence of the officers charged with the work in the respect that so-called native cattle of commerce can be handled to the nutritive pastures of Osage county, Oklahoma, thence to the market, with the same freedom that characterizes the movement of cattle from the states of Iowa, Illinois and Missouri.

We may recite another illustration of the co-operation of the carriers with respect to hog cholera. We moved, about two years ago, a shipment of stock hogs from the Pan Handle of Texas to one of the states in the East. When the shipment arrived at destination hog cholera developed and spread to adjoining herds. There seemed to be considerable mystery in connection with it, and it caused us to do a great deal of thinking. We could not discover any evidence of hog cholera in the territory from which the shipment moved, nor could we discover it in the territory into which the shipment was delivered. We made known certain of our views to the states which are more actively engaged in the business of the stock hogs, and as the result of our negotiations the states of Texas, Colorado, Kansas and Oklahoma have adopted suitable regulations. We believe that the gentlemen representing the various commissions of the various states can probably examine the regulations of those various states if they have trouble in connection with the possible introduction of cholera by stock hogs shipments in transportation.

I should like to say a word with respect to the uniform health certificate. The practical operation of the uniform health certificate, as observed by us, compels the thought again and again: When will all the states operate with or require the uniform health certificate already adopted by the Live Stock Commissions of Texas, California, Louisiana, Alabama, South Carolina, Oklahoma, Tennessee, Missouri and New Mexico?

In conclusion, gentlemen, I want to say that I should be most happy to meet the various Commissioners of the states that are members of this Association, and if it is humanly possible I hope to have the pleasure of meeting the Commissioners of the states which are served by the rails of the Santa Fe system. Thank you. (Applause.)

Dr. Yard: Mr. President, as the State Veterinarian of Colorado I would like to say that the assistance that we have received from the railroads in getting some sanitary laws has been of great help to us. We had no laws on Colorado hogs at all. I have been in the office now for three years, and I have been trying for two years to get a hog law through. The first suggestion that I got from any outside source was from the Santa Fe Railroad—I am not boosting for the
Santa Fe any more than any other road, for they have all co-operated—and I think that Mr. Brooks was the gentleman who suggested this; I have never seen him before, although I have had communication with him, he suggested that if we could get a sanitary law through regulating the shipment of hogs that they would be very anxious to co-operate. The bill was drawn up and presented to the Legislature at the last session, and the strongest force I had to help in getting that bill through was the letters from the Santa Fe railroad. The Commissioners did not think much of it, and of course the hog raisers did not want it, but with the argument back of it that the railroads wanted to have such laws as it helped increase their business and protected them to a great extent we got a good law, and I think we have one of the best hog laws in the United States.

The railroads are co-operating with us. I had a shipment go to Colorado the other day from Nebraska, and after the hogs arrived at destination they were unloaded and sold. Now they should be held in quarantine for eighteen days before they should go in with any other hogs, but for some reason the hogs were unloaded on the 10th and sold at auction on the 11th. I notified the railroads about that, and they helped in every way to round those hogs up and get them together. The man started two or three weeks after that to ship in some more, and by simply notifying the railroad of the man’s name and address he was telegraphed that he could not ship the hogs in. And I just want to say that I believe the railroads are the best friends we have in the enforcement of sanitary regulations, and I believe if it is possible to tell them our troubles, that as far as they can go they are willing to do everything that is right.

Dr. Gibson: I don’t wish to prolong the discussion to any extent, but I appreciate the paper by Mr. Brooks, and I think he mentioned five states that were using the uniform health certificate recommended some time ago by this Association. He spoke for certain sections of the South; I want to speak for the Middle West; they are all using it. Some have not resorted to the original, duplicate and copy, or triplicate. Some states have only made one form, but use three of them. But I think Nebraska uses one color and Illinois uses one color. So far as I know none of the states have encroached upon the colors first adopted by the Bureau, but this certificate is fashioned after the Bureau Certificate, and I have furnished samples of our Iowa certificate as far away as Vermont, and have even loaned them copies to make tests from, and I am glad that Mr. Brooks brought this one subject up. There are too many kinds of certificate forms in use now, and there seems to me to be no good excuse for any commission that comes to the meetings of this Association and takes part in them and votes “Aye” on the adoption of a uniform certificate, and then do not adopt it. (Applause). Now it is high time that every state in the
Union adopt this uniform certificate, because I, for one, can say to you that it has been working splendidly for about three or four years in Iowa, and they have it, I think, almost up to standard in Minnesota, exactly right in Missouri, exactly right in Arkansas and in a lot more states that I might mention. South Dakota, with all her troubles, has the proper form of certificate, and I, for one, insist that everyone connected with this work throughout the states should adopt the uniform health certificate.

Dr. Dyson: I want Illinois to get out of the backward class as quick as possible, and I want to advise our friend, Dr. Gibson, that Illinois has adopted the uniform certificate, and it has been in use for about thirty days. Now the original chart is a bright yellow, so there is no mistake.

Dr. Gibson: Well, of course we would be willing to give Illinois a special color, but I would say to you that the prevailing color for the official certificate is white for the original, buff for the duplicate and straw color for the copy or triplicate.

Dr. Ward: Minnesota, North Dakota, Montana, South Dakota, Oregon and the other Western states were the first states in the Union to adopt uniform certificates of health, and from the adoption of those certificates followed their adoption by the other states. Now so far as we are concerned in the West we don't need the White House certificate, we are satisfied with any plan of certificate which will be accepted as the proper order. Notwithstanding the fact that there are official forms of certificates, those certificates do not always meet with the requirements of the state to which the shipment is being destined, and I would suggest that the easiest method of controlling these shipments is for each State Veterinarian, or for each Live Stock Commission of a state, to indorse the certificates covering interstate shipments and furnish their general freight agents of railroad companies doing business within their own state a copy of the fac-simile, or a fac-simile of the indorsement which will be used by the veterinarian or the Live Stock Commission, with the instruction to the local agent that they be posted in the office where they can be seen in a moment's notice, and if the certificate bears that fac-simile it will be sufficient evidence to show that the inspection has been properly made and meets with the requirements of the state to which the shipment is destined.

Now we require that all certificates of health shall be forwarded to the Live Stock Sanitary Board for indorsement before the shipment can go forward. If that inspection has not met with the requirements of the state to which the shipment is destined, we refuse to indorse the certificate, and the shipment cannot go forward. Therefore there is absolutely no delay in transit, and I believe in the suggestion that I have offered, that the fac-simile of the State Veterinarian's indorsement be placed before local railroad agents so they can refer to them.
What is the use of giving them a lot of dope on the requirements of Montana, Iowa, South Dakota, etc., which takes them an hour and a half to find; first they have to find the state they are looking up, and then when they do find it they are not able to interpret the regulations. Now we State Sanitary authorities are conversant with the regulations of the various states. If there are any amendments we are the first to be notified, so therefore when certificates are sent in to us for endorsement, if they do not meet with those requirements, then we can refuse to indorse those certificates, and the transportation company be saved from being asked for damages on the part of the shipper.

Dr. Ramsay: I am glad to see the transportation companies represented here in this discussion. I have had a good deal to do for several years in connection with the Bureau work with the eradication of cattle scabies, sheep scabies and cattle ticks. I want to say that we have had no better co-operation from any class of people than we have had from transportation companies, or the bankers throughout the country. I have had lots of men, in my experience, say that they would not try to eradicate disease, and I would advise them to go to see the transportation companies and see what they were going to do about the marketing of their stock. The transportation companies told them that they had to settle with the Department regulations first and then those men nearly all changed their minds. And so I say they have been of very great assistance.

In the same way, we have had a lot of cases throughout the country where men would become very obstreperous, and sometimes they would be men who are dealing in live stock in a large way. They are notified of the state regulations and of the transportation conditions, but they are going to fight with everybody. Find out who that man's banker is. Write to the banker and tell him the condition of things and explain to him that this man is trying to fight all the regulations, Federal, State and every other kind. That banker can nearly always settle the matter. He can tell him whether his loan is going to be continued or not the next year or the next ninety days. He may be glad to see some one who will show him how to live up to the regulations and the requirements of the transportation companies. There is where the banker can be of great assistance.

I have always great hopes that the states will accomplish something when they call in the transportation companies and the business interests of the state; they are the people that do things in a business way, that keep books right; they know how the dollars come and how the dollars go, and then we get matters on a correct basis, we eliminate sentimentality and all other "isms" and smallness, and get at it in a right way, and generally accomplish something.

Now in regard to the uniform certificates, I think that the certificate originated by the Bureau has been adopted by the Association and
by nearly all the states, and I noticed one thing in using that certifi-
cate for the past four or five years in our work that it has been of great
advantage to us in having the original certificate printed in copying
ink; and in all our field offices throughout the country where we are
doing this interstate inspection we have kept a copy of these original
certificates in a copy book set aside for that purpose. When we want
information in regard to any particular shipment—suppose we are
prosecuting a violation—we go right there and get it, and there is no
trouble whatever, we don’t have a thousand sheets piled up in all kinds
of shape, we simply have these copy books, and that tells the story, and
it continues from there to the railroad company’s books, we go right
on there, and we get the whole story. And since we have adopted
this plan we have had less trouble getting information in regard to in-
terstate shipments and in regard to the tests given to the animal, the
mallein, the tuberculin that was used, whom it was done by, and all
about it than ever before. Even in many cases the date on which the
mallein was obtained and on which it was manufactured is kept, and
I think one of the very greatest advantages that we have derived from
the adoption of the universal uniform certificate is the readiness with
which we can obtain information from it, and it has always helped us.
We have it all there in that copy book, and we do not have an end-
less number of sheets to go through. (Applause.)

PROPER BASIS FOR INTER-STATE RECOGNITION OF HEALTH
CERTIFICATES.

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

The above subject was assigned to me by the program committee
and recalls to our minds the continued variance of inter-state re-
quirements and health certificates.

The laws of the various states are yet so divergent and the various
official health certificates so different that we cannot condemn trans-
portation companies if our statutes are violated by them, nor can it be
expected agents of the railroads can interpret with accuracy the
requirements of states.

The foundation for recognition of health certificates must be such
as to render them easy of interpretation to the ordinary railroad agent,
who is the prime factor in leaving within our jurisdiction shipments
not properly examined or perhaps containing diseased animals.

It would appear, therefore, that the first basic principle is to es-
establish for transportation agents some ready means of identification
of certificates which on sight are recognized as official.

As a means to this end each certificate of health should bear the
endorsement of the authorities of the state from which shipment orig-
inates.

In order that recognition may still further be aided, it is suggested
that a publication be issued by this Association giving fac-simile
signatures of State Veterinarians, or a reproduction of the official
endorsement used by them on certificates of health.
For instance, Illinois would use a rubber stamp: "Live Stock Commission, O. E. Dyson, Veterinarian."

Missouri would use a stamp: "Board of Agriculture, D. F. Luckey, Veterinarian."

So each State Board or State Veterinarian could have some official stamp made to endorse certificates. Copies of these could be collected by the Secretary and published as they would appear on the certificates.

Railroad companies in each state could then be furnished with a copy of the State Veterinarian's endorsement, which they in turn could issue to their various local agents. For instance, all companies doing business in the State of Illinois would be furnished with a copy of the Illinois State Veterinarian's endorsement. This would then be sent out by the General Freight Agents to their local agents on a circular, to which could be added instructions to post same in a conspicuous place for reference and to accept no shipments of live stock unless certificate bears a fac-simile endorsement.

Bureau of Animal Industry certificates would be accepted without endorsement.

The fact that certificates bore the official endorsement of the State Veterinarian of Illinois would be sufficient warrant for agent to accept certificate without question as to whether or not inspection was in accordance with the regulations of the state to which shipment is destined.

It is needless for me to point out to you the saving of time to agents which would result from the instant acceptance or refusal of certificate offered with shipment.

Railroad agents have not the time and in many cases are unable to interpret requirements, nor are they always informed as to amendments. On the contrary, state veterinarians are usually the first to be notified of amendments, and inquiries covering state requirements are so numerous that most of us have the information in our minds, hence if certificates are sent to us for endorsement, which do not show the requirements of the state to which shipment is intended endorsement would be refused and veterinarian notified as to what is lacking. So railroads would be protected, and the possibilities of irregularities would be few, as compared at present.

THE CONTROL OF HOG CHOLERA BY SLAUGHTER METHODS.

By George Hilton, Ottawa, Canada.

Mr. President and Gentlemen:—

I have been honored by an invitation from your Secretary to read a paper at this meeting, and, as I am naturally very much interested in the sanitary control of live stock, I am very glad indeed to have this opportunity of meeting the members of this association. Dr. Torrance, our Veterinary Director General, kindly granted permission, and suggested that a paper on the Control of Hog Cholera by Slaughter methods might prove of interest to you.

This policy was inaugurated in Canada by Dr. Duncan McEachran more than twenty-six years ago, when preventive inoculation was unknown, and while it has naturally undergone certain changes, its more drastic provisions still prevail, it being found, in the opinion of the veterinary authorities in Canada, the best means of combating the sporadic outbreaks with which we are called upon to deal.
As you are quite familiar with this method of controlling infectious diseases, I will not take up the time of this meeting by going into too much detail in dealing with this subject.

A glance at the annual reports of this association indicates that the control of this disease is a very live issue in your country. You have evidently given the question careful consideration, and you have fully discussed the more modern methods of immunization.

Although opinions may differ with regard to the most suitable methods of control, and existing conditions may make method practicable or impracticable, it is generally admitted that the more drastic the measures, the greater the success in reducing the number of outbreaks, and that the disease increases and decreases according to the strictness or laxity of any regulations governing the movement of hogs in infected districts.

In dealing with such a highly infective malady it is essential to obtain the co-operation of those whose interests are concerned, as otherwise the very important secondary factors in the spread of the disease would seriously interfere with control work. It is a very difficult matter indeed to deal with outbreaks in districts where the natural immunity of hogs has been overcome by improper feeding and filthy insanitary surroundings. Individuals, who are content to raise hogs under these conditions, are themselves a grave source of danger, and require very careful attention.

All possible steps are, therefore, taken to enlighten the owners with regard to the nature of this disease. Copies of the regulations and Hog Cholera bulletins are freely distributed, and special care is taken to give clear and definite instructions.

The Canadian hog raisers, after years of education, are becoming accustomed to our methods, and the opposition which formerly existed is now seldom met with.

The necessary authority for adequate action in the enforcement of this policy is fully provided for by the Animal Contagious Diseases Act and the regulations made thereunder. Notification of suspected cases is made compulsory, and failure to report, punishable.

We have found, that in localities where the disease has been seen, outbreaks are reported promptly, as hog owners naturally prefer to realize all they can on their infected stock, and as they are familiar with our regulations, they fully appreciate that it is in their best interests to advise the Department directly they suspect the existence of this disease. They are generally very anxious to obtain the services of an inspector with the least possible delay, as they understand that compensation is not paid under any circumstances for hogs which succumb to the disease. Little difficulty is therefore experienced through owners concealing the disease and disseminating it by shipping hogs from infected farms.

In dealing with an outbreak, an endeavor is made to wall off the infected territory by prohibiting the movement of hogs from adjacent farms. The size of the restricted area naturally varies, according to the nature of the outbreak and the existing conditions.

The most serious outbreak with which we have had to deal occurred some years ago in Western Ontario. The conditions in the infected territory were exceedingly favorable to the propagation of the disease, and it was necessary to prohibit the movement of hogs in a very large area. As this action seriously interfered with trade conditions the shipment, under official supervision, of healthy hogs direct to abattoirs was permitted, and proper attention given to the cars in which they were conveyed.

139
A great deal of difficulty was experienced in controlling this outbreak, but this was finally accomplished, and the spread of contagion to outside points prevented. It has since been possible to suppress outbreaks by the formation of infected circles of comparatively small areas.

Premises on which this malady is suspected, as well as adjacent ones, are promptly quarantined, and measures taken to establish a diagnosis. Directly this is accomplished, all infected and contact hogs are slaughtered. The carcasses of the hogs, which have shown evidences of the disease, together with all debris, are cremated, and when this procedure is impracticable, they are covered with lime and deeply buried. The apparently healthy hogs are suitably slaughtered on the owner's premises, the carcasses carefully inspected and a license issued, permitting the removal for sale purposes of any which are considered wholesome. It is, however, not customary to remove the carcasses of hogs which have been in direct contact with those showing symptoms of the disease.

As soon as all carcasses and contact matter have been satisfactorily disposed of, the cleansing and disinfection of the premises is proceeded with; this is done under the supervision of the Veterinary Inspector in charge of the outbreak, and must be performed in a manner entirely satisfactory to him. Cheap, crudely constructed, insanitary hog houses are burned, while proper measures are taken to effectively disinfect the more modern structures. The yards, to which hogs have had access, are covered with lime and carefully ploughed under, and the trees in the orchards, or yards, and fences are also disinfected from the ground to a suitable height.

No hogs are permitted to be brought onto any farm until a period of three months has elapsed from the completion of disinfection. At the termination of this period, the inspector revisits the premises, makes a careful inspection, and if satisfied, forwards a recommendation for their release to the head office. Compensation is always withheld until this release is received and honored, and if the inspector's orders have not been carefully followed, it is forfeited. Compensation is also forfeited in cases where the owner persists in feeding raw garbage after due warning has been given.

This provision was found necessary owing to the frequency with which outbreaks of this disease occurred in swill fed hogs, where the origin of infection could not be traced to any other source.

A maximum valuation of fifty dollars is allowed for registered pure bred hogs, and fifteen dollars for grades, the values in each case being adjusted by the inspector, whose decision is final.

During the first few years this policy was in force, compensation was paid at the rate of one-third of the appraised value for diseased hogs, and three-fourths of the appraised value for healthy contacts. It was found, however, that this method of awarding compensation frequently resulted in friction, as it was often impossible to satisfy the owner that his hogs were actually diseased, unless the postmortem appearances were most pronounced. The necessary measures were, therefore, taken by Dr. Rutherford, to have the Act amended. This was done in 1904, and two-thirds of the appraised value has since been paid for all hogs destroyed, whether diseased or in contact, with the exception, of course, of carcasses which are considered suitable for food purposes.

This change has removed a great deal of friction which previously existed; has made the enforcement of the policy more practicable, and
has enabled the inspectors to gain the confidence of those interested
in the hog industry.

I have briefly outlined the procedure generally followed by our field
officers, but I would like to add that the strictest precautions are taken
to prevent the spread of contagion in any known manner. The usual
measures are, therefore, followed by the inspectors with regard to
their wearing apparel. Dogs on infected farms are chained, and steps
taken to prevent traffic over contaminated ground.

In addition to the measures already mentioned, it is, of course,
necessary to protect Canadian hogs from infection imported from
other countries. A quarantine of thirty days is imposed on all swine
imported from the United States, and these animals must be accom-
panied by a certificate of health from the district in which they origi-
nated. Inspectors are employed to superintend the disinfection of
stock cars entering the country, as also to enforce our regulation, that
transit hogs passing through Canada are shipped in cars specially
fitted with 10-inch footboards. Inspectors are also stationed at im-
portant interior traffic points throughout the country to insure the
proper cleansing and disinfection of all stock cars arriving, either from
your country or any part of Canada. This work is very closely su-
 pervised, and has been so arranged that stock cars are automatically
cleansed and disinfected upon arriving at our important centers. Any
cars which escape detention at any of these points are quickly caught
at some other point, where the inspectors are located, and properly
dealt with. Stock yards, chutes and other facilities required for han-
dling hogs are given close attention. Experience has also rendered it
necessary to prohibit the drenching with water of transit hogs while
in Canada.

The prompt effective destruction of the virus is, of course, the
keynote of the whole situation. This, as you know, is an exceedingly
difficult undertaking, owing to the strong resisting power of the or-
ganism outside of the animal body, and the uncertainty which exists
with regard to the many channels through which it may be carried.

The hog industry in Canada is receiving every consideration by the
Federal Government and Provincial Legislative bodies, as it has been
found that the rapid increase in our population, due largely to the
enormous development of our country, has resulted in the demand ex-
ceeding the supply. Our national production does not meet our require-
ments, and the price of these animals has consequently attained an
unprecedented figure.

All possible measures are, therefore, taken in our control work to
prevent reckless destruction. With this end in view all marketable
hogs in the vicinity of infected centers are slaughtered, and their
carcasses utilized while fit for food purposes. This procedure assists
materially in case an extension of the outbreak occurs, and also dimin-
ishes the loss to owners. We have found that an educational cam-
paign is invaluable, and that directly the hog owners realize that their
interests are being guarded, they are only too willing to follow the
advice of our officers. Little difficulty has, therefore, been experienced
in reducing to advantage the number of hogs in any district when it
is considered advisable to do so.

The number of live hogs in Canada, during the past seven years,
as shown by the Census returns, compiled on June 30th of each year,
totals 22,040,000. During this period we have destroyed, in the enforce-
ment of this policy, an approximate total of 17,950, diseased and in
contact, marketable hogs, for which we have paid in compensation
$107,260. We have, therefore, destroyed .081 per cent of the 22,040,000

141
hogs, or 81 per hundred thousand, and have paid an average price of $6.00 per hog. As, the maximum compensation paid for grade hogs is $10.00, the low average paid per hog, which includes the pure bred animals, for which $5.00 is allowed, indicates that the majority of the hogs destroyed were immature or of inferior type. If we figure the compensation paid on the total Census stock, we find it has cost .48 of a cent, or practically half a cent per hog, to protect our hog industry.

The hogs slaughtered yearly in the Dominion for food purposes must, however, not be overlooked. Our Meat Inspection Records show that 8,600,000 hogs have been slaughtered in Government inspected abattoirs in a period of five years and seven months. It is estimated, however, that this service only covers about 50 per cent of the hogs slaughtered, and it is, therefore, evident that there has been an approximate total of 17,000,000 slaughtered for food purposes in that period.

By extending this period to seven years we have an estimated total of 21,517,628 hogs slaughtered for food purposes. It will, however, be evident to you that a large percentage of these hogs could not have been included in the Census returns. If, therefore, we include 50 per cent of these animals in our figures, this policy will have cost the Canadian Government one-third of a cent per hog to control this disease.

I have not, of course, taken into consideration the expenditure incurred in the enforcement of this policy, as it is a common one, necessitated by the maintenance of an adequate veterinary sanitary force, essential to any country for the protection of live stock.

Our yearly returns naturally show considerable fluctuation; there are periods in which the disease breaks out suddenly in widely separated districts and becomes troublesome, and others when it seems to have almost disappeared.

There has been an increase in the number of outbreaks dealt with in the last few years. They, however, have occurred, with few exceptions, in districts where the disease had not previously been encountered.

Hog cholera broke out almost simultaneously in the vicinities of cities and towns in several provinces of the Dominion in 1911 and 1912, outbreaks occurring for the first time in Saskatchewan and Alberta. A very serious outbreak also occurred in Manitoba, in which province the disease had not been detected since 1889. A most searching investigation was made by experienced officers, who reported that these outbreaks were undoubtedly due to the feeding of raw garbage.

We have, with few exceptions, been able by energetic action, to confine outbreaks to the districts in which they originated, as, owing to compulsory notification, prompt attention is, as a rule, possible.

Although carcasses entering establishments under inspection, showing the slightest evidence of hog cholera, are condemned by the Federal Meat Inspectors, they have only detected this disease on four occasions during the last five and a half years.

By this means, the possible dissemination of the disease, through feeding pork scraps in garbage, is practically eliminated. As large quantities of the American product are imported into Canada, we are glad to note, in a recent ruling of your Bureau, that the same action will now be taken with regard to infected carcasses of hogs slaughtered in your Government inspected abattoirs.

The compulsory slaughter and compensation policy has not, by any means, been a simple undertaking. The public, as you know,
do not take kindly to drastic measures, and difficulties have, therefore, frequently arisen which have required diplomacy and tact. Under Dr. Rutherford's guidance, however, this policy has survived, and our experience has shown that it gives an excellent opportunity to effectively dispose of known contact matter, removes the possible carriers, lessens very materially the period of existence of the contagion, and, therefore, enables the conscientious inspector to render the best possible service in eradication.

The conditions in Canada have, fortunately, been suitable for the effective enforcement of these measures, as the outbreaks have not at any time assumed an epizootic aspect.

You will readily understand, however, that in order to retain full control of the situation throughout the Dominion, it is necessary to prevent the possible introduction of unauthorized methods of control. The importation, therefore, or manufacture, sale, or use, of hog cholera serum is prohibited. I can assure you, however, that while the circumstances, peculiar to our country, have necessitated this action, we are watching with a great deal of interest the results published from time to time by the many able and earnest hog cholera research workers in your country.

Dr. Torrance: I might say in further explanation of the action of the Canadian authorities in prohibiting the use of hog cholera serum and virus, that the information obtained by me from attending meetings, etc., convinced me that there was a certain amount of danger derived from the immunized hog. No one, apparently, is able to tell just how long the living virus survives in a hog that has been immunized by the simultaneous method. I asked the question of Dr. Dorset yesterday whether he considered they were perfectly safe, and although he apparently wished to convey the impression that they were entirely safe, yet he qualified his answer by saying that it depended on the care and skill with which the immunizing method was carried out. Subsequently in a paper information was given regarding the statistics from Germany, and it appeared there that German authorities considered that the immunized hog may become a possible carrier of infection.

In Canada, during the past summer, we had an outbreak in Saskatchewan, and tracing up as carefully as possible all the lines of infection which might possibly have occurred, we finally eliminated everything except two hogs which had been imported through one of our quarantine stations, had passed the thirty days' quarantine, had subsequently been taken to a farm in the infected area, and had given rise to this outbreak of hog cholera. It was reported that these hogs had been immunized by the simultaneous method, and it seemed reasonable to suppose that these hogs had conveyed either in them or on them the infection which subsequently caused this outbreak.

I am now seriously considering the advisability of requiring from all importers of hogs to Canada not only a health certificate but a certificate that the hogs which are proposed to be imported shall not have been immunized against hog cholera. I realize that by thirty
days' quarantine we are not protected against the virus which may be contained in the living body of a hog which is immunized. There may be an immune carrier of the disease that develops no symptoms while in quarantine, and yet when placed in contact with susceptible animals may give rise to an outbreak. I am just stating these as my personal views, from hearing the discussions with regard to hog cholera at these meetings, at the meetings of the A. V. M. A., and from reading the literature on the subject. I may be wrong, but in my position it is very important to block up every possible avenue by which the disease may attack our herds. (Applause).

Dr. Dorset: Mr. President, I have been very much interested in Dr. Hilton's paper. I think that he has indicated, without giving the exact statistics concerning the prevalence of hog cholera or otherwise in Canada, that in an area that is free from hog cholera it can be kept free by proper quarantine measures and restrictive processes such as slaughtering the diseased animals and immediate removal of the infected center. In fact I think that is a practice that is generally recognized in combating all infectious diseases. I thought that it might be of some interest to refer to an experiment that was undertaken by the Department of Agriculture in 1898, I think it was, when there was a special sum set aside, and in Page County, Iowa, the attempt was made to eradicate and control hog cholera by methods of slaughtering and disinfection. The work was begun at first by slaughtering only the diseased animals and the segregation of those that were well at the time the inspector first visited the farm. The methods of quarantine and disinfection of course were carried out at the same time. This was found unsatisfactory, and the area was found too large for the force of inspectors, so the work was limited then to one-half of Page County and all of the hogs in an infected herd were slaughtered, with some compensation to the owners—the exact amount I don't remember—but the process was quite similar, if not identical with that described by Dr. Hilton in use in Canada. The result of it was that the farmers opposed it vigorously. Our inspectors, when they visited the farm, were frequently met by the farmer and his wife, one with a shotgun and the other with a knife. It was found to be utterly impracticable. The disease was so widespread and it required the destruction of so many animals, there was such an interference with the industry when the animals were destroyed that it created a great deal of dissatisfaction and a great opposition on the part of the farmer. I feel that in this country the slaughter-out method would be entirely impossible.

I can understand, on the other hand, that the slaughter-out method in Canada, where there is no disease practically, might be quite effective. I have been interested in reading from time to time the reports of the British Board of Agriculture, which has for years been following in England the plan recommended and used in Canada by Dr. Tor-
rance. Judging from statistics published in British veterinary journals hog cholera, or swine fever, seems to prevail in England in just about the same amount as ever, in fact I have noticed for the last five years that it has been distinctly on the increase, possibly with the exception of the present year. That indicates to my mind that in a thickly populated country, where there are many avenues of communication, that the slaughter-out method is not satisfactory, and that this method is not ridding England of hog cholera.

I thought I would say just a word or two more with regard to immunization, so that I might make it perfectly clear in Dr. Torrance's mind concerning my opinion as to the danger from a hog that had been immunized. Of course I feel quite sure, and no doubt Dr. Torrance will agree with me, that there can be no danger of spreading a disease from a hog that has been inoculated with serum-alone; he should make—which he has not always done, apparently—a distinction between the two methods. There could be no possible danger of spreading the disease by the serum-alone. Furthermore in view of Dr. Torrance's statement that he is thinking of excluding serum treated hogs from Canada, I believe, that he should, if he takes such steps to protect the Canadian industry, also take steps to see that no immune hogs enter Canada. He is likely to have hogs that have passed through attacks of hog cholera offered for importation; certainly those hogs are just as dangerous as those that have received simultaneous inoculation, probably much more so, because they may have been actively diseased, which certainly does not occur in cases of simultaneously treated animals.

I want to make an inquiry of Dr. Hilton; I would be very much interested in knowing his methods of disinfection. He stated the method he used in destroying the carcasses, but he did not say what disinfectant he used, the strength, and exactly how it is applied on the infected farm. I would be very much interested in knowing that.

Dr. Hilton: The disinfectant we generally use is 2 per cent of carbolic acid and lime water. It depends on circumstances. If we cannot get the carbolic acid we use bichloride of mercury, and the disinfection is carried on with whatever facilities we happen to have on the individual premises. As a rule it is done with a spray pump over contaminated matter. In the hog sties all the woodwork is pulled down and burned with the hogs, and the floor of the sties scraped, and that is also done away with in the same manner. In cases where we have a sanitary stable, one that can be properly handled, whitewash is applied with a spray pump, and lime is spread over the ground six inches deep, and the hogs then kept out. In that connection I will say that in all our quarantine farms, after a period of three months quarantine, and after having used the methods I have described, when we put the hogs back on to them we find that we do not have a recurrence of the
disease. During the last seven years we have never had to re-quarantine the premises on which the disease has been dealt with in this manner. Whether it is the disinfection or the three months’ period—we don’t have a recurrence of the disease after the hogs have been brought on the farm.

Dr. Yard: In the San Luis Valley in Colorado, gentlemen, about $400,000 worth of hogs were lost in two years. The method used up there was similar to that described by Dr. Hilton. The serum treatment had been used. Before putting the well hogs on other premises, those premises were first disinfected and then the well hogs put on there. Thorough disinfection was carried on, and the veterinarians engaged in the work were deputized as sheriffs, so the minute they went on to a place they had absolute jurisdiction. This happened a year ago, and there has not been a case of hog cholera reported there since, except one shipped in. So I think thorough disinfection on the clean farms, with the absolute burning of hogs is probably the only way of destroying the source of the infection. That is at least what happened in the San Luis Valley, and there has not been a case of cholera reported there for a year.

Dr. Torrance: Just one more matter. Dr. Dorset suggested that if we were to require the exclusion of the immunized hog, artificially immunized hog, we should also require the exclusion of the naturally immune hog. I quite agree with him that the naturally immune hog may be a carrier of disease. At the same time I would point out that our present health certificate in Canada is such that we insist that hogs be not shipped in from any territory where there has been any hog cholera within a radius of five miles during the period of six months preceding the importation. That unless it is shown that there has been no hog cholera within a radius of five miles during the period of six months preceding the importation, the hogs from that territory may not come in. That should protect us against those natural immune hogs, but it does not protect us against the artificial.

Dr. Dorset: I don’t believe anything has been said here as to the disinfectant that we have used in connection with our control work, and I feel that I should say just a word, which is that we have been employing a 3 per cent solution of the compound solution of cresol, U. S. P. Our experiments have indicated that the carbolic acid is not an efficient disinfectant against hog cholera. I would be strongly inclined to believe, Dr. Hilton, that the failure of hogs to contract the disease on the premises after three months’ quarantine is due to the lapse of time rather than to the disinfectant, because we have kept hog cholera virus in contact with 2 per cent carbolic acid for six weeks or two months, and it will still kill pigs. We have found also that one to one thousand of bichloride of mercury, we mixed it with the blood—that possibly was an unfair test, because we know that albumen will
interfere with the action of bichloride—does not destroy the virus, whereas the compound solution of cresol is apparently very effective, and I am glad to see that our observations in this respect have been confirmed by Dr. Uhlenhuth in Germany, and I believe Dr. Schern said in his paper that they are using the solution of cresol as disinfectant in Germany.

NECESSARY REGULATIONS FOR INSPECTION AND DISINFECTION OF HORSES AND MULES FOR INTERSTATE SHIPMENT.

By Chas. E. Cotton, Minneapolis, Minnesota.

This subject was assigned to me by the program committee and the paper, I assure you, will of necessity be a very short one, as it is a subject on which we all agree as to the main features and disagree only in the measures to accomplish the same end, according to our different conditions.

In studying the requirements of the different states I find that twenty-one require no health certificates for horses, mules or asses; twenty-seven require a health certificate on all horses, mules and asses; five require a health certificate and a mallein test on all horses, mules and asses; two require a health certificate on all horses, mules and asses and a mallein test on all stallions and jacks; one requires a health certificate on all horses, mules and asses and a mallein test for all exposed animals; and one state requires a health certificate for all horses, mules and asses and a mallein test for all branded horses. One of the southern states prohibits the entrance of animals affected with strangles or influenza.

The first state to adopt regulations requiring the mallein test of imports of all horses, mules and asses was Montana. This was in 1906. North Dakota, Wisconsin, California, Iowa and Maine followed in their order.

The disease glanders is yet more or less prevalent in some of our states and larger cities and the advisability of a mallein test of all export cannot be denied.

A number of states in which the disease formerly existed to a large extent have within the past four or five years almost eradicated it. The enormous expense and the arduous nature of eradicating and controlling the disease, especially in the newer settled states like North Dakota, warrant strict measures against its further introduction and all importations of horses should be subjected to a rigid examination and to a mallein test. The states that compensate owners for glandered animals destroyed, become the dumping grounds for diseased animals from neighboring states where there is no compensation. Sanitary authorities have at all times sufficient troubles within their individual states without having fresh material for worry sent them.

The greatest danger lies with the emigrant stock, the horses used by contractors on railroad construction work and the range horses. The reputable horse dealers seldom offer glandered animals for export. Their buyers are usually men of experience, and precautions are taken against the purchase of suspicious animals. In our experience reactors are not found in the sale markets of the first class dealers. If any, the percentage is extremely small.
In the past two years 16,250 animals were mallein tested in Minnesota for export, with about seventeen reactors, a trifle more than one tenth of one per cent. These were animals offered for shipment by emigrants and contractors.

The enforcement of the mallein test for inter-state shipment has the effect of uncovering latent cases of the disease, thus directing the attention of the sanitary authorities to its presence and stimulating more active measures for its eradication. I recall an instance a few years ago of testing some so called "second hand horses" that an emigrant to North Dakota had purchased from some of our cheap dealers, and finding a reactor in an aged animal which showed no clinical symptoms. We traced her back to a small country town and from there to two different settlements where we found centers of infection and clinical cases. As the result we succeeded in finding and destroying some thirty animals affected with glanders.

The existence of dourine in some districts in our western states renders it necessary that before animals from these districts are offered for export, they be given the complement fixation test for this disease. The officials of the Bureau of Animal Industry are fully aware of this and are doing noble work in preventing any such movement and are examining all animals in these districts, compensating for and destroying them.

Regulations governing the movement of horses, mules and asses inter-state in the southern part of our country should also cover inspection and disinfection of animals for the Texas fever tick.

Some districts in our western states are still the harbors of mange or scabies in range horses, and regulations should require thorough and repeated dipping and disinfection of animals from these districts.

The regulation preventing the importation of animals affected with strangles or influenza, in my opinion, is impractical and one that in our part of the country at least, would practically do away with all importation of horses. Regulations should require that cars in which stock has been shipped to stock yard centers should be thoroughly cleaned and disinfected, and the stock yards and pens should be cleaned at regular intervals. This would do away with a great amount of our strangles and shipping fever cases.

I am personally of the opinion that Bureau of Animal Industry should and eventually will do the inspecting and mallein testing for inter-state shipment, especially for importation into those states that are undertaking to do something for themselves in the eradication of contagious diseases in their live stock.

Dr. Mattatall: I have not given the subject the thought that its importance demands, nor, if I gave it ever so much thought do I believe that I could suggest a solution under the conditions existing at the present time. I wish to call your attention to a few of the difficulties in handling the mule and horse business. The requirement of interstate inspection and testing of horses for glanders, and the examination for influenza is practically limited to small shipments of horses from one state directly to another. It would almost seem necessary at the present time to exclude those shipments to a large degree. In the first place, if the mallein tested horses, for instance, were going into a large market, the lot of horses is taken into that market, sold to a dealer and is divided up several times, and then within three
to four days the horses go to another point, and when you stop to consider that in a market like the National Stock Yards, for instance, they handle over 200,000 horses and mules in a year, you can see the difficulty in obtaining a health certificate which will go farther. It would not be practicable to re-administer the mallein test within a few days after it has been given; it has probably been given to the mules that originated in a certain Illinois town, or some other point, going to the market, within the past week or ten days, or sometimes three or four days. If it were possible and practicable to have a uniform health certificate and uniform regulations with regard to the administration of tests and the inspection of horses and mules, it might be possible for an inspector located at the market to issue a certificate of health based on the certificate received from the one where the shipment came from. This sometimes would not be possible—at the present time—as the transportation companies are not obliged to send those health certificates to destination. They are considered the property of the transportation company, and they are frequently placed on file by them, if not always.

Then again comes the question of the examination—the requirement made by a great many states of the examination of a certificate by the state authorities at the point of origin of a shipment. I believe myself that the better way is to indorse the man and not the certificate. If the health authorities at the point of origin would indorse the man, and know that the man is what he should be, and indorse him, I believe that it would be better than indorsing the certificate. And when that man produces a certificate and submits it for a shipment and the copy is sent to the proper officials at destination, those officials, if that certificate is not correct, should return the information to the point of origin, because when the man comes to market to make a purchase, when he buys the horses he wants them shipped out that night, or wants them shipped out the same day that the purchase is made. As soon as he makes the purchase the horses are his property, and he must pay the expenses for them, and the necessity of forwarding the certificate to the destination city, where the State Veterinarian or the Live Stock Sanitary Board or the officer of the state who has control of that work has to look over that certificate and sign it, requires three or four days, and the shipment is delayed that length of time. Moreover, it is a very easy matter, if the man is not honest, to make a certificate that would satisfy anyone in so far as the certificate is concerned. It is a very easy matter for that man to make a certificate if he knows what the supervising officer requires. I can hardly see that anything can get by the officer looking over that certificate if he really knows the man.

Dr. Davis: For two years Wyoming had a requirement that stallions and jacks should successfully pass the mallein test. That requirement was made because we were in hopes that we might get a better
examination, in order to detect any glanders that might be present in a shipment. At the same time we accepted all horses on a health certificate. That was in force for two years, and after consideration that part of the requirement was removed; we are now accepting horses in Wyoming on a health certificate. One reason for that change was owing to the fact that in Wyoming we have but eleven qualified veterinarians—probably about seven or eight are engaged in the practice of their profession—that are available for this interstate testing. If we required the test on our horses, our neighboring states would expect the same of us, and we are absolutely not in a position to furnish mallein tests on the class of horses that move interstate, as a rule, from Wyoming. The greater part of them are ranch horses, and unbroken, and if anyone of you have ever attempted to test with mallein a ranch horse you fully realize the proposition. I think it is a huge joke, and has been a huge joke, the testing of horses with mallein, that are absolutely unbroken. I refer to chute tests and chute inspections, and such tests as I know personally have been made by veterinarians, when the horses were afterwards passed and destined to states that required the mallein test. I was told afterwards and believed, that all the test in the world that they made, and all that was considered by them in the making of that test was the fee and the size of the swelling—and I don’t think that the swelling got large enough so that they eliminated any of the horses.

Now if we had more veterinarians perhaps Wyoming would make some more requirements in regard to the testing of animals before coming into our state. The handling of horses that originate in the state of Wyoming and in some of the other Western states that move east is in many ways a joke, so far as meeting the requirements of states to which they originally go. I know of one instance, which I learned of afterwards, where a shipper of ranch or Western horses, had his horses shipped around to Denver, Colo. They arrived at Cheyenne, Wyo., and the horses had to be mallein tested. They were unbroken and the owner did not want to submit these horses to a test. The horses would have been loaded at Cheyenne, and I suppose they would have attempted to test this bunch of horses. The owner changed his mind. He billed them to a state which did not require feed in transit en route. Now they never went to the original destination, but they gave them water at a place where they wanted to stop, and they were required to test with the mallein test, and they are there yet. Many of the shipments are diverted in that way in order to give the mallein test. The horses we find infected with glanders in Wyoming are freight outfits, stage outfits and railroad outfits.
OFFICIAL INSPECTION ON INTERSTATE CATTLE.


The State Live Stock Sanitary Board of Pennsylvania is charged with the enforcement of the laws pertaining to meat and milk hygiene, stallion registration, and the control of the transmissible disease of animals and is empowered to make necessary rules and regulations.**

The Board is composed of the Governor, Secretary of Agriculture, Dairy and Food Commissioner, and the State Veterinarian who is the Secretary and Executive Officer.

Permits are issued under certain conditions for the importation of cattle into the state, but one of the objects of the present law was to force examinations and tuberculin tests on dairy and breeding cattle before they are admitted into Pennsylvania. Valuable assistance has been furnished by inspectors in the Bureau of Animal Industry in examining and tuberculin testing cattle for shipment into Pennsylvania from Chicago, Cincinnati, Buffalo and a few other places. Complaint is occasionally made by shippers that Federal inspectors consume too much time in making a tuberculin test. The influence of their thorough and honest work has a good effect upon dealers, and makes it easier for local veterinarians to demand better facilities for examining and testing at destination. Let us hope that the Federal Government may sometime take charge of tuberculin testing cattle for interstate trade.

Our experience with officially certified veterinarians outside of Pennsylvania has, as a rule, been good so far as the Board is concerned. Shippers complain occasionally about what they consider excessive charges for service, and state that it is not possible in all cases to get veterinarians who are endorsed by the proper authorities to make the physical examination and tuberculin test. Purchasers are provided, upon application to the Harrisburg office, with a list of the certified men in or nearest to the place where the purchase is to be made. We have had considerable trouble with tests made by men who were not previously certified.

Every state has a percentage of licensed veterinarians who are not qualified to make a tuberculin test. Some of them do not know how, some are careless, others dishonest, and the purchaser does not become aware of these facts until he is held up by an official and subjected to necessary expense and embarrassment. Some dealers do not make a reasonable effort to find a good man to do the work; others appear to prefer a disreputable person to make the test and it is unfortunate that such men can be found. Dishonest veterinarians and disreputable dealers are like counterfeit money. They exist, but they are the exception—not the rule—and there are so many that can be trusted that one does not seem justified in doing business with those who are disreputable.

State officials do not know positively in all cases, that certain men cannot be trusted to examine interstate cattle, and while they would not employ them or place their names on their private certified lists, they would not care to blacklist them in other states. The names of those who are known to be dishonest should be published. The American Veterinary Medical Association has adopted a resolution to expel from membership any member if it can be shown that he has willfully done dishonest work in tuberculin or mallein testing. If it is not contrary to the Constitution, such an offense should be sufficient reason for

**Laws, rules and regulations will be furnished upon application.
revoking a practitioner's license. Veterinarians, dealers and others should not hesitate to expose those who do dishonest work, and furnish the one having charge of the transmissible diseases of animals with such information. There are about 850 men licensed to practice veterinary medicine in Pennsylvania. The majority of this number are honest and can be depended upon to comply with the requirements of the law.

Transportation companies are in a position to cooperate with our Board by instructing their agents to notify us of cattle consignments which are not accompanied by tuberculin test chart or a permit. In many cases local agents are not familiar with the numerous requirements of the various States and occasionally illegal shipments are made. While transportation companies are amendable to our law, we have but few reasons to believe that they have willingly or knowingly violated it. Better results may be expected when the laws and regulations and their purposes are understood by the transportation companies.

Valuable assistance may be rendered by cooperation of the various States, especially in reference to tuberculous cattle, as the federal law forbids the inter-state movement of such animals. Pennsylvania law requires all sales of tuberculin and all tuberculin tests to be reported to the State Veterinarian within one week. It also requires veterinarians to report animals which are physically affected with tuberculosis. Cattle condemned by either physical examination or tuberculin test may be appraised and slaughtered, or placed under quarantine, from which they can not be removed except by permit. Buyers have found it to their advantage to purchase cattle from those who make a reasonable and intelligent effort to eliminate tuberculosis from their herds. States are in the same position as private buyers and should take a positive stand in reference to preventing and controlling tuberculosis within their borders.

It is extremely important that some State official should have charge of tuberculin testing, and every test should be reported to him. This is apparently the only method for breaking up the custom, in some places, of testing and retesting until eventually a satisfactory test is obtained and the animal allowed to go into the market as tuberculosis free. Those cases are most dangerous forms of tuberculosis. Notwithstanding all reasonable precautions that may be taken, such animals may subsequently find their way into healthy herds and cause extensive losses.

Pennsylvania will accept an examination and test when properly made by an agent of the Bureau of Animal Industry, or by an officially certified veterinarian in nearly all States. He can use any tuberculin that is endorsed by the Bureau of Animal Industry, or this State will furnish free of charge upon application, the regulations for applying the test, tuberculin and identification tags. We urge, but cannot compel veterinarians outside of Pennsylvania to send duplicate copy of the full report to their local authorities. The reacting animals are not always reported to our Board, yet instructions are furnished to do so when tests are being arranged.

When cattle are tested in Pennsylvania to go to other States the report of each animal tested must be sent to the Harrisburg office within one week from the time of the test. Pennsylvania pays a liberal indemnity, under certain conditions, for all native cattle destroyed to prevent the spread of tuberculosis. Before such indemnity can be paid the owner must sign a contract in which he obligates himself to do certain things. In a numbers of cases the requirements of
the contract were not fulfilled by the owner of the cattle and the Board found it necessary to bring prosecution for its enforcement. A case was brought in the Court of Common Pleas of Montgomery County, Pennsylvania, in March, 1913, as a test. The form of contract and the decision of the Court is submitted as an appendix.

We do not pay for animals that are tested to go into another State when such animals fail to pass the test, unless the original owner of such animals will comply fully with the conditions as set forth in the contract. The owner or dealer can get a permit to have such animals killed under federal or state inspection, and is entitled only to the amount he can get for the carcass, hide, offal, etc. If not destroyed, all reacting cattle are held in quarantine.

The law in reference to handling interstate cattle in Pennsylvania has been tested in the Courts and sustained. The following case has been tried and a conviction obtained:

Commonwealth vs. Kramlich.

Mr. H. C. Kramlich, a resident Pennsylvania cattle dealer, was arrested upon the charge of violating the Pennsylvania law regulating the importation of dairy and breeding cattle. This law required cattle of these classes to be inspected and tested with tuberculin before importation. In lieu of this, the shipper was required to obtain a permit from the State Live Stock Sanitary Board to ship the cattle in quarantine, to destination, and to remain in quarantine until having passed a satisfactory tuberculin test.

The defendant was charged with having made two illegal shipments, consisting of three carloads, at different times.

The arrest warrant was drawn to cover three criminal charges, each carload being regarded as a separate and distinct violation.

The defendant waived the Magistrate’s hearing and carried the case to the Northampton County Court, where it was cited for trial on May, 15, 1913. The Grand Jury returned a true bill on all three charges. The three cases were tried concurrently before Judge Stewart and a jury in the Criminal Court, the jury returning a verdict of “guilty” on all three charges, and the Court imposed a penalty of $100 and costs.

The evidence presented by the prosecution was indisputable and incontrovertible. The defendant admitted the actual shipments, but sought to show that the majority of the animals were intended to be used as feeding and slaughter cattle and that only a few were of dairy and breeding types. He claimed his intention was to ship only feeding or butcher cattle but that he had to include a few dairy cattle in order to fill out his consignment. He attempted to prove his intention to comply with the law by introducing the evidence of a veterinarian whom he had instructed previous to shipment, to procure five or six doses of tuberculin so as to be ready to test any dairy cattle which might be included with the shipment. This evidence may have applied on one of the charges, but evidence was introduced to show that the defendant had contracted in advance, to procure dairy animals for a farmer, and that dairy animals had been purchased in New York State and delivered on this contract, to the farmer in Pennsylvania, said animals having been brought into Pennsylvania without test or permit, and were not subsequently tested until having been quarantined by the Board and the tuberculin test enforced.

In his address to the Jury the Court stated that, while the defendant may have shown his good intention by ordering the tuberculin in advance, this was not in compliance with the law, which required that the
cattle must be accompanied either by a certificate of health or a permit.
The Court also stated that if such a case as this had been brought 26
years ago, the defendant's attorney would probably have attacked the
constitutionality of the law, and, in his opinion, would have been sus-
tained by any Court; but we must recognize that we are living in a pro-
gressive age and that such laws as would have been regarded as con-
fiscatory and unconstitutional at that time, are now recognized as being
necessary for the protection of commercial interests and general public
welfare. It was formerly held that a man had the privilege to do as he
pleased with his own property, but we now recognize the necessity
for municipal, state and federal regulations of even our most personal
belongings, and cited the compulsory education law to show that a
man's right in governing his own children is subject to legislative
control.

We regarded this case as being of unusual interest, as it proved
our constitutional right to enact and enforce such requirements.

This prosecution was brought under the old law which was good
in many respects, but unfortunately it had a weak point which seriously
interfered with its application. Under the old law feeding cattle and
those for immediate slaughter were exempted from regulation. The
defendant in this case, and many other dealers as well, would bring
in dairy and breeding cattle under the guise of feeders, and sell them
as such. In bringing prosecution, it was necessary to prove that the
cattle were sold and used for dairy and breeding purposes. Dealers
have brought in fresh cows with calves at their sides, in violation of
the law, and, when cornered would declare them to be feeding or
slaughter animals, and in order to avoid prosecution, would accord-
ingly have them slaughtered. It is believed that the present law will
cover such cases.

The Board experiences difficulty in enforcing the interstate law in
border counties, where cattle are driven over the state line. It is
practically impossible to establish the identity of cattle after they are
driven into the State. The best results have been obtained by posting
notices along the principal roads in the border counties, and printing
the law and the regulation of the Board in local newspapers. A
more efficient system could be adopted by providing police protection,
but this plan is too expensive for practical purposes.

So far the only tuberculin test officially recognized on interstate
cattle is the subcutaneous test. We have received inquiries in reference
to accepting the intradermal test, but have had no such test offered.
Considerable work has been done with the intradermal test in an ex-
perimental way. The results have been good in animals that have been
injected with the precipitated tuberculin and not previously tested by
the subcutaneous method. We are satisfied that it is unreliable where
ordinary or retest tuberculin has been used up to a certain time before.

In interstate work the subject of retesting is often considered, and
in some cases it may be advisable. In testing individual herds lesions
of tuberculosis are found in about 98 per cent of the animals that
react. By following the same method of procedure on condemning
interstate cattle, lesions would probably be found in not more than 75
per cent of the cases condemned. Temperatures are irregular and
unsatisfactory in most instances. For these reasons considerable re-
testing has been done on interstate cattle during the past year. Special
retest tuberculin, which is five times the strength of ordinary tuber-
culin, is used for this purpose and is applied within one week from the
time of the original test.

We believe that better results will be obtained when the retest
is made in not later than one week after the original test. After this
time the tissues are apparently not sensitive to tuberculin for about two months, and one is quite liable to fail to get a reaction in a tuberculous animal retested during this interval. In Pittsburgh and Lancaster we have tested nearly 14,000 head of cattle since the last week in July, 1913. Most of the animals condemned have been retested and slaughtered under inspection. A number of animals have failed to pass the original test but have passed a satisfactory retest. In almost every case such animals have failed to show lesions after a careful post mortem had been made. In a number of cases well marked reactions have been obtained on the retest, where the original test was negative. Lesions were demonstrated in practically all these cases post mortem.

The ocular tuberculin test has been used on several hundred head during the past year. The results are better than those obtained with intradermal tuberculin. Two droppings are made in the same eye, about one week apart. A special dry form of tuberculin in normal saline solution is used. The first dropping is 4 per cent, the second 8 per cent tuberculin, and the dose in each dropping is from two to four drops. The first dropping is made to sensitize the eye, and a definite reaction may occur in from 8 to 16 hours. The second dropping is much more likely to produce a reaction, and the reaction appears sooner than on the first. Reactions to the 8 per cent tuberculin may disappear as soon after the dropping as the sixth hour.

We have found lesions in all cases where a positive ocular or intradermal reaction has occurred. Well marked cases of tuberculosis have been observed in animals that did not react to either test when applied subsequent to a subcutaneous test. We consider a reaction to the ocular or intradermal tests sufficient evidence of tuberculosis to condemn an animal, but would not feel justified in all cases, to accept animals that pass either or both of these tests. Next to the subcutaneous test, we consider the ocular test the safest and surest. Those who do much testing should be provided with means for making the subcutaneous, ocular and intradermal test.

APPENDIX.

IN THE COURT OF COMMON PLEAS OF MONTGOMERY COUNTY, PENNSYLVANIA.

COMMONWEALTH OF PENNSYLVANIA vs. David Davis and Jacob Lampert
trading under the firm name of Davis & Lampert.

TRIAL BEFORE THE COURT WITHOUT A JURY, BY AGREEMENT OF THE PARTIES FILED OF RECORD.

BY THE COURT—This action was brought to recover back the money paid to the defendants by the Commonwealth. The State Live Stock Sanitary Board, at the request of the defendants, applied the tuberlin test to their cattle, under a contract which required certain acts or conditions to be observed on the part of the defendants. The said Board contends that the defendants failed to carry out their part of the agreement, and that there was a failure of consideration, whereby the State has the right to a return of the money paid to the defendants for the destruction or slaughter of the cattle infected and suffering from tuberculosis.
FINDINGS OF FACTS.

1. The defendants conducted a dairy farm and supplied milk to a tuberculosis sanitarium and also shipped some of the milk to Philadelphia. There were twenty-four milch cows in the herd.

2. On October 27, 1910, they made application to the State Livestock Sanitary Board for an inspection of their cattle and for the tuberculin test. The application was made on a formal contract prepared by the said board. It reads as follows:

"To the State Livestock Sanitary Board, Harrisburg, Pa.

"Gentlemen—I have reason to believe that some of my cattle are afflicted with tuberculosis, and I wish to have my entire herd inspected and tested with tuberculin if such a test is deemed necessary by your representative, and the diseased animals disposed of in accordance with the rules and regulations of the State Livestock Sanitary Board. I understand that this inspection and test are to be made at the expense of the Commonwealth and, in consideration thereof, I agree to thoroughly disinfect the premises and correct faulty sanitary conditions and thereafter to observe the precautions and measures and employ the means recommended by your board to prevent the re-introduction and redevelopment of tuberculosis in my herd. In particular, I agree to purchase no cows for addition to my herd until they have been proven, by tuberculin test, to be free from tuberculosis, and if 20 per cent of my present herd shall be found to be tubercular, I will have a retest made under the supervision of your board at my expense within eight months of the time of the state inspection.

"I certify that to the best of my knowledge and belief, none of the dairy cows or cattle for breeding purposes, in my herd, have been brought from another state into Pennsylvania since January 1, 1898, without having been subjected to inspection and tuberculin test, as required by law. Yours respectfully, (Signed)

"DAVIS & LAMPERT."

"217 East Main Street, Norristown, Pa."

3. The application or contract was accepted by the said board, and on December 29th and 30th, 1910, the inspection and test were made by Dr. E. P. Althouse, a veterinarian and representative of the State.

4. The cattle at the inspection were found in three stables. The first contained fourteen cows and heifers, and of these six cows reacted on the tuberculin test. They were condemned and quarantined. The second stable contained ten cows and heifers, and one cow reacted to the test, and was likewise condemned and quarantined. The third stable contained two cows and one steer. The test showed that the two cows were in an advanced state of tuberculosis, and, with the consent of the owners, were killed at once.

5. Tags were placed in the ears of the seven quarantined cows. Under the State quarantine the product of these cows could not be used and the animals could not be allowed to come in contact with the other members of the herd. Upon being slaughtered, it might be found that the meat was not infected, but still fit for human consumption. The defendants found, that under the quarantine, the cows were of no profit to them, and, on the 11th day of January, 1911, pursuant to their request, they were killed and inspected. Their meat was marketable, although certain parts of the animals, not used for food, gave clear evidence of the existence of tuberculosis.

6. Upon an adjustment with the State, after due appraisement, there was paid to the defendants the sum of $194.54 to compensate...
them, in part at least, for their loss of the nine cows. The payment was received without any complaint or objection to the adjustment or to the test.

7. The State also paid the expense of the tuberculin test, which amounted to $26.76.

8. On April 21, 1911, the State Veterinarian wrote to the defendants asking them whether they were ready for the second test provided for in their contract with the State. Request was made in this letter for the name of the person selected by the defendants to make the test. The necessary supplies for the test were tendered in the letter. No reply was made to this communication.

On September 19, 1911, the State Veterinarian asked for an answer to his letter of April 21, 1911. No reply was made.

On October 23, 1911, the defendants were asked to reply to the communication in regard to the eight months' test. Again there was no reply.

On November 3, 1911, attention was called to the three unanswered letters. The eight months' limit for the tuberculin retest expired on August 30, 1911. It is admitted that the three letters were received by the defendants.

9. On November 7, 1911, an answer was made to the State, signed by Davis & Lampert. The defendants claim they did not write the letter, but admit that they authorized one of their clerks to make the reply. The answer read as follows:

"Received your letter of 3 instant, we kindly leave you know that we have sold our cows all off and are not shipping any more milk; we only have two cows for our own use. Yours respt.,

"DAVIS & LAMPERT."

10. To this communication the State Veterinarian replied by requesting the information, whether the two cattle, still on the premises, belonged to the original herd. On November 11, 1911, an answer was made to this request, signed Davis & Lampert. The letter reads:

"As you will see in my former letter that we have sold all of the dairy, we have two cows for our own use, and before we have any more trouble we will sell them immediately. It will be useless to inspect them, as they will be sold in a few days. We had bother and trouble enough, therefore we sold them off. Yours respectfully,

"DAVIS & LAMPERT."

This letter was also written by the same clerk who was authorized by the defendants to make a reply.

11. On November 19, 1911, Dr. Althouse, the veterinarian who made the original test, called on the defendant, David Davis, at Norris-town and asked him in regard to the retesting. Mr. Davis replied that "he had sold the herd and discontinued the dairy business and that it was not necessary to do any retesting."

12. The same day Dr. Althouse went to the defendant's farm and there found fourteen dairy cows. He was not able to identify them as the same cows he inspected and tested on December 30, 1910. His record was very meagre and he admits that it is difficult to identify cattle after a year unless they are tagged. His record runs as follows: "Dark Brown," "Brown and White," "Red," "Black," "Roan," "Red Heifer," "Holstein Heifer" and so on.

13. The defendants both declare, under oath, that there were seventeen cattle on the premises when Dr. Althouse visited the farm on November 18th, and that they were all in the herd examined on December 30, 1910.
We find as a fact that the fourteen cows observed, viewed and inspected by Dr. Althouse on November 18th were the same, or at least some of the same, he tested on December 30, 1910.

14. The defendants swear that they did not tell the clerk to write to the State Veterinarian that they had sold off their dairy cows.

Mr. Davis, we find, as a fact, made the same statement to Dr. Althouse on November 18, 1911.

We are satisfied, and so find, that the letters were written by the clerk as directed by the defendants. The misstatements were made to prevent a second test. The defendants' evidence shows that they did not wish to run the risk, or incur the expense, of the retest provided in their contract. The letters of the clerk are in entire accord with the verbal statement made by Dr. Althouse, by the defendant, Davis.

15. Dr. Althouse, upon examining the fourteen cows, on November 18, 1911, found that six were milch cows and were being milked, and that the remaining eight were forward springers. He palpated them and found that they were so near giving birth to calves that the meat of the cows would not be fit for butchering.

16. The defendants, that they were out of the dairy business, and kept these fourteen or seventeen cows to fatten for the shambles, is not sustained by the evidence. They sent their milk to Philadelphia and were unable to fix any date when the shipping ended. The defendant, Lampert, admits that they shipped milk while the cows were paying, and it was also shown that a number of the cows had calved after the original test was made, some of them several months after the said test. It follows that the dairy business continued, at least up to the expiration of the eight months test limit, and we so find as a fact. This finding is confirmed and in part based upon the fact that the cows were not fattened, although eleven months had nearly expired since the original test, and the cows, or at least eight of them, were served by a bull. The claim that this service must have taken place by the bulls of neighbors breaking down the fences is not sustained. There is no evidence of any such occurrence, and the number of cows that were found to be springers is too great to be explained by any such unobserved fence breaches or unobserved accidental meetings of the cows with a strange bull.

The defendants also differ materially in their evidence, when they decided to go out of the dairy business. Mr. Lampert fixes the date in April or May of 1911, and Mr. Davis claims that it was on January 11, 1911, the day the seven infected cows were killed.

17. The evidence of the defendant, Davis, also discloses that he bought springers and put them on the farm in 1911 and kept them there for several months. He says the number was not more than about five, "because cattle went too high. We could not afford to buy any more." This evidence shows that they were purchased as an addition to their herd. Some of them may have been on the farm when Dr. Althouse visited the premises in November, 1911, but this is not material, for under the inspection and test contract no cattle were to be added to the herd until they had been proven by the tuberculin test to be free from tuberculosis. No such tests were made before the five cows were added to the herd.
18. On November 26, 1911, the barn of the defendants was destroyed by fire, and all the cattle on the premises perished in the conflagration.

19. Where cattle in the same stable are tested with tuberculin and some are found infected with tuberculosis and others do not react to the test at the time, it is generally found that, under a subsequent test, made from three to six months after the original test, that some of the cattle that pass the first test will react on the second. The infection from contact with the tubercular cattle has had time to develop sufficiently to respond to the tuberculin. The importance of the second test within the eight months is manifest if the owner would check the "reintroduction and redevelopment of tuberculosis in his herd."

20. The defendants violated their contract with the State in two material matters—First, they continued in the dairy business and breeding cattle for at least eight months after the original test, with the same cows, or some of them, that were tested on December 30, 1910, without having a retest made as provided in their contract and at their expense. Secondly, they added other cattle to their herd without first subjecting them to the tuberculin test, as they had agreed to do under their said contract.

CONCLUSIONS OF THE LAW.

1. The main object or purpose in making the tuberculin test, at the expense of the Commonwealth, is to stamp out tuberculosis or to check the spread of the disease where an infected herd is found, by requiring the owner of the cattle to observe the precautions directed by the State and the State Livestock Sanitary Board. The State is interested in the public rather than in the individual owner, except that it is interested in an infected individual herd as a menace to other cattle.

2. The agreement between the state and the defendants was an entire contract, and the failure on the part of the defendants to observe or perform a substantial act or condition which induced the State to make the payment, constitutes a breach of contract and a failure of consideration on the part of the defendants.

3. The failure to have the balance of the herd which was separated from the infected cattle reinspected, at the expense of the defendant, within eight months from the original test, was a breach of a substantial part of the contract by the defendants, so long as said residue of cows or any part thereof, was used for dairy or breeding purposes during said period of eight months, as disclosed in our finding of facts.

4. The addition of milk cows or springers to the said remaining herd, without having the so added cows tested with tuberculin to determine whether they were free from tuberculosis, was also a breach of a substantial part of the said contract made with the State.

5. As the defendants are guilty of a breach of the contract and failed to give the consideration on their part, stipulated in the agreement, and failed to observe the conditions which were to be the consideration for the money paid to them, they are not entitled to retain the money, but must return the same to the State.

6. The Commonwealth is entitled to a verdict against the defendants for $221.30, with interest from August 30, 1911, and cost of suit.
ARGUMENT IN SUPPORT OF OUR FINDINGS AND CONCLUSIONS OF LAW.

Our findings of facts refer to the evidence upon which they are based.

That the defendants retained on their farm seventeen of the nineteen cattle that passed the test on December 30, 1910, and that they were still on the farm on November 18, 1911, is the positive testimony of both defendants. They kept them on a farm for over ten months without a retest, although frequently requested by the State authorities to have the same made.

That they were kept for dairy use and breeding purposes is self evident from the testimony. Some of them had calves after the original test, and the defendants admit that they kept them for milking so long as there was any profit. They could not say when they stopped shipping the milk away, but continued so long as the cows were paying (page 51). Four or five had calves after the original test, some as late as four months after the original inspection. They milked these cows that came into profit four months after the test. Surely the milking of these cows would pay as late as August 30, 1911. Mr. Lampert testified that they made up their minds not to keep a dairy any longer, and that this conclusion was reached in April or May, 1911. "After we decided not to buy any more cows for dairy purposes we shipped some milk from the same cows to Philadelphia." When this shipping stopped is not definitely fixed, except that it continued as long as the milking of the cows paid.

But the proof that the defendants kept these original cows for dairy and breeding purposes is shown by the testimony of Dr. Althouse, who found six milking cows and eight forward springers. The cows were not kept to fatten for the shambles, for the evidence is conclusive that they were not fit to be killed, that their meat would not be fit for human food, because they were so near to the time of giving birth to calves. If they were to be fattened for the butcher why would the owners have them served by the bull and thus destroy their value for beef cattle? If they were to be fattened for killing, why did they retain them for nearly eleven months without disposing of them? Mr. Davis admits that eleven months is ample to prepare cows for the butcher (page 57). That they intended to sell these cows as milch cows is evidenced by their condition, even if the defendants intended to give up the dairy business eventually. To send these cows out among the farmers, when the probabilities were strong that some were tubercular because of their contact with the infected cows that were killed in December and January was a serious wrong to the State in its efforts to check tuberculosis. The retest provided for in the contract was intended to avoid this danger from infection in the community.

But the strongest proof that the defendants were violating their contract was the studied effort to deceive the State authorities as to the true condition of affairs on the farm. The letters and the declarations of Mr. Davis to the State Veterinarian show that there was an attempt to keep the veterinarian from the premises by assuring him that the defendants had sold the cows. If they believed, as they say, that the second test was not necessary, as they were fattening their cattle and if they in fact and in truth were fattening them for the butcher, why all this prevarication? Whether the cattle were to be reinspected under the provisions of the contract, even if they were kept for fattening and not for dairy use or breeding purposes, we need not
decide, under our finding that the defendants in fact continued to keep a dairy with their remaining cows and also use them for breeding up to the time when the limit for the retest expired.

That the defendants also violated their contract by purchasing milk cows—springers—and by placing them on the farm for three or four months is shown by the admission of the defendant, Davis, "We would buy springers and put them on the farm. We left them for some months and then would sell them." There were at least five springers so placed on the farm during the year 1911.

True there is no direct evidence that they were not tested with tuberculin. But we do not see how the State could be called upon to prove the negative. When and from whom the cows were purchased was not shown and we do not see how the State authorities could gain the information without going to the defendants themselves. The testimony of the defendants is of such a character that an effort to obtain the true facts might not be very successful. The defendants purchased the springers and admit that they placed them on the farm and that it was an easy matter for them to show that they complied with their contract. They had the privilege to add other cattle, but upon the condition that a specific act should be done on their part. The State showed that the defendants availed themselves of this privilege, and we think it follows that the defendants should show that they complied with the conditions. "Where for any reason the evidence to prove a fact is chiefly and not entirely within the control of the adverse party, it has been held that the burden of proof is on the party who knows or has special opportunity for knowing the fact." (Cyc, vol. 16, page 937.)

The defendant, Lampert, denied that any of the cattle purchased in 1911 were placed on the farm. Our finding against the witness, Lampert, and in accordance with the evidence of the defendant, Davis, that they were so placed, left the subject with sufficient circumstantial evidence of the probable existence of the negative fact and called on the defendants for an answer. But, if we are in error on this point the failure to make the retest within eight months is alone sufficient to show a substantial breach of the contract.

That the retesting within the eight months was a material condition of the contract, is self-evident, under the testimony. Experience showed that where twenty per cent of a herd react to the tuberculin, it is usual to find in several months after the test that other members of the herd which pass the first test had tuberculosis in its incipient stage from their contact with the infected cattle. In the time specified the condition develops so that there is a reaction under the subsequent test.

The separation, under the original test, is of little value to the State if some members of the remaining herd are still contaminated by the disease. There is little progress in such case in stamping out tuberculosis and the menace to other cattle continues. The defendants agreed to employ all the means recommended by the board to prevent the reintroduction and redevelopment of tuberculosis. One of the means suggested was the second test at the expense of the defendants. If the infection is not checked there is no gain to the State. The gain is all with the defendants who received compensation for the nine cows destroyed, but gave no consideration to the State. The same is true, even if the first separation is effectual, if the defendants are allowed to add to their herd new cattle infected with the disease.

But it is needless to discuss the subject any further, for it is a self-
evident proposition that unless the defendants keep their part of the contract the efforts and expenditure of the State are all in vain. That the cows were destroyed by fire is not material. The case must be judged as of the time when the conditions were to be observed. They were violated before the fire occurred. To what extent the infection may have been transmitted to the cows that were added to the herd and then resold for dairy or breeding purposes no one can tell.

Can the Commonwealth recover the money paid for the cows that were killed and the money expended for the test?

We do not see how this controversy differs from the ordinary case, where one of the parties to a contract fails to keep his agreement or fails to give the consideration stipulated in the writing. Where there is a breach of contract the injured party is entitled to the damages sustained. In this case it is not possible to estimate or to determine the actual damages that flow from the breach. It follows that the damages must be assessed by ascertaining the amount of money actually expended by the State, for which it received no return. The same conclusion follows, if we treat the case as one of failure, on the part of the defendants, to give or pay the consideration named in the contract. They cannot retain the fruits of the contract unless they make good the consideration stipulated on their part. The contract was entire, although the defendants were required to render distinct items of performance on their part. There was no apportionment of the money paid by the State for any item of performance by the defendant. When a contract is entire it must be performed or rescinded as a whole. The defendants cannot affirm the contract, so far as they were to receive compensation, and rescind or revoke the conditions they were to perform. (Semple vs. Cleveland & Pittsburg R. R. Co. 172 Pa. 369.)

The parties have agreed that the plaintiff shall file an amended statement, as of the day of the hearing or trial, so that the said statement shall properly raise the issues of law and of fact submitted to the court under the evidence.

And now, August 7th, A. D., 1913, the foregoing facts and conclusions of law are filed in the office of the Prothonotary, who will give notice forthwith of such filing to the parties or their attorneys. If no exceptions are filed within thirty days after the service of such notice judgment will be entered by the Prothonotary on said findings and conclusions, to-wit: Judgment in favor of the plaintiff and against the defendants for the sum of two hundred and twenty-one dollars and thirty-one hundredth dollars, with interest from August 30, 1911, and costs of suit. If exceptions are filed within said period of thirty days they will be proceeded with as required by law.

By the Court,

(Signed) AARON S. SWARTZ, P. J.
THE MOST SUCCESSFUL METHODS OF TICK ERADICATION.

By J. A. Kiernan, Birmingham, Alabama.

The most successful methods of tick eradication are those which will accomplish the desired results, in the shortest time, and at the least expense. Seven years ago when active work began, the most successful methods were to change pastures and to grease cattle regularly every two weeks. It was found at that time, that the owners could not be relied upon to apply the grease rag method adequately.

Considerable territory was thus freed of ticks but we doubted very seriously if the tick could have been ultimately exterminated by these methods. You will understand, that in the northern areas quarantined, infection didn't extend to every herd. Some counties were but slightly infested with here and there a ticky herd, consisting of from one to forty cows. The original map outlining the area infected with disease, as shown in the first Annual Report of the Bureau of Animal Industry, included only about seven counties in Tennessee, whereas, on a more thorough investigation, it became necessary to include about fifty counties under quarantine. The further south we move the greater percentage of infested herds we find. The best method of tick eradication now is the arsenical solution in the dipping vat. No longer is it necessary to travel around a 100 acre pasture in search of the quarantined cow, which has by thrift and industry satiated herself with delicious blue grass or succulent lespedea and has sought the restful confines of the shaded sequestered nook, neath the outstanding branches of a giant of the forest.

Today, in any territory in Tennessee, Alabama, or Mississippi, in which tick eradication is being prosecuted, the owner of cattle brings them to the nearest dipping vat on the appointed day, regularly every two weeks, and plunges them into the arsenical solution. After a few times he doesn't even need to prod them, to get 'em to go through, merely opens the gate, as they have experienced the benefits of the refreshing bath, and take to it with eagerness and apparent delight.

When we first started this work it was not only difficult to get anything done, but it was somewhat difficult to exist in the territory long enough to make an effort. The reason was not the inhospitality of the people, but the obnoxious disinfectants that we carried, which in the course of our work, saturated the clothes and gave forth unpleasant aromas to the stranger. It became necessary in many instances after our sojourn over night at a farm house to hang the mattresses on the back porch for good sunning. I agree with the people now, who objected to having their cattle oiled, for it was a dirty process, but it was the most successful method then known.

Cooperation of the farmers, the state and government officials is the keynote to the successful methods employed at this time.

We believe that our form of cooperation is as complete as could be expected. We would not deceive anybody by permitting the impression to get abroad that we are now progressing without difficulties. On the other hand, we freely confess, we have more troubles now than ever before, because we are doing a greater amount of business. The millenium has not arrived, and our work is of too great importance to wait for it.

We do not get every farmer in every county that we go in to cooperate with us, no more than they succeed in getting every farmer to join cooperative egg marketing associations in Ireland, where the most unique and perfect cooperative societies in the world exist. We know
when work is started in a county, that we are going to have trouble, just as my wife and I know that we are going to have increased trouble every time the Almighty presents us with a new boy. But the work we have set out to do, is so much greater than the opposition that can ever arise from an individual, or any unit of people, that we see no insurmountable obstacles. We must march on to victory, with banners unfurled to the breezes, trusting in the principles that we know are right, and performing each day the same practices that have proven time and time again to be efficacious.

When we go to a meeting of the County Commissioners to introduce tick eradication, our argument is, "Give us a chance to interest the people and if you are not satisfied with the results, stop the work which hasn't cost you very much and surely won't hurt politically." We ask them for some cement—30 sacks—and a little money to buy arsenic. Then, we go to the people and say "Friends, we want to help you make more money on the farm by eradicating the tick, it will give you a better beef or milk cow. With an increased revenue from that cow, you will find it possible and advantageous to raise more cows on your farm, for your soil needs the application of manure. You have farmed it for cotton or corn for years. You haven't put back any vegetable matter, and it is deficient in that. True, you do use commercial fertilizer each year to raise cotton or corn, but the soil is so free from vegetable matter, that each rain washes most of the fertilizer out of it. Friends, there is money in eradicating the tick. Your neighboring county has succeeded in this work; it is now in the free area and the people can ship their cattle at any time of the year, to any place in America, for any purpose, and they are getting at least seven dollars per head more for every animal than you can get. What is your neighbor doing over in the next county? Is he satisfied with that scrub bull, and that unprofitable cow that is eating her head off? No. He has joined the county live stock association, which owns a pure bred bull. In his county they have brought in, in the course of a year, seventy-five pure bred bulls, and in a few years in place of shipping cattle with an average value of $15 per head, that farmer friend of yours will have three times as many cattle, worth at least twice as much as they are today. Instead of being a year in debt for having been supplied with meats to feed himself and members of his family and tenants, to grow the cotton crop that he owes to the merchant every year, he is now raising good cattle and hogs and sheep, and a little cotton and corn and other crops. He has a silo, money in the bank and a bath tub in his house, and there is a school close by, where all his children and his neighbors' children attend. Let us help you in your farming operations. You, Bill Jones and all the other neighbors come up to the cross roads in the morning at 7 o'clock and we will dig a hole and put in a dipping vat. You dip your cows a few times, and see what effect it has on them. If you are not satisfied, take a sledge hammer and break up the vat. If you are satisfied with it, tell the commissioners about it, and we will all get to work and eradicate the ticks next year."

This story or something like it, is repeated in every county. We run on to commissioners who want to buy the cement, and lumber, and nails, and want to furnish the labor and everything else, as an experiment, so the people won't think that they are going to be asked to spend any money. We turn a deaf ear to all such propositions, because our slogan is "Cooperation with the farmer as the basis of the union."

This argument was presented to a Board of Supervisors, three of which were opposed to eradicating the tick, because the people didn't
I want it, and when we said, "Put in a few vats and give the people the opportunity of determining for themselves whether they want it or not," they said, "That is a fair proposition and we will start it." That, was in Hinds County, Mississippi, the location of the Capital of the state. Twenty-five vats were arranged for, five for each Supervisor's district. In less than six months there were 135 vats established and in a year the county was free of ticks and released from quarantine. If we waited for all the people of a county to get ready to invite us to come in, we would be creating sinecures for our children, if they have the good fortune to be in live stock sanitary work.

Tick eradication is a good deal like selling hams or lightning rods. We have got to promote it. We have got to get the will of the people, we have something they need. We have to get off the railroads and go along the cow paths into the "sticks" as the "boys" call them. If we are going to make a success of our work we have to take the most ignorant, non-progressive, "don't believe" farmer that exists in that county, and make him do precisely the same thing the most progressive farmer of that county does. That is why there are a good many surprises at the time of election. Some people get along the main thoroughfares, up and down the railroads, and everybody they meet is in favor of this or that measure; but, when election day comes, the multitude who have not expressed their opinions, march silently from their hamlets, and vote the same as they have been thinking for years.

Tick eradication has reached the fellows way back in the woods pretty successfully, as you must conclude from what has been accomplished.

Three years ago we didn't have a dipping vat in Mississippi; today, in the counties in which work is in progress, there are 3,000. Not built by Uncle Sam or the state or the county; but by the toilers of the land. Built of concrete, sand and gravel; cement sand and broken rock; cinders, sand and cement; brick bats, sand and cement; slag, sand and cement; or anything else that will make the combination.

It is mighty pretty to plan to eradicate the tick, or plan a campaign for eradicating tuberculosis, or plan to build a Panama Canal, or a trip to the north or south pole. This latter attraction has fascinated the minds of men for centuries, and has driven many to shroudless sarcophagi of impenetrable mountains of ice, and others through starving pangs of hunger and remorse, through the fantastical imaginations of madness, out into the broadening plains, to the snow drift bed, thence into eternity. To complete 100 or 150 concrete dipping vats in a county where the people are beseeching the authorities not to increase taxes, is a great big work.

The writer has no exalted illusions of being responsible for what has been accomplished. We do steadfastly maintain that good progress is being made. The people are responsible for what is being accomplished; and to attain the desired end it is essential that men of brains, will power, determination and good fellowship be placed in counties to wisely guide the work. So to the men on the ground, in the field, who have completed these 4,000 vats, organized these communities of farmers, to improve their conditions, I give credit for the manly efforts they are putting forth.

The most successful methods of eradicating the tick are those that will treat every man alike, asking favors from none and bestowing concessions upon none. Without laws and adequate regulations it would be a serious waste of time and money, to attempt to exterminate the tick. There are thousands of people who, when tick eradication is introduced into a county or into a state, do not believe it feasible or
practical. Some say they do not believe because it is contrary to the
laws of nature, using as an argument, that all creatures were created
for a purpose and that it is a violation to attempt to remove them;
others close their eyes, shake their heads and say it cannot be done,
without giving any reason; while there is a third class of prophetic
seers, who usually explain their doctrines from the top of a flour barrel
or a potato sack, and who declare that tick eradication is uncon-
stitutional; for it interferes with the personal rights of the owners
of the cattle and the tick. Now a large majority of the people are God-
fearing and law abiding. Preserve us from that state of civilization
when men do not believe in the observance of all laws. So we are well
established in a county when the local officials take up the work,
because a majority of the people do what we want, as the state laws
say, "Do it." The class of people that give the greatest apprehension
are those smooth, oily fellows, who pat you on the back and say it is
a good thing, and then at night move ticky cattle, spreading infection
to clean places. These fellows are always looking for permits to move cattle contrary to established
customs, and if given an inch, will take nineteen miles. We can
handle the fellows who fight out in the open. The fellows who
dynamited our vats (and we had about 30 of them destroyed this year)
can be caught, indicted, punished or restrained from further depreda-
tion. But the movers of ticky cattle; either on permit or without, are
the bane of our lives.

It took about four years to convince some people in Tennessee,
that when the regulations said that cattle could not run at large, that
they could not do it. At one time in a single county, forty-two people
were indicted for violating the regulations and they appealed to the
Supreme Court. The Supreme Court said, "It is manifest that a rule
which went no further than to prohibit cattle which were already known
to be afflicted with communicable or infectious disease from running
at large would be comparatively valueless in the way of preventing
the spread of such diseases." That was in the case of George Bishop
vs. State, rendered April 2, 1910, and since that date there have been
comparatively few prosecutions and no appeals.

The Tennessee laws governing live stock sanitary work are enforced
in all instances. Under these laws, it is possible to eradicate all the
contagious and infectious disease of live stock, and I believe it will be
done. It has been done as far as the tick is concerned, for it has been
eradicated from fifty-one counties, from the entire quarantined area
of the state. The Volunteer State is now entirely released from
quarantine with the exception of a small strip of Marion County which
is recommended at this meeting to be released.

The most successful methods of eradicating the tick from Tennessee
have been in enforcing the regulations and the laws, applied either to
the dirty grease rag, the spraying of cattle, the changing of pastures or
to the twentieth century method—the dipping vat.

Last year we got down to a condition where it was hard to do
very much work in Tennessee. All the counties that were willing to
work had finished. There was a group of counties that would not
work or would not allow anybody else to do it. Now they had been
in that frame of mind for several years and got away with it, but
that was before they had a State Veterinarian. When they told George
White that they wouldn't do it he told them he reckoned they had
it to do. We looked up every one of their shipping points. He pro-
hibited cattle from running on the open range or moving from one
county to another. He conferred with the Circuit Court judges and
asked them to explain the law to the people, which they did. They told the people if they violated the law they would be fined and put in jail. In consequence, they changed their minds, and said, "Yes, we will eradicate the tick," and in sixty days after, he told them what they had to do, and in a little more than a year from the time they actually got busy, they were clean and released from quarantine. Did that stir up enemies in that county for the State Veterinarian? On the contrary, it made everlasting friends for him. They are all friends of him and his Department, because they now know that what he coerced them in to doing, was what they needed more than anything else.

Please let it be understood that when certain states are spoken of specifically, it is because the speaker is in immediate touch with conditions in them and knows only in a cursory way of the conditions that obtain in Southern California, Georgia, Arkansas and the other states in which our co-workers are engaged. As a general proposition, the same conditions apply throughout the territory in which this work is in progress. I'll ask you to bear with me just a while longer until I recite some of the interesting points of the work, in the state of Mississippi.

That magnificent commonwealth has the proud distinction of having sent more sons to the United States Senate, than any other state in this Union. The keenness for information, displayed by its people, their progressiveness in every line of activity is apparent to every person who comes into it. No state has had the reverses in the past five years, as has Mississippi. Cotton remained King indisputably since the organization of the state, but an unconquerable foe has dealt unmercifully with the cotton planters. In some instances, the annual production of the counties was reduced 95 per cent by the Cotton Boll Weevil. If that devastation were only for one year, while it would produce great hardships, it could be survived, but the Boll Weevil once it has invaded a country remains there, and renders the old methods of cotton production absolutely unprofitable. Deprived of their annual revenues, the working class of people naturally left these counties and sought occupation elsewhere. The large land owners and the smaller farmers stuck to their posts, perhaps because they could not leave, but undaunted by disaster and disappointment, they buckled on their fighting clothes to make the best of the conditions. They took inventory of their stock, and found that they had vast areas that would grow corn and grass, and potatoes, and oats and mostly anything, but the staple crop they had learned to grow from boyhood. Now the natural inclination of the good farmer is to raise live stock, and thus those people launched forth in that line of work. They soon found that cattle and ticks were incompatible, and they accepted the statement, that the ticks could be eradicated and proceeded with the work.

In 1908, the Legislature of Mississippi passed a law creating the Live Stock Sanitary Board, and furnished that Board with $5,000 to carry on cooperative tick eradication work two years. The work has been continually carried on since that time. Of the 47,000 square miles comprising the state, 30,000 square miles have been freed of infection, and, with this season's work will be released from quarantine. This year's work is somewhat a repetition of last year's work. We did a little better this year, as you will understand from the following statistics.

From January 1, 1913 to October 31, 1913, in the state of Mississippi, there were 339,217 herds of cattle dipped in arsenical solution. The total number of cattle was 2,680,836. This dipping was done in 3,000 vats at an expense to the state and counties of $117,751.16, and to the
Bureau of $53,474.45, or in the proportion of more than $2.00 by the state and counties for every dollar spent by the government. Now the average number of inspectors maintained by the state and counties, was 179 and for the Bureau 32. The average cost to the state, counties and Bureau combined, of locating infested herds, inspecting, supervising the dipping, etc., was 6.3 cents per head for the entire season.

In addition to the counties in which active eradication work was conducted, we supervised the construction of vats in almost every county in the state.

I cannot refrain at this opportunity from telling you of the earnestness of these people and how vats were built in a piney woods county in southern Mississippi last winter. It was necessary at times to haul cement 20 miles from the nearest railroad station. At that season of the year, the public roads were almost impassable, but these people promised to build vats, and they sent three teams to the railroad to bring back ten sacks of cement each. When the pulling was too hard for one team, two and sometimes three were hitched to one wagon, and eventually the arduous task was accomplished, and the material was deposited at the site of the pit for the vat. There the stalwart men of the forest congregated with picks and spades and soon built a swimming pool for their cows. Jasper County, one of the poorest in the state, built 88 vats, and dipped on an average 26,090 cattle every month, and that is where they blew up 10 dipping vats. Ali were quickly replaced however, and the miserable anarchists were apprehended, and are now under indictment in the federal court. Pardon me for going into the details of this work, but to me the human side of the work is the most important. It would not be half so interesting if the powerful nations sent an army to clean up the ticks. The fact that within a few short years the people could be educated to that degree that they will lay down their other work to dip their cows because the state and government tells them it is a good thing, is evidence of a pretty high degree of civilization.

It is impossible to tell you one side of the history of the work in Mississippi, without relating the other. The Sanitary Board in its wisdom, promulgates and issues regulations to be observed, respected, and enforced by due process of law when it becomes necessary. This year it became necessary 190 times to institute prosecutions. In 118 instances, convictions were obtained. There were 72 acquittals, 23 suspensions of sentences, 7 compromises. 17 cases now pending, 14 appealed and one pardoned. In all, there were fines imposed to the amount of $6,237.50. In some counties, an attorney is paid by the Board of Supervisors to prosecute offenders of the law. In some instances the political personage refused or failed to be interested in quarantine enforcement; upon notice of which, the Secretary of the Live Stock Sanitary Board, Prof. Archibald Simth, authorized the employment of the best legal talent in the community to institute proceedings. To the credit of that Board be it said, that whenever it puts forth regulations they are concise, easy of interpretation, and meant to be observed by the rich and poor alike. The Governor of the state is a member of the Sanitary Board, but when he desired to move a cow from a quarantine county into the Capital, he learned that it could not be permitted under the regulations, so he purchased nearer home.

This year at one of the fairs, a number of exhibitors of southern cattle desired to ship them to the State Fair at Jackson. They were promptly informed by the Sanitary Board that no such arrangement could be made. In consequence, they went to their County Board, demanded to know why they should be quarantined against the world,
and were informed that the county would engage in eradicating the tick in 1914. We anticipate no unusual difficulties in completing the work in Mississippi. The next three or four years should surely place the entire state in the free area, providing the means are furnished.

Alabama has succeeded only in getting one county released from quarantine, and a part of another has been recommended for release this year. It is unfortunate that more has not been accomplished. There are better prospects now than at any previous time, and we expect that within the next two years, with a campaign of education, a wholesome sentiment will be created.

I have a few figures showing what has been accomplished in our territory in the way of co-operation, which I think is one of the most important features of the work. In Alabama from January 1, 1913, to October 31, 1913, there were 37,195 herds of cattle dipped, with a total number of 315,481 in 268 dipping vats. The counties and state spent $13,000 in this work and the bureau $9,772.38. There were twenty-five county inspectors, four state inspectors and eight Government inspectors. The average cost per head of dipping the cattle during the entire year was six and nine-tenths cents. The figures for Mississippi I have related. In Tennessee there were 114,768 herds, with a total of 506,991 cattle dipped in 319 dipping vats. The counties and state spent $26,000, the bureau $12,999. The counties employed sixty-five inspectors, the state nine inspectors and the bureau ten inspectors. The cost of eradication was seven and seven-tenths per head. The totals for the states of Alabama, Mississippi and Tennessee this year were: 491,180 herds, 3,403,308 cattle and 4,000 dipping vats; a total expense to the counties and states of $160,000 and to the bureau of $76,000. Total number of county and state inspectors employed was 282 and 50 bureau inspectors and the average cost of eradicating the tick in that territory was six and nine-tenths cents per head. (Applause.)

Dr. Flower: The Live Stock Sanitary Board of Louisiana created in 1908 carried on the work which had been started under the auspices of what was known as the State Crop Pest Commission. Up to that time we had not had any Live Stock Sanitary Board. Unfortunately the work was begun in a very small way, and with compulsory and drastic methods, which from the very first antagonized to a very great extent the people. We have realized since the inception of the Sanitary Live Stock Board and the enforcement of our necessary regulations, that in order to get universal co-operation in this work it is necessary to do in the first place a great deal of educational work. In other words, to institute a campaign of universal interest by visitations, by practical demonstrations and by the issuance of publications pertaining to tick eradication and the great and untold advantages resulting therefrom. We find by doing this, of course, that the people themselves in these counties having an interest in the work financially will co-operate in every respect and leave no stone unturned to further the development and perpetuation of this work. We have in Louisiana one county released from quarantine, and in all probability during the first of 1914 will have another county released. Tick eradication in a voluntary way is being carried on in at least five parishes, or five counties in our state to-day. In the parish of the capital, East
Baton Rouge parish, there are at least sixty-five vats owned by individuals who turn them over to the public. These vats are being used constantly, and have been used for the last year or two years. Cattle have been dipped there regularly, and there are numerous sections in that county that are free from ticks today. We have in contemplation four counties to begin this work in next year. That is about as far as our funds will permit us to go at this time.

Unfortunately, as Dr. Kierman has stated, we are in the same position as our sister state of Mississippi. The devastation of the boll weevil has demoralized to a great extent the agricultural interests of our state, and this has been followed by very disastrous overflows from the Mississippi River. This latter catastrophe has proved a God-send in certain respects in the last two years. One parish, especially the parish of Madison in the northeastern part of the state was threatened with great loss when the danger of an inundation, a complete inundation, became imminent in 1912, which actually happened a few weeks later, the entire parish being completely overflowed, with one or two exceptions. After the recession of the flood waters the natural advantage of this became apparent, the destruction to a great extent of the cattle tick in that parish by the overflowing of these lands was brought to the attention of the officials, and they readily saw these advantages, appropriated a sufficient amount of money to begin the work, with the result that one year later the entire county was released from Federal quarantine.

Now there is no question but that this harmful parasite must go. He is doomed to oblivion, and it is recognized generally in our own state—and I predict without fear of contradiction—that in the next five to eight years our whole state will be released from quarantine. That is the spirit that is being manifested now by the whole state. There never was a movement in which such enthusiasm is being manifested. The counties are ready, and have evinced their desire to appropriate a sufficient amount of money to begin co-operative tick eradication work in conjunction with the Louisiana State Live Stock Sanitary Board and the Bureau. (Applause.)

Dr. Cary: Mr. Chairman, eradication work in Alabama has been backward for one or two reasons, the first reason is lack of funds. I hold that you cannot eradicate any disease without having funds to do it primarily. There are probably just four elements that go into the work of eradicating any domestic animals' disease, money, men, law and education. And we lack the primary thing. It doesn't matter how much you have of the others, you can do it in a way, but you can't do it completely. We have another unfortunate feature to contend with, in that we do not have a meeting of our Legislature but once every four years; that militates against us to a certain extent. We have sentiment ripe enough to get money, but we haven't a chance to
get it, so we must wait. Owing to the fact that the state could not furnish sufficient funds we could not demand more work from the Government, consequently we are in that condition that we are ready, but we have not the funds. However, much work has been done in the way of education, and a great many vats have been built in nearly all the counties. Individual work has been done sufficient to guarantee that when we are ready with the funds the work will go forward with rapid strides. No doubt we will do as efficient and rapid work as any other state has done as soon as we get the money. (Applause.)

Dr. Gow: At the present time in Arkansas we have cleaned up practically all the counties that voted to be in the District. When I first started in Arkansas in 1909 I rode around and visited as many farms as I could, and we would maybe come up to a farm and find a cow outside and we would examine it and if we found ticks on it we would go around and tell the owner that he should clean the cow up and keep it clean and free from ticks. We cleaned up a few herds in that manner, but it was not until we started with the concrete dipping tank that we had any success. In Newton County there was no railroad, it was too rough for any railroad to be built, and the cattle were scattered on a broad range, but in eighteen months we got the county above the free line by using the concrete dipping vat. In 1912 we started in Boone County. The work had been done there under the old system of spray pump and using the oil, and people got disgusted, but after staying out for a while they voted it in the District. We started working there in 1912, and the first of November this year the county went free, simply by using the concrete dipping vat. At the present time we expect to have several counties come in when the next Legislature meets in 1914. We are now carrying on educational work by helping in tick eradication work in various counties which lie adjoining the counties already free, and I hope to be able to report in the next two years that we will have at least twenty counties working in tick eradication in the state of Arkansas.

Dr. Dalrymple: We feel encouraged in Louisiana by the progress that has been made recently, in the last year or two years, and we find the sentiment is that other counties want to get into line. It is a very good sentiment. We are trying to make the most of having got one of our counties out, by giving that as much publicity as possible. It is an object lesson, the benefit that that county is receiving by being able to get their cattle to the open markets at any time they want to. They are beginning to realize that tick eradication does not simply mean getting ticks off the animal, but it means cleaning the ticks from the entire section and opening the markets of the world to them when they are ready to ship. That is the thing, and in talking along those lines I try to impress upon our people that the important thing in tick eradication is to open the markets of our country and the world to our
cattle, whenever we are ready to ship. I believe that if we had been
a tick-free section of the country and had been able to ship our animals
to the great markets of the North, that we would not have had such
a shortage of meat at this particular time. I think there is no question
but that this is one of the great causes of the shortage of our meat sup-
ply, the South being prohibited from competing in the great markets
in the North, for while the West and the sections that are free are
permitted to send in all the cattle they can raise, the South are pro-
hibited from competing in the open market. When we change that
condition, and the South is on a level with all other sections of the
country things will improve very much. It is resulting in a great
many fine cattle being taken down there. You gentlemen who were
down at the Stock Yards and saw those cattle from Jackson, Miss.,
could see what can be done, what can be raised in Mississippi. Those
cattle of Mr. Davis, Herefords, I think took first prize, bulls, and he
had some young stock there that took second and third prize, and so
on. And it is just an object lesson to show what can be done if we
could eradicate the tick.

Some years ago the Louisiana station bought in Illinois a carload
of grade Angus calves from four to eight months old. That was be-
fore the days of tick eradication proper, and we had to immunize them
against the fever. We shipped those cattle from Baton Rouge, sixteen
head, averaging something like 1,325 pounds, and they came to Chi-
cago and topped the market by 40 cents that day, that carload of
cattle. That gives an idea of what may be done under tick-free con-
ditions and with intelligent feeding. We have all sorts of valuable
forage, we have silos and cotton seed mills, and we can raise meat very
cheaply in the Southern states.

I would like to correct an impression that Dr. Flower perhaps left
about the overflow. The whole state of Louisiana is not subject to
overflows, it is just a certain section of it on the western side of the
river. You know there is an impression which prevails in other parts
of the country amongst people that have not been there that Louisiana
is full of alligators and swamps and yellow fever and malaria. I have
been there twenty-five years, and I have never had a serious day's sick-
ness since I came there. We have highlands, but the overflow section
is merely that which is contiguous to the river. But we did take ad-
vantage of the overflow that Dr. Flower referred to, we suggested to
the people that they take advantage of the overflow and dip the refugee
cattle before they would go back, and in that way when the cattle
would come back they would be free from ticks, and we would have
practically a tick free county, or tick free cattle, and it would, per-
haps, save years of work by the ordinary method. They took cog-
nizance of our suggestion, and went to work and the result is that
since the 1912 overflow that county is the first to be released from
quarantine for two years, so we felt very much encouraged in the
work. We have not got along as fast as Mississippi, for instance—the
appropriation has been small—but I think there is no doubt that
through the cattle owners themselves seeing the benefit of this, through
interesting them and through them the members of the Legislature, and
showing the members of the Legislature the advantages to be gained
we will get large increases in appropriation from time to time as we
go along. Like the Mississippi Legislature, ours meets only at certain
periods; ours meets every two years, and of course we have to wait for
the two years to pass until the next session before we can get our ap-
propriation.

Dr. Ramsay: Mr. President and gentlemen: It is somewhat in-
teresting for me to sit here and listen to the reports from different
states. As I stated yesterday I have been connected with the eradi-
cation of diseases by the Bureau for a number of years. I sometimes
hear such questions as this made: “Well, now, aren’t the people of the
South different from the people of the North that you have been asso-
ciated with in the eradication of cattle scabies and sheep scabies?” I
want to say that they are not. I find that human nature is human
nature in all the states, whether it is East, West, North or South. We
find that when the Federal quarantine is put on a certain number
of states or a certain area, that the very same human nature is mani-
fested in that locality as anywhere else. In the first place there is
generally a period of surprise and indignation expressed in the state
or in the area that the United States Government should take up such
a small piece of work as killing a few insects that create the disease,
whether it be scab mites, tick or anything else. We had the same thing
in the foot and mouth disease. They are all surprised to think that the
United States Government should think it necessary to spend govern-
ment money, as they say, money that we pay into the United States
treasury, to go around here and eradicate ticks and hiring men to do
it. Now that is about the first stage we go through in every state. We
have the same thing occur wherever we go. Then we have the
next period coming after that. We get a period of half-hearted co-
operation from the state officials, and from a few of the more intelli-
gent and enlightened live stock men, the men who are in the live stock
business. Now we continue along for a little while, they may get dis-
couraged in a little while, and they kind of quit, they try to get ap-
propriations, and, as Dr. Dalrymple says, they are all the time asking
for a little additional appropriation, but they don’t get it, or if they do
get it it is so small and so insignificant that those who are in favor of
tick eradication, in the first place, or the eliminating of the disease,
whatever it is, become discouraged. And about this time we will find
we have a period then of discouragement, and practically a stopping
of the work. There is a pause in the work. Those who were en-
thusiastic at first become discouraged, because they are held back so much, and the other people are not ready. We come to that stage. We are all glad to come to that stage. It is just like a doctor looking at a patient: Now we have got to have a higher fever, we have such and such an operation to go through and such and such a condition to meet, and after that the patient will begin to recover. Now, sitting in Washington we know perfectly well that one of those things must follow the other as we go along. Now the next symptom that comes up will be the period when the transportation companies, the bankers and the business men of the country become alarmed as to the conditions that exist in that country. They say, "Here, there is not going to be any income, there is no business, the people are not complying with the law, they are not eradicating this disease. The result is that their live stock is not permitted to move interstate. They are not getting their returns, and we are not getting the business, and not getting the revenue that we ought to get from this business." Now we find in nearly every state, East, West, North and South, that as soon as we get the transportation companies, the bankers and the business men interested in these things they get busy. There are Commercial Clubs and there are District Organizations, and there are different manufacturing and commercial enterprises that start in and organize this work and co-operate with the Government and push the state men a little, and then we get some activity, and there is the period that we are glad to see reached. Whenever we reach that period we know that there is going to be something doing. Now you can sit here this morning and listen to the statements of these various states, and everyone can pick out the stages that those states are in. I know when they are in the first stage and when they are in the second stage or in the third stage, I know where they are by that means. I can tell what stage they are in at the present time there in the South; they are going at it now and have a few of the good stockmen who are co-operating, but now they have got to go through another stage yet, and then another stage before they get where the business men are going to take part in it.

Just as an example, we have had a period of lull in the Carolinas, both North and South Carolina, in the past two or three years. They got into a discouraged condition, they didn't believe it was possible to do very much. Now, in South Carolina the Chambers of Commerce have organized all through that state and are engaged in doing good work along this line. The bankers have got petitions in their banks, and when a man comes in they ask him to sign that petition to get an appropriation of $40,000 a year to carry on the work of eradicating the ticks. Now there is going to be something doing in South Carolina. Just wait. I am going to stand here next year and tell you about it. Now we have got to a good stage here.
In North Carolina we have got to a similar stage. Dr. Nighbert, who represents North Carolina, is not here. Why? About two weeks ago there were some business men came up to Washington and presented the case to Dr. Melvin, and they said: "Now, the period is right here when something can be done, and the crisis is here, we want some help, we want some educational help, and we want it right now. There are certain things that are to come up before the legislature meets, and we want some assistance, we want some enthusiasm put into these people," and the result is that Dr. Nighbert and Dr. Owen, two of our state men, are out there with stereopticon machines and slides, telling the people all about this, and they had expected to get through in time for this meeting, but we got a telegram at Washington before this meeting, in which they said that so much enthusiasm was shown and so much interest that they did not think it wise to go away at this time. They are going to spend two weeks more in North Carolina. Now that state has reached a good stage. We are satisfied when we see them arrive at this stage. We know that when they come to this stage it is like a man who is coming out of a spell of typhoid fever, when he comes out of it the first thing he thinks of is every good thing that he ever had to eat, and he wants them all at once. Now we know that that condition will subside, but we don't care, we have got it that far, and we know that the other stages will follow.

Now, I think it is the duty of this Association to try and give every assistance possible. I want to say that the general impression all over the country is in favor of eradicating ticks from the south and turning that great southern country either into a beef-producing country or into a country for preparing animals for beef. And I am free to say that just as soon as we release a county from quarantine we get inquiries at Washington that day: "Can I go to Mississippi or Tennessee—or whatever it is—and buy cattle?" Last year when they took that county out of quarantine down in Alabama, Madison County, that order took effect the first of April, and the people down there knew it, and they were holding cattle there ready to ship out that day as free cattle, and the railroads didn't know it, and they wired in to Washington to find out whether the law was in effect, and why it was that they did not require a certificate. You see, they had knowledge of the conditions down there and knew what had happened even before the railroads. Now, that shows that the people are interested, and that they are utilizing every opportunity that is given them. They don't have to wait for business, the people are right there ready to do business. If the people of the south eradicate the tick there will be a market. Capital will push down there, build packing houses and build stock yards, and they will have a market right there. A man down in South Carolina not long ago said to me:
"What is the use of all this, we haven't got a market; we will have to ship our cattle to the market anyhow." Now, I want to say the market is right there. You produce the stuff, let the people produce the stuff and there will be ample market right there, and capital will be there ready to take care of that interest. We will leave that to the other fellows, I don't believe it is our mission to try to fidget around and arrange for all these different things; leave that to the other fellows, they will take care of that.

Now, as has been stated, there is a great deal of educational work that should be done. Some of the states have fallen into a period of lethargy, and there should be educational work done to convince them of the value of this work and awaken them to take an interest in it. And I think that if we can get good speakers, if we can get men of different classes to go down there and talk to these people throughout these different states it will be the finest thing in the world. We are trying to arrange everything we possibly can in the way of educational work, both on forage growing and on the raising of cattle, and I think that an expression from this Association to the Secretary of Agriculture, or to the Agricultural Appropriation Committee of Congress would have a very good effect.

The Department of Agriculture is making somewhat of a new departure this year, they are not asking Congress for an increase of money to eradicate ticks. We find that the way the states are working, a lot of them cannot accept an appropriation, they have not got the machinery themselves, they are in these stages yet where they are not ready, and we have got to wait till they get out of that stage, and we are perfectly willing to wait, for we know perfectly well they will come out, it is a cinch they have got to come out, 't is just a question of time until they will come to the point where we can work to the fullest extent with them.

But, in the meantime, as Dr. Kiernan, and as the gentleman from Arkansas have told you, they have been holding meetings, they have been telling these people what a glorious and fine thing this thing of cattle raising is; telling them all about it, and urging them to go into the cattle industry, to go into the live stock industry, how they can do better by that here than they can by raising cotton. Now, the people have been eradicating ticks over large areas—200,000 square miles—and lots of them are sitting back and saying: "What about all this live stock business, what about it? You say there is going to be-this great, fine future. What about this future?" Now, this year the Secretary of Agriculture is asking Congress for $50,000 to help develop the cattle industry in the states released from quarantine, to send men out to organize these counties into live stock associations, to get them to get thoroughbred bulls, improve their cattle, to show them how to raise their calves, how to feed them along and get them to
market and get the very highest value out of them. Now, I believe an expression of this Association to the Secretary of Agriculture and to Congress would have a very great effect in this regard, and I believe that money used like that would be very well spent, and be for the benefit of the livestock industry of the south; when we are going to have cattle we are going to have hogs, they both go together, and with that comes the demand for corn, and all that sort of thing. Now, I would like to see this Association put forth their energies along that line, urging appropriation not only for tick eradication, but for the livestock industry of the states that have asserted themselves to such a degree as to free themselves from this pest, and to give them assistance to take the next step. They have got to be helped, and it is up to us to help them. Lots of them are unable to do this of themselves; their fathers and their grandfathers never raised a beef animal in their life; they probably never raised more than a mule, and probably not that, and they don’t know anything about the production of anything pertaining to this line, and they have got to be shown how to do this, just the same as they have got to be shown how to eradicate ticks. Now that is the next step, and I believe, a good place for this department to break in and lend a hand. (Applause.)

Mr. Waddell: Mr. President, and Gentlemen of the Association—This question is one that appeals to me greatly, and I am flattered to think that I am a representative of the greatest state in the Union. We have conditions in our country to contend with that you gentlemen in other states do not have, and I cannot in the limited time that I have now, go into detail enough to have you thoroughly understand what the conditions that we have in Texas are. Two years ago I reminded this Association of the promise made by the cattle men of Texas. That promise was made to the Secretary of Agriculture, that if he would agree on a certain quarantine line across the state of Texas we would police it at our expense until the Legislature would meet, make an appropriation, and create a Sanitary Board to take care of it. That promise was fulfilled; we did that. Three years ago a delegation was sent to this Association asking that the State of Texas be held up and not have the ban put upon it of having it fall below the quarantine line, until a new organization could be effected in Texas. This Association, and the Federal authorities, granted that request, and that promise has been made good.

We promised to put a new board in and give efficient service. To-day I am here to say that to the best of my belief we have done more work in Texas in the last twelve months than has been done in any other state. With all the good work that we are doing, we are yet confronted with the proposition, gentlemen, which I want to state to you now. There is a market in Texas for pure-bred breeding
cattle below the quarantine line that amounts up into the thousands. There has been placed at Fort Worth within the last sixty days an order from the Argentine Republic for 900 registered immune bulls. There were sold at one sale within the last ninety days on the King Ranch in Texas 700 high-grade and thoroughbred bulls to go to tick territory. Now, when you take into consideration the fact that there are men scouring the ranches of Texas all the time hunting for these well-bred and thoroughbred bulls that are eligible to go to South America, Australia, Mexico, into the tick belt, you realize what a fight we have on our hands when it comes to eradicating the tick. We find the best men in Texas—more progressive than whom do not exist—opposed to this; their money is invested in an industry that is so situated that their product is eligible to go to market in a country where the tick exists, and they are naturally opposed to eradicating the tick.

Now, there is one proposition that I would like to put up to this Association. Our people in Texas, when we are discussing this Association and urging them to join and come to the meetings of this Association, say: "That is an organization of veterinarians; that is an organization of scientists and that is an eastern organization." Now, gentlemen, there is one thing that I want to impress upon you with reference to this Association and its relation to tick eradication work in the Southwest, and before I sit down I am going to make a motion to this effect, that this organization go to the people, and not ask the people to all come to this organization. You have educated Illinois; we have met here six or seven years—there is no reason why this Association should meet every time in Chicago. We people in the Southwest are doing more work, eradicating more disease and gaining more territory than any other section in this country. Now, I am going to ask this Association to come down in the Southwest and meet with us and give us cowmen the hand of encouragement, and tell us that you are working in our behalf. We need in Texas, we need in Mississippi, we need in all the Southwest the encouragement of this Association, and a closer union between this Association and our people. Two years ago Dr. Kiernan offered a resolution here that was turned down. I don't believe that he offered it exactly in the way that resolution was worded. It was suggested that this Association pass a resolution changing the interstate commerce law so as to prohibit the shipping of ticky cattle from one state to another. At that time, Dr. Kiernan very well remembers, I was opposed to it. I didn't think the State of Texas was ready for that kind of a law. It is questionable, in my mind, whether the State of Texas would indorse it to-day or not, but as the official representative of the State of Texas, the head of the Sanitary Board of Texas, I heartily indorse that proposition to-day.
Another thing that Texas needs more, I think, than the balance of the states that are interested especially, I mean the tick infested states, we have got these large ranches, and we have got conditions of affairs that do not exist in the farming communities, and we need a liberalized policy, we need—as I have been discussing the question with Dr. Ramsay and Dr. Melvin—we need the most liberal policy that can be extended to us consistent with the safety of movement of these cattle. There is no man employed by the Bureau of Animal Industry more opposed to the spread of disease than I am, yet, having been born and raised on a ranch, having made my livelihood and studied the requirements of the cowmen, both on the big ranches and on the small ranches, I am free to say to you that you cannot impress these minor restrictions upon them in a state like Texas, as you can in a farming country. Therefore, in the two years I have been in this work I have been continually after Dr. Melvin and Dr. Ramsay—though I am proud to say it has been in a friendly, amicable way—I have been constantly after them for modifications. I don’t think I have ever asked them, however, for the privilege of moving a bunch of cattle that were infected.

We have reclaimed in Texas—I believe the report so shows, though I can’t recall the exact figure—about 24,000 square miles of country during my administration. That is not a very big showing. At the same time, when you take into consideration the fact that the old chairman of the Live Stock Sanitary Commission of Texas, has met me at every point of progress that I have attempted to make with a fighting proposition, I feel very grateful that we have done as well as we have. We have had a bill passed through the Legislature, which I guess I am to blame for, though it was not so stated in the paper that was read here with reference to new legislation—we have had a very good law passed in Texas within the last year taking effect the first of last July. Under that law our people below the quarantine line have the right to vote on the question of tick eradication themselves, in the various counties. We call it local option. A petition signed by seventy-five resident land owners in the county presented to the commissioners of the county calls for an election, and it is imperative, when that petition is presented to order an election. If, at the election, the majority of the vote is affirmative; that is, in favor of tick eradication, the Live Stock Sanitary Commission of Texas are so notified, and the Live Stock Sanitary Commission of Texas then issues a supplementary proclamation signed by the Governor putting the county in special quarantine. Since that law went into effect, since last July, we have had six counties have special elections; four of the six carried it, and in the other two the proposition was defeated. And, I believe, with proper encouragement from the Bureau of Animal Industry—and we get that all the time; good
encouragement, at least—with proper encouragement from the Bureau of Animal Industry we can inaugurate a system of education in Texas so that under that local option law, during the coming year there will be inaugurated systematic tick eradication across the State of Texas three or four counties deep. I cannot appreciate how far this work can be done. It is now a question of education with our people. I have asked the Bureau of Animal Industry to join the State of Texas in putting missionaries in the field—I don’t know what to call them—lecturers or missionaries to educate the people in the work. They think it is a good idea, and, I believe, gentlemen, that in twelve months from to-day—I am not going to say when we meet here, because I don’t want to meet here—in twelve months from now when we do meet somewhere in the Southwest, that Texas will come back to you with a better showing, more country cleaned up and more work being done than has ever been done before.

Now, Mr. Chairman, I move you, sir, that this convention pass a resolution that the next meeting of the Association be held in the Southwest, if I can get a second to that motion.

Dr. Kiernan: I don’t want to lose this opportunity of giving credit to those who have contributed towards the progress and success of tick eradication. There have been 200,000 square miles out of the original 700,000 cleaned of ticks and released from quarantine. We think that work has been accomplished by enlisting the co-operation of all forces, of the scientific bodies, of live stock associations, farmers’ meetings, business men, bankers, railroads and corporations. We intended to bring this matter before the entire people of the nation to show them the importance of eradicating the tick as an economic problem for the entire 100,000,000 people of the United States. The South has at the present time—at the last census—about 20,000,000 cattle. Those cattle are worth on the average $15 per head. We believe that with the eradication of the tick that there will be produced, in time, at least, 50,000,000 cattle in the territory originally infected with ticks, and that those cattle can be improved one hundred per cent, which will mean a billion dollar proposition to the United States. Now, that may seem visionary to some people, but in the areas that we have cleaned of ticks, we can demonstrate that the cattle business has grown by leaps and bounds. As Dr. Dalrymple said, out here at the International Stock Yards there are two herds of pure-bred cattle that were contributed from counties that two years ago were the worst tick-infested counties in Tennessee and Mississippi. Those herds are acquitting themselves with credit, and bringing glory to the states from which they come. We have accomplished real work and made a real showing in the areas released from quarantine, results worthy of note; they have raised seven distinct types of pure-bred cattle in counties where scrubs only were formerly raised.
That is a demonstration that the entire state can produce those cattle, and with the eradication of the tick they will do so.

Now, in reaching the people; we went to the railroad companies and asked them to get out literature on the subject, and there wasn't a single road in the country—in the South, at least—that did not agree to help in that way, and we distributed over a million bulletins issued by various railroads and corporations.

This Association has contributed largely to the success of tick eradication. Fourteen years ago, when I first attended the meeting of this Association, the entire time was engaged in taking up the question of tick eradication work. This Association has lent its influence, which has been felt over the entire quarantine area, for the benefit of tick eradication.

I want to take this opportunity of stating that next week we are going to have a meeting of the Southern Cattlemen's Association at Memphis, Tenn. That organization was created July 9, this year, at the meeting at Montgomery, Alabama. Without any special effort we got 100 people to come there and organize the association, and we expect at the meeting at Memphis next week to have three or four, or, maybe, five, hundred people present. I am taking this opportunity of extending an invitation to everybody who has the opportunity of attending that meeting. (Applause.)

Mr. Hatfield: Mr. President and Gentlemen—I have come here simply to say a word—or it will not take more than three or four words—to add my voice to the invitations you have already had to consider San Francisco in 1915 for your meeting place, and there are two or three matters that have developed the last year that I thought might be of interest to you, and I am not going to read any long paper, but I have just jotted down a few things, as I could not remember them all. I want to call to your attention a list of institutions similar to this, or that you may be indirectly interested in, that are coming in large numbers to San Francisco in 1915 to hold their conventions. At this time we have 180 conventions that are going to San Francisco, and we are working along a new line of Exposition work. For instance, here are a few of the larger ones: International Congress of Education, International Efficiency Congress, International Congress on Milk and Farm Products, Association of American Universities, American Historical Association, American Academy of Politics and Social Science, American Breeders' Association, and there are several of the Live Stock Associations which are considering the matter tentatively, and we believe we are going to have quite a number of the Live Stock Organizations meet with us. I don't know how many there are, but there are quite a number that have already decided tentatively to come. Here are a number of them: The Farmers' Educational Co-Operative Union, Society of American Florists
and Horticulturists, International Association of Breeders, Society of
American Agricultural Colleges and Experiment Stations, etc. I
have prepared this list to submit to the agricultural organizations,
and we hope to have a great many of them meeting there. And I
want to say that we are going to have a collection of exhibits of all
the conventions and congresses, and try to have a syllabus made up
from your various organizations, so that as you go through it will be
handy for you, and you can go to that feature of the exhibit which
is most interesting to you. That is the feature that I want to empha-
size, and that the Exposition at San Francisco is going to be particu-
larly one of education and of doing things. We are bringing that
one feature to the front. I believe that it will be a great opportunity
for you gentlemen to enjoy that trip and the many things you will
see there. The Exposition is spending eighty millions of dollars, and
they are going to be ready for you. A recent survey has been made by
which it has been shown that we can entertain out there 200,000 peo-
ple. San Francisco is not the largest city, of course, but don’t forget
that within a radius of one-half an hour we have several of the other
cities around there where thousands can be entertained. Of course,
you all know that. And I trust that when the time comes that you
may arrange your affairs so that you may be with us in 1915. I
thank you. (Applause.)

Dr. Caldwell: Gentlemen, it occurred to Dr. Clark, who is the
President-elect of the Chicago Medical Society, and who will be in
charge of medical affairs for the Chicago Medical Society next year,
that if you meet in Chicago next year it might be a good idea to
have one or two joint meetings with our Society. As I said the
other morning, they have a membership of 2,500 doctors, and it is a
well-organized Society. We have fourteen branches throughout the
city, and carrying on bi-monthly scientific meetings throughout the
city, and a very large public meeting could be arranged for, and it
will give a great deal of publicity to the question of municipal in-
spection of meat, pure food, pure milk and matters of public interest.
Now, it strikes me that what your Association needs—what our
Association needs—is public sentiment. It has got to be aroused, and
it can only be aroused by public meetings and the education of the
public. Now, if your meeting occurred next year during the Live
Stock Show, the Live Stock Show can be circularized in a way,
breeders and feeders and farmers can be invited to these public meet-
ings, and they will receive their education along the lines that you are
working, and they will go back to their home towns and talk with
their legislators and stir the thing up and help to promote the very
plan that you are working for, and the aims that you are after. And
with that in mind, I would be very glad to have a conference with a
committee from your body, having that in mind, that the Chicago
Medical Society would be ready to push any such educational scheme along, and I can assure you that we would have meetings of 800 or a thousand, anyway, and possibly more; I am, fortunately, an optimist; I don't want to really forecast the meetings we would have, but I imagine it would aid your cause a great deal, and it would aid our cause a great deal, and we are entirely in sympathy with you in the work and will be glad to do anything we can.

We have Dr. W. A. Evans with us, who is giving his life to the study of sanitary matters, and we have also Dr. Clark, who is the President-elect of the Chicago Medical Society, and who will be in the saddle next year, and I would be glad to hear from him and Dr. Black, also, who is familiar with the workings of our milk commission, and if you could spare them a few minutes I will thank you very much. (Applause.)

Dr. Evans: Mr. Chairman and Gentlemen—Now that you have eradicated the tick, I understand that your status is this: Your Association is considering matters of business, and that it is in order to decide, at least tentatively, certain questions as to your next year's programme. The Chicago Medical Society is before you with two suggestions, one of which they are in a position to talk finally about right now, and the other they wish to discuss, and in the discussion to have participation by some representative of your organization. The first proposition is that a public meeting shall be held when you are meeting here next year; that to this public meeting there shall come speakers from your organization and from the Chicago Medical Society. The object of that meeting is to acquaint the people, those in attendance on that meeting, of this whole matter and through the newspapers to reach and to acquaint the people with the subject of food and inspection, and particularly with the subject of meat inspection. And so we are asking that you, through your officers, cooperate with us next year in a meeting, a public meeting, to be arranged to be held here in Chicago to discuss food inspection, and particularly meat inspection. That is one suggestion.

The other suggestion is this: We hope that about this same time, and probably at the very same time, that we will have a meeting of sanitarians held here in Chicago under the auspices of the Chicago Medical Society, appealing to men who are interested in sanitation, who are in this particular part of the country, not a meeting at which papers will be read and discussions will be had so much as a meeting that will correspond with what the doctors call, and what you veterinarians call a clinic, that is to say, methods will be demonstrated, and a part of the methods that we hope to have demonstrated are the methods of meat inspection. Now, some towns, of course, have government meat inspection, and other towns have no meat inspection at all. Many of them are anxious to have it, but
they have no opportunity to train their inspectors even superficially, even partly trained men, so we thought at about this time we would try to arrange it so that inspectors and health officers could come here, and for a few days, or during a few days would see just how meat inspection was done in the packing plants here in Chicago. Now, that is not final; we hope that that can be arranged. We would like to have you co-operate with us in making these arrangements. (Applause.)

Dr. Black: The Chicago Milk Commission stands in the same place with regard to this matter as the Chicago Medical Association, as Dr. Caldwell and Dr. Evans spoke of. We are very anxious to co-operate with you along these lines, our work dealing principally with the sanitation concerning milk, and it is our earnest hope that you will find some means to co-operate on that day. (Applause.)

**OBSERVATIONS ON DOURINE IN THE NORTHWEST.**

By A. W. Miller, South Omaha, Nebraska.

For the benefit of the laymen present I will state that dourine is a contagious disease affecting horses and asses disseminated by sexual intercourse.

It is not the purpose of this paper to give a technical discussion of this disease, but only a few observations made in connection with the outbreak on which the Bureau of Animal Industry in co-operation with state officials has been working the past two years in the states of Montana, North and South Dakota.

Aside from the outbreak in northwestern Nebraska, and the Pine Ridge and Rosebud Indian Reservations in South Dakota, during the period from 1892 to 1905 no outbreak covering a large territory and affecting many animals had been discovered in the United States until the present one in the Northwest.

The other outbreaks, one in Illinois and two in Iowa, did not cover large areas or involve a great many animals.

The Bureau realized the probability that the disease might have spread from the Pine Ridge outbreak and for several years after that outbreak was under control kept inspectors in the field to investigate all cases reported as suspicious and to make inspections over sections of the country to which it was probable the disease might have spread but no cases were found which could be diagnosed as dourine.

From time to time horses were reported to have died in the Northwest from some unknown disease which now appears in many instances to have been dourine, but owing to the character of the disease and the fact that animals showing typical symptoms were not observed it was not recognized as dourine.

All information obtained indicates that the disease has existed in certain sections unrecognized as dourine for more than twelve years.

I feel it is better that this admission be made than to try and conceal the fact that the present outbreak is of long duration and covers an extensive area.

Finally, in June, 1912, Dr. M. E. Knowles, at that time state veterinarian of Montana, reported to the Bureau of Animal Industry that a stallion and three mares had been found affected with some disease.
which he suspected to be dourine. These animals were first reported by Dr. A. H. Cheney, a deputy state veterinarian, of Miles City, Montana.

At the request of the Bureau blood serum for dourine test was forwarded from these animals and gave positive results to the complement fixation test which at that time had only recently been adapted to this use by the Bureau.

The Bureau of Animal Industry immediately at the request of the state authorities detailed such inspectors as were available and a preliminary investigation was made extending through the late summer and fall of 1912.

This investigation resulted in finding a number of cases of dourine at widely scattered points and realizing the situation was serious, plans were made for a vigorous campaign in the spring of 1913.

Owing to the method of range breeding followed in Eastern Montana conditions were ideal for the spread of the disease and one of the first measures for its control was the issuing of an order prohibiting stallions on the open range in the area where infection had been found. There is a law in Montana that stallions must not be allowed on the open range, but it has never been enforced.

Considerable difficulty was encountered in enforcing the above order, but by the time the breeding season opened most of the stallions were up.

Recently the restricted area has been greatly enlarged and range riders hired by the Bureau of Animal Industry with instructions to castrate stallions found running loose on the range. The United States Department of Agriculture through the Bureau of Animal Industry bought and destroyed all reactors found in 1912 and a number in 1913 up to March when an appropriation made by the state of Montana became available.

The Montana Legislature passed a bill providing that the assessed value of the previous year should be paid on animals slaughtered by order of the state veterinarian on account of being affected with tuberculosis, glanders or dourine and appropriated for this purpose $8,000 for the year 1913 and $6,000 for the year 1914 and further provided that an equal amount should be paid by the counties in which diseased animals were destroyed, the state paying fifty per cent of the assessed value and the counties the other fifty per cent.

A large force of Bureau inspectors started work in Montana this spring as soon as the weather would permit of blood being handled and Dr. W. J. Butler, state veterinarian of Montana, furnished several deputies to assist in the work.

All stallions as far as possible in Eastern Montana were blood tested, inspectors were detailed to accompany the various round-ups and whenever a suspicious mare was found she was blood tested. All herds in which infection was found in 1912 or this spring were quarantined and all breeding animals in such herds were blood tested, and only those animals passing a satisfactory test were allowed to be used for breeding purposes. Also breeding animals ranging with infected herds were classed as exposed, even if the herd to which such animals belonged was found free from infection. A number of infected stallions were found late in the summer and where such stallions had been used for breeding purposes this year, all mares served by such stallions are being held in quarantine until next spring for a blood test.

After experimenting with various tags and brands for identifying animals tested it was finally decided that the numbering of animals with a hot iron was the only method giving satisfaction where it was neces-
sary to handle large range herds. Considerable opposition was offered
to this branding by some of the horsemen, but no other satisfactory
method has been found.

Reactors not immediately destroyed are branded in Montana with
a reverse D on the left jaw and in North Dakota with an M on the neck.

Dourine was also found early in the season on the Standing Rock
Indian Reservation in North Dakota and inspectors were detailed who
handled this outbreak as outlined for Montana. At a later date in-
fection was found in the part of this reservation in South Dakota and
also on the Cheyenne River Indian Reservation in the same state. A
stallion just received in Montana from South Dakota was found in-
fected with dourine and while only a small amount of work has been
done in South Dakota outside of the Indian reservations several affected
animals were found.

Late in the summer two mares were found on arrival in Montana
from North Dakota showing well marked symptoms of dourine and upon
investigation at the point of origin an outbreak of some extent was
found. Dr. W. F. Crowe, state veterinarian of North Dakota, imme-
diately detailed veterinarians to cover this outbreak and work in co-
operation with inspectors from the Bureau and a large part of the stal-
lions in the suspected are have been blood tested. The exposed mares
will be tested as soon as a sufficient period has elapsed after exposur-
so that a satisfactory test can be secured.

At this point I wish to congratulate the states of Montana and
North Dakota in having very stringent laws covering the control of
contagious diseases and also that the enforcement of these laws is in
the hands of very capable officials.

The Montana funds have not proven sufficient to pay indemnities
on the animals slaughtered, but considering the magnitude of the out-
break this is not to be wondered at. North Dakota has no funds to
indemnify owners of animals slaughtered on account of dourine in-
fecion, but Dr. Crowe is very hopeful that of the next Legislature's
making an appropriation for this purpose. Indemnity for animals
slaughtered belonging to Indians is paid by the United States Depart-
ment of Indian Affairs.

It is hoped that conditions will be such that more thorough work
can be done in South Dakota the coming season.

While a great many cases have been found in Montana and North
Dakota I am certain the disease is being handled in a manner to pre-
vent its further spread and is rapidly being brought under control.

Reports were received through the Miles City (Mont.) office of the
Bureau from February 1st to December 1st of this year covering about
11,000 samples of blood sera forwarded to the Pathological Division of
the Bureau of Animal Industry at Washington for the complement fixa-
tion test and of this number 1,233 gave positive results. Of those giving
positive results 66 were retests of previous reactors, thus showing a
total of 1,168 animals affected with dourine in the states of Montana,
North and South Dakota. Of the animals tested about 10.5 per cent
reacted and consisted of 932 mares, 222 stallions, 7 geldings and 7 jacks.
While this appears to be a very large per cent of diseased animals it
must be borne in mind that most of the testing was in herds known to
be diseased and in many of which the infection had existed for years.
The test has shown that many animals affected with dourine would not
be discovered by a clinical inspection. About 900 of the reactors have
been disposed of and disposition is being made of the remainder as fast
as possible.
Dourine is such an insidious disease and it is so seldom if an affected animal exhibits typical symptoms that it is either quite often overlooked or mistaken for some other disease such as glanders or swamp fever. The use of the complement fixation test should assist greatly in the diagnosis of this disease and sanitary officials should be on the lookout at all times for infected animals, as there is no doubt the disease exists unrecognized in many states at the present time, and it is in such states that the future spread of the disease will occur rather than in those states where it has been recognized and measures taken to eradicate it.

ANTHRAX IMMUNIZATION AND CONTROL.

By E. R. Forbes, Fort Worth, Texas.

The matter of immunization and control of anthrax is one of great interest and importance to those of us who have this disease permanently within our borders. It is useless to take up your valuable time in going into a history and description of the disease itself, which is so well known to all, so we will at once proceed to the subject of immunization and control. This brief paper is presented merely with the hope of bringing forth a free discussion on this very important matter.

The three important phases to be considered in the control of this disease are:

First: Immunization. Second: Restriction of the movements of animals from the infected territory. Third: Disposition of carcasses.

Immunization: A number of different methods have been practiced of rendering animals refractory to the Bacillus anthracis, but all are apparently based on the production in the system of defensive products, as a result of a non-lethal poisoning with anthrax toxins. It is true of anthrax as of many other infections that a first attack protects against a second. In all the animals there is a certain measure of defensive power against the Bacillus anthracis, amounting in some cases virtually to immunity and in others having very little effect. The object of immunizing is to stimulate to the increase of these defensive products in quantity or power until an ordinary dose of the bacillus will fail to colonize the tissues or the blood. These immunizing agents, when injected into the system are present only for a limited time, and while they may be subservient to a temporary immunity, they can give no permanent protection and must be considered mainly as therapeutic agents.

A permanent immunity must depend upon a stimulation of the system to the production of these defensive agents in increased quantity. This must be done by exposure of the tissues to the toxins of the Bacillus anthracis and is accomplished slowly, as for example by repeated vaccination or by the method of simultaneous injections of immune serum and cultures.

We will pass over the various methods which have not gained any particular footing on this continent and refer only to those now being used.

We have two recognized methods of immunization—Pasteur's and Sobernheim's—which we may use to great advantage in protection from anthrax. For a full discussion of these methods the reader is referred to the recent English translation of Hubyra and Mark's work, vol. I.

Immunization covers one phase of the control work. We now come to another which is one of the greatest importance, and that is the active control of infected areas by the State, and the first essential step is legislation, which places the sale of anthrax vaccine absolutely under the Live Stock Sanitary officials of the State. This appears to be a
keen commercial age, and in order to successfully handle outbreaks of anthrax, it becomes necessary to restrain commercialism.

At the present time the general attitude seems to be that all obstacles to commercialism must be destroyed. If Live Stock Sanitary Boards and Commissions do not boost John Doe's vaccine, then destroy the Sanitary Board as was recently attempted in Texas, failing that obtain an act of legislature taking such diseases as may be profitable to manufacturers of biological products out from under the control of said Board or Commission and place them in some other department which knows absolutely nothing about such matters, but are more amenable perhaps. This was accomplished recently in Texas. At the present time the slightest rumor of anthrax brings a horde of hysterical salesmen intent on large sales, and no matter whether it is a false report or true, no matter how much depreciation of live stock and land values may occur, spread the word—Vaccinate.

We recently had such an occurrence in Texas, where a small area of infection of twenty years standing and little spread since that time, owing to its being principally in a rocky canyon, and in which a few cases of anthrax appeared, was heralded over thirteen counties in all, when in fact, another disease entirely was prevailing with a few exceptions. Such things, while profitable to the commercial man, confuse and alarm the public and greatly handicap the work of live stock sanitary workers, who are quite well able and are the proper ones to handle these matters themselves. I hear of general anthrax vaccination in sections where forage poisoning has appeared. I find horses exposed to glanders with anthrax vaccine.

Shipments of live stock moving in the State or going interstate arrive with certificates of vaccination. Horses receive a serum which, according to the literature, is equally efficacious for canine distemper, roup in chickens, canker in pigeons, etc. Good gold brick business.

It becomes necessary to take these matters strictly under control and it would be still better for the States or the Federal Government to prepare these products for this use. It seems that to the commercial house the State has no rights whatever, that compliance with Federal regulations, which becomes necessary in order to ship out their products from the manufacturing center, is all that is required to give them free rein to run hog wild. I am extremely anxious to see the curb applied and covering all biological products.

The restriction of the movement of animals from the infected area should be complete as far as possible, applying also to dogs and other carrion eating animals. In connection with this the elimination of the buzzard in infected areas is to be desired.

TheDispositionofCarcasses.

This should be promptly done by either of the following methods depending upon facilities, expense, etc.: Burning until not a vestige of the carcass remains. Burial, in which the method adopted by the State of Delaware is followed, that is the body is not touched by the knife, and with formalin solution 4 per cent soaked cotton plugging all natural orifices, the carcass, thoroughly wetted with a 4 per cent solution of formalin, is deeply buried and the grave fenced in.

In Texas, with the exception of a limited canyon area, our infected area is in the South and Southeast Coast Country, but little above sea level, flat and badly drained, in heavy rains becoming a lake. This country is largely given over to more or less open range country and very difficult to control as to disposition of carcasses.
INVESTIGATIONS OF THE ETIOLOGY OF INFECTIOUS ABORTION OF MARES AND JENNETS.

By Edwin S. Good, Lexington, Ky.

According to Williams, the disease of infectious abortion of mares first made its appearance in the United States in 1886, in several States of the Mississippi Valley, and soon acquired a very extensive distribution and high degree of virulence. The disease has been quite a menace to the special horse breeding interests in Kentucky. A few instances have been noted in this State where all the foals in a stud were lost, and it is no uncommon occurrence to lose from 50 to 75 per cent. of the foal crop in a stud afflicted with this disease. Most of the abortions come between November 1st. and March 1st. Observations show that more slips occur during the eighth month than at any other period during pregnancy. Colts that come alive from a stud afflicted with this disease are usually weak and subject to pneumonia, "joint ill," white diarrhea and affection of the eyes.

In 1911, while giving the results of our investigations of the etiology of infectious abortion in cows before this association, brief mention was made of an organism we had isolated in several instances from aborting mares and jennets. Since that time these investigations have been continued and we have isolated the germ from six studs of mares and jennets afflicted with the disease. In all, we have examined twenty-four different cases and have secured positive findings in twenty-one. This bacillus has been isolated from the vagina, uterus and afterbirth of aborting mares, and from the internal organs of the aborted fetus. In no case of abortion due to multiparous pregnancy or to accident have we found this organism.

From its morphological and cultural characteristics we have placed this bacillus in Subgroup II of the Colon Typhoid Group. There seems to be some difference of opinion among investigators as to whether this subgroup does or does not ferment lactose and saccharose bouillon. Most authorities, however, claim that gas is not produced in these sugars by the organisms in this subgroup. The germ isolated by us fermented 1 per cent. lactose bouillon in 80 per cent. of the 116 trials conducted. The amount of gas produced was about 2 per cent., with the average production of about two-tenths per cent. acid. In saccharose bouillon a slight amount of gas was produced in 50 per cent. of fifty-six trials. Seventeen strains of the organism were used in these tests. Strains of the Bacillus enteritidis, which belongs to the same subgroup of the Colon Typhoid Group as the germ isolated from aborting mares, were used in fermentation tests for comparative purposes. This germ produced a small amount (about 2 per cent.) of gas in lactose bouillon in 80 per cent. of the trials. Gas was produced by the Bacillus enteritidis in 32 per cent. of the eleven trials conducted in saccharose bouillon, three strains of the organism being used. Differences were at times noted in all of the above strains mentioned, even in duplicate and triplicate tests of the same strain of germ. Controls were carried on in these tests. We feel quite sure that these organisms will, under certain conditions, ferment lactose and saccharose bouillon, although to a slight extent. We are, however, at the present time, unable to explain the variations noted.

The germ isolated from aborting mares ferments dextrose, xylose, raffinose, arabinose, sorbit, mannite, maltose and dulcit, with the production of both acid and gas. It does not produce gas in adonit, sorbose or rhamnose.
Inoculation Experiments with the Bacillus Isolated From Aborting Mares.

An intravenous injection of 4 c.c. of a broth suspension of the organism isolated from aborting mares produced abortion in a pregnant ewe in seventy-two hours and the germ was recovered from the afterbirth and from all the internal organs of the fetus.

A subcutaneous injection of 4 c.c. of a physiological salt suspension of the organism in a pregnant ewe did not produce abortion.

An intravenous injection of 20 c.c. of a physiological salt suspension of this germ produced abortion in a pregnant sow in forty-one hours and the organism was recovered from the afterbirth.

A subcutaneous inoculation of some of the contents of the stomach of an aborted fetus produced abortion in the guinea pig in about thirty-six hours and the germ was isolated from the placenta of the pig. An intravenous injection of a pure culture of this germ into the ear vein of a sow produced abortion in forty-one hours, and the germ was recovered from the afterbirth.

On February 7, 1912, a supposedly pregnant mare was slowly injected, intravenously, with a 10 c.c. culture suspension. This injection nearly proved fatal to the mare, as the day following she was greatly depressed and had a temperature of 108 degrees for a short time. She fully recovered in a few days. This mare proved not to be in foal.

On February 28, 1913, ten different strains of the bacillus isolated from aborting mares were washed off agar slants with physiological salt solution and 2 c.c. injected intravenously into a pregnant mare. This mare aborted on the tenth day after inoculation. At no time from the date of inoculation up to the time of delivery of the fetus did this mare show any sign of aborting. The bacillus was found in abundance and in pure culture in all the internal organs of the fetus and in the afterbirth of the mare. Cultures made from the discharge taken from the vagina of this mare revealed the abortion, bacillus up to the fifth day after aborting, and this, in spite of the fact that her genital organs were washed daily with a saturate solution of boric acid. After the third day the mare appeared normal and took the stallion on the eighth day after aborting. This mare has been bred several times, but is not in foal.

On April 10, 1913, the growth of this organism on ten large agar slants was washed off with physiological salt solution, mixed with grain and fed to a five-year-old pregnant mare. The mare did not take readily to the mixture, and it was a few days before she had eaten all of the material. It was soon noted that the feces of this mare were becoming very soft, turning later into a diarrhea which medical aid could not check. She gradually became weaker and died fifteen days from the date of the initial dose. Having previously fed large amounts of this organism to a pregnant sow without apparent harm, led us to believe that we would be safe in giving a large dose to the mare. The mare was posted and streak dilutions made of the heart, liver, spleen, kidney and intestinal trace, with the result of securing a culture of the organism on the plate streaked with heart blood. The fetus was taken to the laboratory and streak dilutions made on agar from the stomach, kidney, heart, ovary, spleen, lung and liver. All plates remained sterile, with the exception of those having been streaked with the contents of the liver. A few colonies of the organism were found on these plates. Recovering the organism from the mare and fetus proved to our satisfaction that the germ in question had entered the blood stream of the
mare and then to the fetus through the intestinal tract of the mare, and that had the mare lived a few days longer she undoubtedly would have aborted.

**Diagnosis of Infectious Abortion in Mares**

Besides diagnosing the disease by the isolation of the germ the disease can be diagnosed by the agglutination and the complement fixation tests. We drew blood from fourteen aborting mares and obtained the following results, as far as the agglutination test is concerned: The serum from one mare agglutinated the bacillus in a dilution of 1:500; from two mares in a dilution of 1:800; from two mares in a dilution of 1:1000; from three mares in a dilution of 1:1500; from one in a dilution of 1:2000; from four mares in a dilution of 1:3000, and from one mare in a dilution of 1:5000. Of the blood serum of six normal horses tested five agglutinated in a dilution as high as 1:200 and one in a dilution of 1:100. The blood serum of the entire fourteen mares responded to the complement fixation test, while the serum from six non-aborting mares did not respond to this test.

So far, we have found no other germ belonging to the subgroup of the Colon Typhoid Group, which is agglutinated in a higher dilution than 1:200.

There is little doubt in the writer's mind that this organism is the universal cause of infectious abortion in mares, for Dr. D. A. de Jong of Holland has recently published on a bacillus which he has isolated from an outbreak of infectious abortion among mares in one of the provinces of his country which, from the description of its cultural and physiological properties, I take for the same germ we have mentioned in this paper. Dr. de Jong places the organism he isolated in the Paratyphus B. enteritidis Group.

In our own investigations we have always been on the lookout for the *Bacillus abortus* Bang, the germ causing the disease in the cow, but have not found it associated with the disease in the mare. Then, too the nature of the disease in the mare would eliminate the Bang bacillus, as in this animal the disease is acute, while in the cow the disease is chronic.

In the light of our investigations, so far, the germ isolated from aborting mares and jennets is not identical with any known germ of the Colon Typhoid Group, and we call it the *Bacillus abortivus equinus*, though this may be presumption on our part.

---

*Cenralbl. f. Bakteriol, 1 Orig. 67, p. 148.*
BUSINESS SESSIONS.

Membership.

New members recommended by the Executive Committee were unanimously elected to membership.

A recommendation of the Executive Committee that any members who use memberships in this Association for advertising purposes be automatically dropped from membership was adopted.

Appointment of Delegates.

The President was authorized to appoint three delegates to the International Veterinary Congress at London, August, 1914, and three delegates to the Convention of the American National Live Stock Association, January, 1914. These delegates to pay their own expenses and report back to this Association.

New Committee.

The Committee on Competitive Tick Eradication Work was discharged and a new committee was created to be known as the Committee on Cattle Tick Eradication.

Federal Registration of Tuberculosis-Free Cattle.

A motion that the Association go on record as approving the plan for Federal registration of tuberculosis-free herds of pure bred cattle and that the Secretary forward a letter to the Bureau of Animal Industry expressing that approval and endorsement, was adopted.

Election of Officers.

The following were duly elected officers in the Association: President, Dr. S. H. Ward. Vice-presidents, Dr. C. M. Haring, Mr. F. S. Brooks, Dr. V. A. Moore, Dr. C. H. Stange, Dr. E. R. Forbes, Secretary-Treasurer, Mr. J. J. Ferguson.

Proposed Joint Session with Chicago Medical Society.

A motion was adopted that if the next meeting of the Association is held in Chicago the Executive Committee arrange to hold one session jointly with the Chicago Medical Society, and that the Secretary be instructed to notify the officers of the Chicago Medical Society to that effect.

Proposals for Change in By-Laws U. S. Live Stock Sanitary Association for Consideration at Annual Meeting 1914.

In accordance with Section 11 of the By-Laws providing for a change in the Constitution and By-Laws of the U. S. Live Stock Sanitary Association, Dr. C. J. Marshall proposed the following change in Section 7 of the By-Laws: namely, that the clause reading as follows: "Each member shall pay an annual due of one dollar" be changed to read "Each member shall pay an annual due of five dollars."

This was presented to the Association and referred to the Executive Committee, which Committee approves of the proposed change and recommends its presentation at the next meeting of the Association for action by that body.
Your committee is pleased to report that the past year has been one of the most successful from a legislative standpoint in the history of our Association. Among the events which are of paramount importance to all interested in sanitary legislation are the following:

1. A decision of the Supreme Court of the United States, upholding the right of municipalities to fix regulations for the inspection of milk and the tracing of unwholesome milk to its source outside the municipality, is of great importance in aiding city health authorities to exclude milk from tuberculous cows, and to direct the destruction of such cattle when found. The case was brought up from Milwaukee, the health authorities of that city having, under police regulations, prevented the sale of milk from diseased dairy cattle from entering the city, and also having directed the destruction of such cattle.

The right of the Milwaukee health officers to take such action was attacked by milk producers, as was also the validity of the city ordinance under which such action was taken. Under the terms of the ordinance the health authorities of Milwaukee are given the power to trace suspected milk to its source, to inspect dairy herds and to order the condemnation of cows shown by the tuberculin test to be diseased.

The Milwaukee ordinance is recognized as the most rigid measure that has yet been adopted by any municipality, and as soon as its enforcement was ordered dairymen attacked the ordinance on several grounds.

The Supreme Court decision, which was unanimous, is that the ordinance is valid as an exercise of the police powers of the state through a municipality acting under a charter of the state.

The decision will have a powerful influence on many other municipalities besides Milwaukee where similar ordinances have been adopted and later held up because of a doubt of the municipality's power or right to enforce them.

2. A most interesting and valuable State Supreme Court decision was given by Judge DeGraffenreid on the constitutionality of the live stock sanitary law of Alabama. This decision takes up the question of whether the legislature has the right to delegate to the live stock sanitary board the power to make rules and regulations to carry out its sanitary police power. A copy of this decision may be obtained by those interested by writing to the Judicial Department, State of Alabama, Court of Appeals, November term, 1911-1912, The State of Alabama versus J. W. McCarty, appeal from Sumpter County Court. This decision is of great value and importance to the state officials of this Association, as it is considered to be the best decision of its kind in America.

3. The increasing use of sera and vaccines in veterinary practice has made it desirable to obtain veterinary and state legislation in order to supervise the preparation of such products. That there is a promising future for this most recent branch of therapeutics may be frankly admitted, but there is a risk of allowing enthusiasm to outrun discretion in the claims which the advocates of these products urge in their favor. It is therefore with much pleasure that your committee reports the recent passage of bills regulating the sale of these products by the State of Pennsylvania and by the Congress of the United States. Last year we reported upon the enactment of similar laws by the States of Alabama and Georgia. In Europe these products are prepared by private firms under state control, as in Germany, or
they are manufactured by the Government itself as in Holland. In the latter instance legislative measures are unnecessary.

4. Armed with an effective weapon against hog cholera in the preventive serum of Dorset, McBryde, and Niles, the Bureau of Animal Industry has given battle to this disease which for so many years has wrought havoc to the hog raisers. Systematic work has been started in four of the leading hog raising states, and with the experience of previous conquests, it is not too much to hope that in time this work will also meet with success. Congress appropriated the sum of $75,000 for the inauguration of this campaign during the current year, and this sum will undoubtedly be greatly increased for the coming year.

5. The progress being made by the various states in obtaining laws for the control of hog cholera is most encouraging. The laws on this subject in Montana, North Dakota, Wyoming, Texas and Indiana were reported upon by this committee two years ago. During the past year Colorado, Idaho, Iowa, Kansas, Kentucky, Maine, Missouri, Nebraska, Oklahoma, Oregon, Utah, Virginia and Wisconsin have adopted similar legislation looking to the control of hog cholera.

6. In addition to the states reported upon in 1911 as requiring the mallein test of all equines coming within their borders, the following have obtained similar legislation during the past year: Alabama, Colorado, Idaho, Kansas and Nevada. Vermont allows the presentation of any one of three documents, one of which is the mallein chart. Maine and Oregon have also included the blood test as an alternative to the mallein test.

7. During the past year the tuberculin test has been adopted by Ohio and Nevada as a requirement for the entrance of dairy and breeding cattle into these states.

At present there are forty-four states which have this legislation, leaving Florida, Illinois, Rhode Island and West Virginia as the only states without such a requirement.

Officials of the following states have kindly forwarded to your committee copies of their state laws and regulations, from which the following abstracts have been made:

**Pennsylvania.**

The last legislature of Pennsylvania gave the Live Stock Sanitary Board $441,000 for enforcing the laws for two years. More authority was given the state veterinarian and agents for the purpose of expediting the work and the state veterinarian was made executive officer of the Board. The purpose of the new law, which is a very admirable one, is to prevent, suppress and control transmissible diseases of animals in Pennsylvania. Veterinarians are required to report these diseases to the State Veterinarian. The Board has authority to destroy animals that are affected with transmissible diseases and to enter inclosures where they are believed to be kept, even against the will of the owner if such action is deemed necessary for the protection of the health of domestic animals. Cattle or horses reacting to tuberculin or mallein must be reported to the Board. The law for handling interstate cattle has been strengthened. All bovine animals except those under six months old and those for immediate slaughter must be tested in the state from which they are to be shipped by proper officials before they
can be accepted in Pennsylvania. If cases arrive in the state without such a test the Board has the power to hold them up and test them. The new law requires that the sale and use of both tuberculin and mal-lein must be reported to the Board. Provision is also made for the use of only such biological products for diagnosing, treating and preventing animal diseases as are indorsed by the Bureau of Animal Industry and their use must be reported to the Board.

Under the law skimmed milk, butter milk and separator slops must be pasteurized by heating to 178 degrees F. before they can be legally used as food for calves and pigs.

North Dakota.

The last session of the legislature of North Dakota passed acts which improved the laws existing at that time. The annual appropriation for field work was increased from $10,000 to $15,000.

Nevada.

A quarantine law was passed at the last session of the legislature under the provisions of which entrance to the state of infected animals is refused. By proclamation the Governor has prohibited shipment into the state of dairy and breeding cattle until they have passed the tuberculin test; all horses, asses, and mules until they have passed the mal-lein test; of stallions and jacks until they have passed a physical examination for dourine; and all animals infected with any infectious or contagious disease. Formerly, there were no restrictions of any kind. The office of state veterinarian was abolished and authority is now vested in a state quarantine board of five members. The more efficient control of outbreaks of infectious diseases within the state was provided for.

Maine.

The legislature of last winter appropriated $100,000 (being double the amount appropriated by the previous legislature) for the control of contagious diseases among the domestic animals of the State. Fifty-two veterinarians were appointed as deputies to the Live Stock Sanitary Commissioner, who is also a veterinarian. No live stock can enter the State of Maine without a permit and inspection at the place of destination is required.

Oregon.

The live stock sanitary law was passed at the last session of the legislature over the Governor's veto and is now in operation. It provides for a live stock sanitary board of six members, and the appointment of a state veterinarian who acts as secretary for the board. The law is very broad in its scope, giving the Live Stock Sanitary Board increased authority over all live stock sanitation within the state. $50,000 has been appropriated for the enforcement of this law.

Respectfully submitted,

JOHN R. MOHLER,
Chairman.

REPORT OF THE COMMITTEE ON FINANCE.

Your Committee have checked the accounts of the Secretary-Treasurer and find same to be correct. (For summary see report of Secretary-treasurer).

W. F. CREWE,
P. JUCKNIESS,
REPORT OF COMMITTEE ON RESOLUTIONS.

The following resolutions presented by the committee were duly adopted by the association:

WHEREAS, the United States Live Stock Sanitary Association, an outgrowth of a sanitary organization, whose object was the control of the cattle tick;

WHEREAS, for seventeen years this association has made recommendations to the honorable Secretary of Agriculture respecting the quarantine line, the open season and release from quarantine of areas cleaned from the tick;

WHEREAS, we have in seven years recommended the release from quarantine of nearly 200,000 square miles of territory in which the cattle industry has been wonderfully benefited;

WHEREAS, the arsenical dipping method of eradicating the tick is so simple and effectual that there is no longer any reason for cattle infested with ticks being shipped or moved in any way,

BE IT RESOLVED, that the United States Live Stock Sanitary Association, here assembled in its seventeenth annual convention, recommends to the Honorable Secretary of Agriculture that the provision made in the Act of Congress of 1884 for the shipment interstate of tick infected cattle for immediate slaughter be repealed.

RESOLVED, that a copy of this resolution be forwarded to the Honorable Secretary of Agriculture, Washington, D. C.

RESOLVED, that this association accept the invitation of President Marshall, of the American Veterinary Medical Association, to join in the European tour of Veterinary Colleges, Experiment Stations, etc., to be conducted by the Bureau of University Travel and under the direction of Dr. Adolph Eichhorn, of the U. S. Bureau of Animal Industry, during the summer of 1914, and

RESOLVED, that we declare this an official tour of this association and urge all members who find it possible to make this tour for the educational and other advantages that must accrue from such a contact with the institutions and officials who have charge of live stock sanitary work in most of the European countries.

WHEREAS, the plan presented to this association by Dr. O. E. Dyson providing for State accredited herds of pure bred registered cattle when free from tuberculosis, represents a modern standard of health which should prevail in every strictly high-class herd throughout the United States.

THEREFORE BE IT RESOLVED, that the association endorse and urge the live stock sanitary officials of the various States to cooperate to the fullest extent in promoting the proposed plan, and that all certificates of health issued for cattle from such accredited herds be accepted at all times in lieu of the present requirements of the various States covering the receipt of cattle from the State of Illinois.

FURTHERMORE BE IT RESOLVED, that the proposed plan of dealing with the problem of tuberculosis in pure bred cattle herds be adopted for the purpose of establishing a reciprocal exchange of cattle between the various States and thereby enable reputable breeders to purchase and receive, or to sell and deliver cattle from State accredited herds without the annoyance, expense and needless delay now occasioned by the lack of uniform requirements covering the interstate movement of cattle which are free from tuberculosis as demonstrated by a reliable and authoritative tuberculin test.

On account of the important part which meat inspection plays in the conservation of public health and the careful study given this
subject, by Dr. V. A. Moore as expressed in his paper read before this association, BE IT RESOLVED:

That this association strongly endorse his address as it relates to Federal, State and Municipal Inspection and recommends that all members use their best efforts in encouraging the introduction of State and Municipal Inspection in their respective States to supplement and complete the work at establishments over which the Federal Government does not have jurisdiction.

This Association further recommends that all who desire reliable information regarding the efficiency of Federal Inspection procure this report.

RESOLVED, That this Association heartily indorse the work of the National Commission Milk Standards, and

That it be incorporated in the publication of our Annual Proceedings.

RESOLVED, That this Association extend a vote of thanks to the essayists and all others who have helped to make this program one of the best in our history.

RESOLVED, That the Chairman of this Association appoint a committee to co-operate with the Committee of the Laboratory Section of the American Public Health Association for the preparation and standardization of tuberculin and mallein.

C. E. COTTON, Chairman.

REPORT OF THE COMMITTEE ON UNIFORM REGULATIONS.

In reviewing the regulations of the several states, respecting the handling of cattle originating in areas quarantined on account of the existence of Southern or Texas fever, we find such a variation, that it is considered advisable to dwell at length on our endeavor to reconcile the differences that exist.

A number of states permit tick infested cattle to be shipped in for purposes other than immediate slaughter during the months of January, November and December of each year. In that group are 31 states, 27 of which probably have not thus received a shipment in ten years.

Eight states permit the movement into them of cattle from the quarantined area for purposes other than immediate slaughter during January, November and December, provided they come from counties in which co-operative tick eradication is systematically conducted, and they have been continuously kept on premises known to be free of infection and are inspected and certified, etc., etc.

One state accepts cattle into its free area, from November 16 to January 16 of each year. One state allows their importation from the quarantined area into its free area after having been dipped, sprayed or otherwise treated in oil or arsenical solution.

A number of states have no open season, but permit quarantine cattle to be moved into their free areas after having been dipped, sprayed or otherwise treated.

We notice that the states within the original quarantine area, and those within close proximity to them, have from time to time changed their regulations, each time making it harder to move diseased cattle into them.
Maine, Vermont and Oregon apparently are standpatters on the cattle tick problem; whereas, Georgia, Tennessee, Arkansas, Kentucky, South Carolina, Texas, Oklahoma and some other southern states are progressive and write annual platforms, slowly but surely thrusting, into everlasting oblivion the wasteful, useless parasite.

Five years before Smith and Kilborne discovered the presence of the micro-organisms of Texas fever in the red blood corpuscles of a tick-infested cow; five years before it was apparent that the tick must be present to convey the infection of Texas fever, Congress created the Bureau of Animal Industry. It authorized the Commissioner of Agriculture to prepare such rules and regulations as were necessary for the speedy and effectual suppression and extirpation of contagious, infectious and communicable diseases. The provision was made "That the so-called splenetic, or Texas fever, shall not be considered a contagious, infectious or communicable disease within the meaning of the law, as to cattle being transported by rail to market for slaughter, when the same are unloaded only to be fed and watered in lots on the way thereto."

We can discern only rational, reasonable and sensible legislation in the provision made at that time, for shipping cattle from the tick area, interstate to markets for immediate slaughter. It was absolutely necessary to provide adequate markets for the cattle raised in Texas and other southern states. The problem was how to get those cattle through without exposing native cattle to the disease. Dr. M. R. Trumbower, inspector, Bureau of Animal Industry, reported to the Commissioner of Agriculture, August 15, 1884, that of 964 head of cattle received at Chicago, which had been previously exposed to ticks, 720 head were condemned and delivered to the rendering tank." The losses in those days from mixing infectious and non-infectious cattle were terrible.

J. H. Fullinwider, inspector, Bureau of Animal Industry, reported to the Commissioner of Agriculture in 1884, an outbreak of southern cattle fever, caused by unloading pure-bred Shorthorn cattle in the railroad stock pens at Hannibal, Mo. The same inspector recommended that the only effectual remedy to prevent such occurrences, was to "Have separate pens set apart, for the exclusive use of Texas cattle, and never allow them to be unloaded in pens used for the accommodation of other cattle, except during months when sharp frosts are experienced."

Nearly three decades have elapsed since the creation of the Bureau of Animal Industry by Congress. As Mohler says: "The classic discovery of Smith and Kilborne, in connection with Texas fever, would without anything else justify its establishment."

The regulations of the Department of Agriculture, based on the Act of Congress of 1884, were absolutely correct for dealing with the tick, and remained so, until methods were evolved and proved practical and beneficial for eradicating it. This nation has found it necessary at times to even amend its Constitution, and in this day of enlightenment we have the temerity to say, when in the course of events, the urgent needs and necessities of this nation require that the Constitution shall be amended, we will make such changes as our patriotism and consciences deem adequate. With the present day knowledge of the tick, the ability to accomplish its eradication and the economic importance to the nation of raising more and better cattle in the southern states, render the antiquated law permitting the shipping of diseased-tick-infested animals entirely obsolete.

We confidently believe that everybody who has anything to do with quarantined cattle, would prefer that they be freed of ticks before leav...
ing their native farms. It is our opinion that the following regulation
would accomplish the present needs. It would stimulate and hasten
tick eradication in the South, and thus provide better cattle. It would
obviate the necessity of maintaining duplicate cattle pens at all the
larger market points, and at many points by railroad companies. It
would do away with the quarantining of southern cattle cars, at points in
the free area. It will not decrease the number of cattle brought into the
free area. On the other hand, it will stimulate their movement. It
will prevent diseased cattle from being thrust upon you. It will permit
cattle to come for any purpose, at any time, and to any market or dis-
trict, for stockers or feeders. It will make the shippers and producers
from the quarantined area richer by several dollars for each head
shipped and will make nobody the loser. It would do away almost en-
tirely with the unpleasant and costly prosecutions of railroads, for fail-
ing to placard cars and for other lapses of regulations. It would facili-
tate the sale of cattle from the south, on the northern markets.

The benefits are manifold, and clearly apparent to everybody.

This is the proposed uniform state regulation:

It is hereby ordered that no cattle of any area quarantined on ac-
count of the existence of southern or Texas fever, outside of the state of ................................, shall at any time be transported, driven, or
allowed to drift therefrom into any portion of this state except as here-
inafter provided in paragraphs (a) to (g).

(a) Cattle shall be free of ticks (Margaropus annulatus).

(b) Cattle shall be dipped twice within an interval of from five to
ten days in a permitted arsenical solution.

(c) The first dipping shall be done in the county in which the
cattle originate under the supervision of an inspector authorized by the
state authorities having under their supervision the live stock sanitary
work, and his certificate shall accompany the cattle to the point where
they are dipped the second time and be delivered to the inspector of the
Bureau of Animal Industry.

(d) The second dipping shall be done at some point in the quaran-
tine area under the supervision of an inspector of the Bureau of Animal
Industry who shall issue a certificate that said cattle are free of ticks
and said certificate shall be attached to the way bill and accompany the
shipment to its destination.

(e) A report shall be made to the State Veterinarian, ..............
............... , by the Bureau Inspector, for each shipment made on above
mentioned certificate.

(f) Cattle after the second dipping shall be shipped only in cleaned
and disinfected cars and boats.

(g) The effect of this order is to prohibit the movement from any
quarantined area into the state of ............. of infectious cattle.

Your Committee has the honor to further recommend that this Com-
mittee be increased in number to ten members, so as to include a rep-
resentative from the New England, and one each from the Atlantic,
Southern, Middle West, West, Northwest and Southwestern states, and
two representatives from live stock departments of transportation com-
panies. It shall be the earnest endeavor of the Committee to prepare
proposed uniform regulations and submit a copy to the officer of each
state long enough in advance of the meeting of this Association in 1914,
so that all differences and corrections may be made, as to permit of the
adoption of such regulations by the state representatives during the
meeting.

J. R. KIERNAN,
Chairman.
REPORT OF THE COMMITTEE ON CATTLE TICK ERADICATION.

Mississippi.

The following areas are respectfully recommended for release from quarantine, viz: Clay, Jasper, Smith and Scott Counties.

That portion of Leflore County, north of a line beginning where Bear Creek crosses the Leflore-Sunflower County line, hence following said creek east to its intersection with the Southern Railroad at Sheppard-town, Miss., hence following said railroad southwesterly to Morgan City at the intersection of Township line 17, Range 1 West, hence following said Township line East to its intersection with the Yazoo River.

The entire quarantined area of Lowndes, Holmes, Madison, Attala, Rankin, Noxubee, Chickasaw counties.

That portion of Claiborne County, north of Bayou Pierre River and east of Range line 3 east Washington-Meridian.

That portion of Warren County, included in Palmyra Island.

The entire quarantined area of Yazoo County, excepting that area west and south of a line beginning at the Big Black River at intersection of Township line 12 with the Yazoo-Sharkey County line, thence east along said Township line to its intersection with Range line 3 West, thence north along Range line 3 West, thence north along Range line to the Yazoo-Washington County line.

That portion of Sharkey County south of a line beginning at the intersection of Township line 13, north with the Yazoo-Sharkey County line, hence west along said Township line to the Y. & M. V. R. R., hence south along said railroad to Riverside junction, hence west along the Riverside division of said Y. & M. V. R. R., to the Sharkey-Issaquena County line.

That portion of Bolivar County, west of a line beginning at a point on the Washington-Bolivar County line at the intersection of Bogue Phaliah with said line, hence north along said Bogue Phaliah to the point where it intersects Range line 6, West, Township 23, North, near Arnold, Miss., hence north along Range line 6, West, to the Bolivar-Coahoma County line.

That portion of Newton County, included within a line beginning at a point where Chunky Creek intersects Township line 7, north, hence following Chunky Creek in a southeasterly direction to the A. & V. Railroad, thence in a westerly direction along said railroad to the point where Range line 11 East, intersects said railroad, hence south along said range line to the Jasper-Newton County line, hence west and north along the Newton County line to the point where Township line 6 East, intersects said Township line to the point where said line intersects Range line 10, East, thence north along said Range line to Township line 7, hence east along said Township line to its intersection with Chunky Creek.

In that portion of the line including the A. & V. R. R. no non-infectious shipping point is recommended.

That portion of Grenada County, north of the Yalobusha River.

That portion of the quarantined area of Leake County south of Pearl River and west of Lahatchee Creek (Yellow Creek).

That portion of the quarantined area of Monroe County, west of the East Fork of the Tombigbee River and south of the St. L. & St. F. Railroad. Amory recommended as a non-infectious shipping point.
That portion of Jones County north and east of Leaf River.
That portion of the quarantined area of Lafayette County, north of Yockana River and west of Range line 1.

**Alabama.**
That portion of Jackson County, north of a line beginning at the intersection of Township line 2, south, with the Madison-Jackson County line, thence east along said Township line to the Tennessee River, thence northeasterly along said River to its intersection with Township line 1, South, thence east along said Township line to the Alabama-Georgia line.

**Tennessee.**
That portion of Marion County, Tennessee, remaining in quarantine.

**Georgia.**
The counties of Franklin and Morgan.

**Texas.**
Territory in Texas Recommended for Release from Quarantine on account of Texas or Splenetic Fever.
The remainder of Foard, Knox and Haskell Counties; that part of Throckmorton County lying north and west of a line commencing where the Haskell-Throckmorton public road intersects with the west line of Throckmorton County, following said road easterly to the southeast corner of section 267, B. B., B. & C. R. R. survey; thence northerly along the Throckmorton-Seymour public road to the northeast corner of section 276, B., B., B. & C. R. R. survey; thence west on section line north of section 267, 238, 237, 210, 209 and 181 to the northeast corner of section 176; thence north on the section line east of sections 177, 178, 179 and 180 to the northeast corner of section 180 of the B., B., B. & C. R. R. survey; thence east on section line south of section 22, G. C. & S. F. R. R. survey, to the southeast corner of said section; thence north along the east section line of said section to the Throckmorton-Baylor County line; thence west on said county line to the northwest corner of Throckmorton County, and that part of Wilbarger County lying north and west of Pease River.

**Oklahoma.**
The following territory in Oklahoma is recommended for release from Texas fever quarantine, effective March 1, 1914:

<table>
<thead>
<tr>
<th>County</th>
<th>Square Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>648</td>
</tr>
<tr>
<td>Tillman</td>
<td>738</td>
</tr>
<tr>
<td>Grady</td>
<td>432</td>
</tr>
<tr>
<td>Craig</td>
<td>324</td>
</tr>
<tr>
<td>Ottawa</td>
<td>162</td>
</tr>
<tr>
<td>McClain</td>
<td>36</td>
</tr>
<tr>
<td>Osage</td>
<td>252</td>
</tr>
<tr>
<td>Delaware</td>
<td>126</td>
</tr>
</tbody>
</table>

**Total** 2,718 sq. mi.
REPORT OF COMMITTEE ON EXTENSION WORK OF THE INTERNATIONAL COMMISSION ON CONTROL OF BOVINE TUBERCULOSIS.

Your Committee is impressed with the feeling that the work of the International Commission and the work of such bodies as the British Royal Commission, should be utilized to much better effect than they can possibly be utilized in the absence of special organized effort. The question before your Committee has been essentially, what can the United States Live Stock Association do to further greater utilization of such available material? We believe that this is a question which our Association here should consider carefully and which it may consider very profitably. The extent of the International Commission's usefulness will probably vary directly with the number of people reached and helped.

In considering the form to be adopted for this report, it has been thought best to make a statement:

1st: Of what appeared to be certain fundamental truths, and
2d: A statement of recommendations.

Fundamental Truths:

Fundamental Needs: There appear to your Committee to be plainly evident certain great needs:

1st: Intelligent public interest, confidence and support.
2d: Concerted effort by those interested in tuberculosis control work.
3d: Better State organization, supplemented by all proper Federal aid.

It is evident, of course, that little of permanent value has ever been accomplished or can be accomplished in this or any similar line of work without an intelligent public interest, confidence and support. It is apparent to everyone who is at all well informed concerning veterinary police control work that there has been a serious lack of uniformity in organization, method and concerted action in general. Some States are doing little or nothing along the line of bovine tuberculosis control work. Other States have been making spasmodic jumps forward, followed invariably by disastrous slumps; a few States have been making steady progress and getting some permanent results.

Your Committee would call attention to the evident weakness and inefficiency of many veterinary state organizations for live stock sanitary control work. It appears to be altogether too common for state control work to be periodically disarranged or overturned. In many places the responsible state authorities who would aid and do good work are hampered either by political affiliations or by knowledge based on experience that the permanency of their job depends upon ability to please politicians and stockmen rather than to accomplish good work.

Your Committee holds the following conditions are essential for effective State Live Stock Sanitary Control Work:

There must be stability;
The greatest possible freedom from political influences;
Reasonable supply of funds;
Public confidence, and that
There must be in any such effective work direct co-operation between the veterinarian and the stock man.

Information Available: The International Tuberculosis Commission has furnished certain educational material; first, in the form of a report consisting of a series of resolutions expressing the judgment of the Com-
mission upon important questions considered; and, secondly, a state-
ment, in very simple wording, of essential facts concerning bovine tuber-
culosis, which the Commission believes every stock owner ought to
know. This material has been apparently accepted in this country as
carefully stated and reliable and this material is now freely available
for distribution. All this and other information is available—but how
to get it to the people, and how to influence the people by it, is one of,
the great questions which we believe this Association can very profit-
ably consider.

There are plenty of outlets available—outlets which lead directly to
people whom this association ought to reach. Some of these will be-
mentioned later in this report.

Forces Available For Aid: There is practically no limit to the num-
ber and power of forces available for aid in this work. The great prob-
lem is to work up to a utilization of them. The agricultural press wel-
comes reliable information along this line. There are deans of agricul-
tural colleges and veterinary teachers in agricultural colleges all over
the country. The introduction of agricultural teaching and allied sub-
jects is coming very rapidly. In one Northwestern state we have some-
thing like 300 teachers of agriculture, whose work has been undertaken
within a very few years. The same condition of affairs has come about
rapidly in many other states and will soon be the rule in all states where
agriculture is a dominant industry. These young men are graduates
of agricultural colleges, interested in this work and anxious to be help-
ful. There are veterinary sanitation workers all over the United States,
breeders' associations, farmers' clubs and granges everywhere. All these
possible aids are available. The difficulty appears to be an organization
and a plan big enough to utilize them.

Many of our agricultural colleges and experiment stations have de-
veloped what is known as Extension Divisions. Most of our agricultural
states have organized farmers' institutes—quite a number of agricultural
colleges now have their own editors—a part of whose business it is to
secure and properly prepare for the purpose, helpful agricultural in-
formation for local papers.

As a concrete illustration of something already done along this line
we have one Western state where arrangement was made with its Agri-
cultural College Extension Division to republish Farmers' Bulletin B. A.
I. No. 473 on Bovine Tuberculosis. This is the simple statement pre-
viously referred to as prepared by the International Commission on
Control of Bovine Tuberculosis. This Farmers' Bulletin was republished
in what is known as the Farmers' Reference Library in an edition of
60,000 and given a very wide distribution through the Extension Di-
vision's mailing list. In this same state there were distributed, through
the farmers' institute corps and otherwise, nearly 10,000 copies of the
B. A. I. Farmers' Bulletin No. 473. Every one of these copies went into
some man's hands who got it because he wanted it, and it was, there-
fore, presumably read and preserved.

The agricultural college and experiment station in this same state
furnishes material for one plate page, which is used very freely by local
papers in this and several adjoining states—the material for this plate
page being furnished entirely by members of the agricultural college
and experiment station. There is another plate page gotten out under
different management, in the same state which uses similar copy. The
agricultural college and station publishes every two weeks a sheet made
up of short articles, suitable for clipping. This is sent to local papers
over the state and they are invited to clip and use freely, which they do.
The editor of these publications is anxious to receive just such copy as members of this association could easily furnish.

All of the work just mentioned as having been done in this state, was done at a trifling expense of time and effort by those who saw the opportunity and used it, and it is safe to say there is no state in the Union where it is easier to secure and enforce rational legislation against tuberculosis, human or bovine.

Recommendations:

In view of these considerations, your Committee recommends for the present, a widespread effort in each state to utilize agencies already in the field and in sympathy with this work.

We suggest that members of this association should endeavor to get in as close touch as possible with the extension divisions or similar agencies at the agricultural colleges and experiment stations, with state farmers' institutes and agricultural college editors. Where there is lack of harmony or rivalry between the livestock sanitary control organization and agricultural college and station people the condition is unfortunate and should be remedied as soon as possible, so as to make hearty co-operation possible. We suggest that, where it seems practicable, members of this association should endeavor to secure republication and wide distribution of commission material, through Extension Divisions. This may be put either in the form of press bulletin or in a farmers' reference library series; and further that members of this Association should help as actively as possible in the work of securing a widespread, intelligent public interest and confidence by furnishing copy for and otherwise utilizing plate page and similar publications previously mentioned.

We recommend further that this Association, as a body, and its members as individuals, should give loyal support to a recommendation from the International Commission on Control of Bovine Tuberculosis, to the effect that arrangements be made for federal registration and recognition of pure bred herds of cattle, demonstrated in satisfactory way to be free from tuberculosis. Such support should be given, of course, after the adoption and putting into operation of this recommendation, providing such action is taken by the Federal Department of Agriculture, which now appears probable.

It may be advisable later for this Association to develop something in the way of a Push Bureau for concerted work along the lines suggested, but for the present your Committee recommends that the start be made according to these recommendations and the work be made to grow as rapidly as possible into whatever larger thing appears later to be practicable.

M. H. REYNOLDS, Chairman.

J. R. MOHLER.

J. J. FERGUSON.
REPORT OF THE COMMITTEE ON UNIFORM METHODS FOR THE CONTROL OF HOG CHOLERA.

Committee.

Dr. Paul Fischer, Ohio, Chairman.
Dr. A. T. Peters, Illinois, Secretary.
Dr. W. H. Dalrymple, Louisiana.
Dr. Marlon Dorset, Washington, D. C.
Dr. A. T. Kinsley, Missouri.

The Committee submits the following report:

Number of Swine in the United States.

A study of the statistics given in the year book of the National Department of Agriculture for 1912 credits the individual states of the Union with a total of 65,410,000 swine, distributed as follows:

<table>
<thead>
<tr>
<th>State</th>
<th>Number of Swine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>9,689,000</td>
</tr>
<tr>
<td>Illinois</td>
<td>4,640,000</td>
</tr>
<tr>
<td>Missouri</td>
<td>4,491,000</td>
</tr>
<tr>
<td>Indiana</td>
<td>4,031,000</td>
</tr>
<tr>
<td>Nebraska</td>
<td>4,267,000</td>
</tr>
<tr>
<td>Ohio</td>
<td>3,578,000</td>
</tr>
<tr>
<td>Kansas</td>
<td>2,808,000</td>
</tr>
<tr>
<td>Texas</td>
<td>2,544,000</td>
</tr>
<tr>
<td>Georgia</td>
<td>2,098,000</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>2,051,000</td>
</tr>
<tr>
<td>Arkansas</td>
<td>1,738,000</td>
</tr>
<tr>
<td>Kentucky</td>
<td>1,724,000</td>
</tr>
<tr>
<td>Minnesota</td>
<td>1,702,000</td>
</tr>
<tr>
<td>Louisiana</td>
<td>1,642,000</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1,577,000</td>
</tr>
<tr>
<td>Tennessee</td>
<td>1,574,000</td>
</tr>
<tr>
<td>Alabama</td>
<td>1,533,000</td>
</tr>
<tr>
<td>North Carolina</td>
<td>1,450,000</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>1,410,000</td>
</tr>
<tr>
<td>Michigan</td>
<td>1,382,000</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1,141,000</td>
</tr>
<tr>
<td>South Dakota</td>
<td>1,104,000</td>
</tr>
<tr>
<td>Florida</td>
<td>954,000</td>
</tr>
<tr>
<td>Virginia</td>
<td>880,000</td>
</tr>
<tr>
<td>California</td>
<td>830,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65,410,000</strong></td>
</tr>
</tbody>
</table>

Value of Swine in the United States.

Farm Value and Pork Value.

These sixty-five millions of swine have an estimated farm value of $523,328,000.00, or over half of one billion dollars. For some reason the number of swine in 1913 dropped to 61,178,000, while their value increased to $603,109,000.00, or in other words, there was a decrease in number to the extent of over 4,000,000 head and an increase in value of nearly $80,000,000.00. The value of these sixty-five millions of swine, when made into pork or finished product, is at least twice this sum, or in round numbers, $1,200,000,000.00.
Loss From Hog Cholera.

Information furnished the committee by the officials in charge of the control of animal diseases in various states in response to a letter of inquiry shows that the approximate loss from hog cholera from the twenty-six states which reported exceeds fifty-five million dollars, itemized as follows:

<table>
<thead>
<tr>
<th>State</th>
<th>Per Cent</th>
<th>Valued at:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>15</td>
<td>$15,696,000.00</td>
</tr>
<tr>
<td>Illinois</td>
<td>10</td>
<td>4,530,800.00</td>
</tr>
<tr>
<td>Missouri</td>
<td>30</td>
<td>10,222,200.00</td>
</tr>
<tr>
<td>Minnesota</td>
<td>5</td>
<td>1,080,750.00</td>
</tr>
<tr>
<td>Nebraska</td>
<td>10</td>
<td>4,000,000.00</td>
</tr>
<tr>
<td>Indiana</td>
<td>30</td>
<td>3,634,800.00</td>
</tr>
<tr>
<td>Georgia</td>
<td>5</td>
<td>770,250.00</td>
</tr>
<tr>
<td>Kansas</td>
<td>20</td>
<td>5,480,800.00</td>
</tr>
<tr>
<td>Ohio</td>
<td>10</td>
<td>3,670,900.00</td>
</tr>
<tr>
<td>Alabama</td>
<td>12</td>
<td>1,188,120.00</td>
</tr>
<tr>
<td>Tennessee</td>
<td>25</td>
<td>2,787,500.00</td>
</tr>
<tr>
<td>Arkansas</td>
<td>6</td>
<td>614,640.00</td>
</tr>
<tr>
<td>Michigan</td>
<td>10</td>
<td>1,418,000.00</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>2</td>
<td>282,500.00</td>
</tr>
<tr>
<td>North Dakota</td>
<td>2</td>
<td>100,280.00</td>
</tr>
<tr>
<td>Kentucky</td>
<td>20</td>
<td>2,326,000.00</td>
</tr>
<tr>
<td>Florida</td>
<td>10</td>
<td>518,000.00</td>
</tr>
<tr>
<td>California</td>
<td>5</td>
<td>376,300.00</td>
</tr>
<tr>
<td>South Carolina</td>
<td>5-10 (7½%)</td>
<td>478,660.00</td>
</tr>
<tr>
<td>New York</td>
<td>1</td>
<td>95,890.00</td>
</tr>
<tr>
<td>Maine</td>
<td>½</td>
<td>65,150.00</td>
</tr>
<tr>
<td>Montana</td>
<td>2</td>
<td>36,420.00</td>
</tr>
<tr>
<td>Delaware</td>
<td>10</td>
<td>65,000.00</td>
</tr>
<tr>
<td>Vermont</td>
<td>½</td>
<td>6,525.00</td>
</tr>
<tr>
<td>Wyoming</td>
<td>1-20</td>
<td>225.00</td>
</tr>
<tr>
<td>Idaho</td>
<td>(5,000 hogs) 2½</td>
<td>60,000.00</td>
</tr>
</tbody>
</table>

The Prevalence and Distribution of Hog Cholera.

The area reported infected for each state and the percentage of infection for the given areas are tabulated below:

<table>
<thead>
<tr>
<th>Area</th>
<th>Percentage of Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>Entire state</td>
</tr>
<tr>
<td>Illinois</td>
<td>25 per cent of area</td>
</tr>
<tr>
<td>Missouri</td>
<td>Entire state</td>
</tr>
<tr>
<td>Minnesota</td>
<td>17 Counties</td>
</tr>
<tr>
<td>Nebraska</td>
<td>Practically entire state</td>
</tr>
<tr>
<td>Indiana</td>
<td>Entire state except two counties</td>
</tr>
<tr>
<td>Georgia</td>
<td>South half</td>
</tr>
<tr>
<td>Kansas</td>
<td>Small areas</td>
</tr>
<tr>
<td>Ohio</td>
<td>Entire state except some hill counties</td>
</tr>
<tr>
<td>Alabama</td>
<td>Entire state</td>
</tr>
<tr>
<td>Tennessee</td>
<td>One-third of state</td>
</tr>
<tr>
<td>Arkansas</td>
<td>One-fourth of state</td>
</tr>
<tr>
<td>Michigan</td>
<td>One-half of state</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Entire state except four counties</td>
</tr>
<tr>
<td>North Dakota</td>
<td>One-fourth of state</td>
</tr>
<tr>
<td>Kentucky</td>
<td>Entire state</td>
</tr>
<tr>
<td>Florida</td>
<td>Entire state</td>
</tr>
</tbody>
</table>
California ................... One-fourth of counties ................. 7
South Carolina ................ One-half of state .................. 7
New York ...................... Wide spread ...................... 7
Montana ...................... 5 square miles .................... 0.1
Delaware ...................... One-fourth of state .............. 0.1
Vermont ...................... None ..........................
Wyoming ...................... 800 square miles ................ 50
Texas ......................... Small areas ......................
Idaho ......................... Two centers .................... ¼
Utah ......................... General ........................

In studying the conditions that existed in previous decades, and covering a period of about forty years, the committee finds that the losses from hog cholera have very probably averaged over fifty million dollars annually during these decades.

In 1897, Dr. D. E. Salmon, then chief of the United States Bureau of Animal Industry, states in the annual report of that Bureau: "The losses (from hog cholera) have, however, been tremendous, being placed by some as high as $100,000,000.00 a year, an estimate which does not appear exaggerated in the light of the careful inquiries in the state of Iowa, from which it was concluded that this one state lost from $12,000,000 to $15,000,000 worth of swine in a single year."

Financial Loss Tremendous.

Since this loss is a regular annual occurrence, its meaning can best be brought home to us by looking upon it as the lost interest on a permanent investment. It would require an investment of $1,250,000,000.00 at 4 per cent to yield $50,000,000.00, and since this loss has been going on at least forty years, the total loss has already exceeded $2,000,000,000.00, or with compound interest, to more than twice the hypothetical investment of $1,250,000,000.00 referred to. Measured in the value of the finished product (pork) these figures would practically be doubled.

The money involved in these losses would build a transcontinental railroad, at $10,000.00 a mile, through the United States every year, or it would support, on a million dollar a year income basis, a great university and agricultural experiment station for each state of the Union, and half a dozen extra universities for such states as needed them.

With these figures before us and the problem of the high cost of living staring us constantly in the face, how many questions are of greater economic importance than that of the control of hog cholera for the prevention of these enormous losses?

Present Efforts to Control Hog Cholera.

Now let us see what is being done toward eliminating this drain on our national economy.

The value of Dorset-McBryde-Niles Anti Hog Cholera Serum has now been practically universally conceded. It was therefore believed that a knowledge of the extent to which the different states gave financial support to official hog cholera serum institutes would be of value to the committee in the way of suggesting possible remedial measures.

Inquiries made to obtain this information were sent out in June, but by November 1st only 33 states had responded, and some of these gave only incomplete answers to questions. However, the larger and more important pork producing states practically all replied, as follows:
Serum Laboratories in the United States.

1. Money Invested in Serum Laboratory—

<table>
<thead>
<tr>
<th>State</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>$48,000.00</td>
</tr>
<tr>
<td>Tennessee</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>South Carolina</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>Georgia</td>
<td>$6,000.00</td>
</tr>
<tr>
<td>Florida</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>Missouri</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>California</td>
<td>$16,000.00</td>
</tr>
<tr>
<td>Michigan</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Indiana</td>
<td>$25,000.00</td>
</tr>
<tr>
<td>Kansas</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>Nebraska</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Kentucky</td>
<td>$16,000.00</td>
</tr>
<tr>
<td>Tennessee</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>Minnesota</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>Illinois</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>Alabama</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Louisiana</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Ohio</td>
<td>$100,000.00</td>
</tr>
</tbody>
</table>

Total...........................................$299,000.00

2. Quarters in Agricultural College or Experiment Station Buildings—

- New York—Quarters in Veterinary College Buildings.
- North Dakota—Quarters in Agricultural College Buildings.
- Texas—Quarters in Agricultural College Buildings.
- Maryland—Quarters in Agricultural College Buildings.

3. No Serum Laboratory—

- Montana
- Rhode Island
- New Hampshire
- Connecticut
- Maine
- Massachusetts
- Wyoming
- Oregon
- Vermont
- Idaho
- Virginia
- West Virginia
- North Carolina
- Wisconsin
- South Dakota
- Mississippi
- New Hampshire
- Virginia
- North Carolina
- Louisiana
- Arkansas
- Alabama
- Tennessee
- South Carolina
- Georgia
- Florida
- Georgia
- Pennsylvania
- Illinois
- Missouri
- Arkansas
- Louisiana
- Ohio
- Minnesota
- Wisconsin
- South Dakota
- Michigan
- California
- Florida
- Illinois
- Michigan
- Indiana
- Pennsylvania
- New York
- New Jersey
- New Mexico
- Arizona
- Nevada
- Delaware
- Washington
- Oregon
- Colorado
- Utah
- Nevada
- New Mexico (few hogs in New Mex—only information received)
- Arizona
- Nevada
- Washington
- Arizona
- Nevada
- Washington
- Oregon
- Colorado
- Utah
- New Mexico

Summarizing these replies, the committee finds that twenty-three states have provided serum laboratories of greater or less pretentiousness (usually less) at a total expense of $299,000.00.

Largest Laboratories.

The cost of the laboratories of the states of Ohio, Iowa, Indiana and Illinois aggregate $205,000.00, while the cost of the laboratories in the other eighteen states together is about $100,000.00. In some of these latter, no special laboratories were provided, but already existing quarters or veterinary laboratories of agricultural experiment stations and colleges were utilized for the purpose.

Support of Serum Laboratories Inadequate.

The amount expended for salaries and running expenses of these institutions is practically nothing except in Ohio, Illinois and Missouri. In the latter two states about $30,000.00 was appropriated last year for the manufacture and distribution of free serum. In all of the other states the serum is sold at an estimated cost price of production, which on an average ranges from 30 to 40 cents per protective dose for a fifty-pound hog. The money obtained in this way, in most of the states is used for operating the plant, but in a few states it is deposited
in the general treasury and cannot again be used for hog cholera work
until the next convening legislature re-appropriates it for that specific
purpose. The efficiency of an already woefully inadequate plant is thus
still further reduced. It is almost needless to state that most of these
laboratories are not by any means properly manned nor equipped.

Present Hog Cholera Legislation.

To obtain information regarding existing legislation and the en-
forcement of regulations for the control of hog cholera in the different
states at this time, the following question was incorporated in one of
the circular letters of inquiry referred to, viz.:

"What sanitary regulations have you made in your state as to:

a. Inter-state shipments of swine?
b. Intra-state shipments of swine?
c. Disinfection of public stock yards, vehicles of transportation,
wagons, cars, etc?
d. Quarantining of infected farms and premises?
e. Disposal of carcasses of cholera infected swine?

The replies are tabulated below:

(a)

Regulations in Regard to Inter-state Shipments of Swine.

Iowa ...................... Health certificate, also immunization with
serum or serum simultaneous for show
animals.

Illinois ..................... None.
Missouri ..................... Health certificate and serum.
Minnesota ..................... Health certificate.
Indiana ..................... Health certificate, cleaning and disinfection
of cars.

Georgia ..................... None.

Kansas ..................... Health certificate for breeding animals.
Ohio ..................... Hogs from public stock yards—slaughter
only.
Alabama ..................... Health certificate.

Tennessee ..................... Hogs from public stock yards—slaughter
only.

Arkansas ..................... Health certificate and serum.

Michigan ..................... None.
Pennsylvania ................ Health certificate.
North Dakota ................ Health certificate and serum.
Kentucky ..................... Health certificate and serum.

Florida ..................... None.
California ..................... Health certificate.
South Carolina ................ Health certificate.

New York ..................... Inspection?
Maine ..................... Quarantine 90 days.

Idaho ..................... Health certificate and serum immunization
required for all swine.

Montana ..................... Health certificate and serum.

Delaware ..................... None.

Vermont ..................... None.

Wyoming ..................... Health certificate

Texas ..................... Serum immunization required.
Utah .................. Health certificate—15 days quarantine—serum treatment all swine.
Maryland ............. Health certificate.
Massachusetts ........ None.
Mississippi ........... Health certificate.
Nebraska .............. Health certificate.
Nevada ................ None.
New Hampshire ........ None.
New Jersey ............ None.
New Mexico ............ None.
North Carolina ........ Health certificate.
Oklahoma .............. Health certificate.
Oregon ................ Health certificate and serum.
Rhode Island .......... None.
South Dakota .......... Health certificate.
Virginia .............. Health certificate, but only from locations where no infection has existed for six months.
Washington ............ Health certificate.
West Virginia .......... None.
Wisconsin .............. Health certificate and serum immunization for all swine.
Arizona ................ Health certificate—two weeks quarantine.
Colorado .............. Health certificate.
Connecticut ........... None.
District of Columbia ... None.
Louisiana .............. Health certificate.

Since the replies to questions (a) were very incomplete they were supplemented from “State Sanitary Requirements” (1913) issued by the United States Bureau of Animal Industry.

(b)

Regulations in Regard to Intra-State Movement of Swine.

Iowa ..................
Illinois ............... Restricted.
Missouri ............... None.
Minnesota .............. Forbidden.
Indiana ................ Cars used cleaned and disinfected.
Georgia ................. None.
Kansas .................. Ship under quarantine unless vaccinated.
Ohio .................... Restricted.
Alabama ................ None.
Tennessee ............... None.
Arkansas ............... None.
Michigan ................ Prohibited from large stock yards.
Pennsylvania ........... Restricted.
North Dakota ........... None.
Kentucky ............... Restricted.
Florida ................ None
California .............. None.
South Carolina .......... None.
New York ................ None.
Maine ................... None of healthy herds. Movement of infected hogs prohibited.
Idaho ................... None permitted of infected hogs.
Montana ................ None.
Delaware .................. Restricted.
Vermont .................. None of healthy hogs.
Wyoming .................. None from non-infected areas.
Texas ...................... See regulations.

(c)

Regulations in Regard to Disinfection of Public Stock Yards, Vehicles of Transportation, Wagons, Cars, Etc.

Iowa ...................... None.
Illinois ................... Feeble progress.
Missouri ................... None.
Minnesota ...................
Indiana ..................... Weekly disinfection of stock yards and disinfection of wagons.
Georgia ..................... None.
Kansas ..................... Disinfection when inspector deems necessary.
Ohio ...................... None except in Fayette County; rigidly enforced.
Alabama ................... Law, but not enforced.
Tennessee .................. None.
Arkansas ................... None.
Michigan ................... None.
Pennsylvania ............... Must be disinfected.
North Dakota ............... Required where infection exists.
Kentucky ................... None.
Florida .................... None.
California ................... Required where infection exists.
South Carolina ............. None.
New York ................... None.
Maine ...................... None.
Montana ................... Disinfection of infected premises.
Delaware ................... None.
Vermont ................... Disinfection of infected premises.
Wyoming ................... Disinfection where infection exists.
Texas ...................... None.
Idaho ...................... None.
Utah ...................... None.

(d)

Regulations in Regard to Quarantining of Infected Farms and Premises.

Iowa ...................... None.
Illinois ................... None.
Missouri ................... None.
Minnesota ................... Quarantine premises.
Indiana .................... Quarantine premises.
Georgia .................... None.
Kansas ..................... None.
Ohio ...................... None except in Fayette County.
Alabama ................... None.
Tennessee .................. None.
Arkansas ................... Premises quarantined.
Michigan ................... Attempt at quarantine.
Pennsylvania ............... Strict quarantine of premises.
North Dakota ............. Quarantine premises.
Kentucky ................ None.
Florida .................. None.
California ............... Quarantine of infected premises.
South Carolina .......... Attempt at quarantine of premises.
Montana .................. Quarantine of infected premises.
Delaware ................. Quarantine of infected premises.
Vermont .................. Quarantine of infected premises.
Wyoming .................. Quarantine of infected premises.
Texas .................... None.
Idaho ....................
Utah .....................

(e)

Regulations in Regard to Disposal of Carcasses of Cholera Infected Swine.

Iowa ...................... Bury or cremate.
Illinois .................. Cremate.
Missouri .................. Cremate.
Minnesota ................. Bury or cremate.
Indiana ................... Bury or cremate.
Georgia ................... No law.
Kansas .................... Bury.
Ohio ...................... Bury or cremate.
Alabama ................... Bury or cremate.
Tennessee ................ Cremate.
Arkansas .................. Cremate.
Michigan ................. Bury or cremate.
Pennsylvania ............. Bury or cremate.
North Dakota ............ Bury or cremate.
Kentucky .................
California ................ Cremate.
Florida ................... No law.
South Carolina .......... Bury or cremate.
Montana ................... Bury or cremate.
Delaware .................. Bury.
Vermont .................. Bury or cremate.
Wyoming .................. Bury or cremate.
Texas ..................... No law.
Idaho .................... Bury.
Utah ...................... Bury or cremate.

Enforcement of Laws and Regulations.

To the question "Are the sanitary laws and regulations of your State enforced entirely or in part?" the following replies were received:

Iowa ...................... As fully as possible.
Illinois .................. As fully as possible.
Missouri .................. Practically neglected.
Minnesota ................. To the best of ability.
Indiana ................... Fairly well enforced.
Georgia ................... In part enforced.
Kansas .................... Enforced.
Ohio ...................... Best efforts to enforce; rigid in Fayette-County.
Alabama .................. In part enforced.
Tennessee ................ Only in part.
Arkansas ............... Only in part.
Michigan ............... Only in part.
Pennsylvania ........... Fully enforced.
North Dakota .......... Partly enforced.
Kentucky ............... In part only.
Florida ................ Not enforced.
California ............. Entirely enforced.
South Carolina .......... Partly enforced.
Maine .................. Enforced.
Montana ................ Enforced.
Delaware ............... In part only.
Vermont ................ Enforced.
Texas .................. Enforced.
Wyoming ............... Enforced.
Idaho .................. In part only.
Utah ................... Enforced.

Thirty-Three States Have Laws Requiring Inspection.

Summarizing these replies we find that among forty-eight States and the District of Columbia, thirty-three States have laws requiring some sort of inspection before swine can be brought into the State. Twelve States—Arkansas, Idaho, Iowa, Kentucky, Missouri, Montana, North Dakota, Oregon, Texas, Utah, Wisconsin and Wyoming—require health certificates showing that swine for exhibition or breeding purposes (unless coming from free territory) have been treated with Dorset-McBryde-Niles serum, and four of these States—Idaho, Texas, Utah and Wisconsin, have the same requirement for all other imported swine.

11,000,000 Swine Absolutely Unprotected by State Laws.

Most of the remaining thirty-three States require mere "health certificates" or affidavits. Fifteen States, among them six States:

Georgia with .......... 1,783,684 swine
Illinois with .......... 4,031,000 "
Ohio with ............. 3,399,000 "
Michigan with .......... 1,245,000 "
Florida with .......... 800,000 "
West Virginia with... 356,000 " have no requirements whatever.

Here we have a total of 11,614,684 swine in six states that have absolutely no provisions in their laws to protect the health of these animals by restricting the shipment of diseased animals from other states.

Thirteen States Have Intra-State Regulations.

A study of replies to question b. shows that among the thirty-three states that require health certificates for animals shipped into the state, only thirteen have regulations restricting the intra-state movement of infected swine. Only twenty-six states, however, replied to this inquiry.

Only Eight States Disinfect.

The replies to question c. received from twenty-seven states show that only nine have laws or regulations providing for the disinfection of public stock yards, vehicles of transportation, wagons, cars, etc. Alabama has a law, but does not enforce it.
Only Twelve States Quarantine Infected Premises.

Among twenty-five states heard from twelve have regulations requiring the quarantine of infected premises.

Twenty-one States Bury or Cremate Cholera Carcasses.

Replies to question e. show that twenty-one out of twenty-five states have laws requiring burial or cremating of carcasses of cholera-infected swine, four of these states have no requirements of this nature, not even on paper.

Only Nine States Pretend to Enforce Hog Cholera Laws.

The replies of twenty-six states to the question, “Are the sanitary laws and regulations of your state enforced entirely or in part?” show that in

9 states these laws are enforced.
2 states as fully as possible.
1 state to the best of ability.
1 state best efforts to enforce are made.
1 state they are fairly well enforced.
10 states partly enforced.
1 state not enforced at all.
1 state practically neglected.

These replies speak for themselves, and the silence of the remaining twenty-two states does not admit of a very favorable interpretation.

The Hog Cholera Problem is Neglected.

To those of us who are at all familiar with the actual conditions that exist throughout the United States in livestock sanitary matters, it is evident that the hog cholera problem, as far as the observance of sanitary regulations is concerned, is a sadly neglected one.

Unless it is on account of the enormity of the problem of hog cholera control, or possibly because of our very familiarity with its ravages, it is difficult to understand why this disease, above all other animal plagues, is so entirely neglected in most states, and not given due attention by any single one.

The Solution of Problem.

There is no question but that the enforcement of proper sanitary regulations, such as control of shipments of diseased and exposed animals, disinfection of railway cars, stock yards, etc., the quarantine and disinfection of infected premises and the proper disposal of infected offal and of the carcasses of diseased swine will do much toward preventing the ravages of hog cholera.

Experiments made by the mere separation of healthy animals from the diseased, as indicated by clinical appearance and bodily temperature, and healthy animals removed to clean quarters, have shown conclusively that many animals can be saved by this simple procedure.

While we have in the Dorset-McBryde-Niles Serum treatment an effective preventive of hog cholera, and, in the very early stages of infection with the disease, a practical cure, production or manufacture of serum and virus used in this treatment should be fostered and encouraged and their use should be regulated.

214
The committee is of the opinion that wise legislation providing for practical regulations for traffic control in swine and the enforcement of special sanitary measures on public highways and on public and private premises, the regulation of the production and use of hog cholera serum, provision for its well planned and systematic use, the exposure of worthless proprietary nostrums which are sold as cures, and the inauguration by the livestock sanitary authorities of the country of a campaign of education in live stock sanitation, is the true solution to the problem of saving the annual waste of from fifty to one hundred millions dollars which this country suffers from the ravages of hog cholera.

The committee recommends legislation authorizing or empowering the proper state authority to make and enforce the regulations suggested in the following outline, or such parts thereof as are necessary for the protection of local (state) interests and with due regard to the interests of the nation.

**Hog Cholera Legislation.**

**Outline.**

**A. Providing for Quarantine and Shipping Regulations.**

1. The shipment or movement, interstate, of swine affected with cholera to be prohibited.
2. Exposed swine to be shipped under permit and placarded.
3. The movement of cholera infected swine over the public highways of the state to be prohibited.
4. Provision for moving exposed swine under permit in approved manner.
5. Carcasses of animals, and particularly of swine that have died of cholera, to be burned within twenty-four hours after death, or under special permit to be disposed of otherwise.
6. The shipment by rail of swine for purposes other than immediate slaughter to be permitted only through special pens and unloading chutes, or through portable chutes directly into wagons. If unloaded in regular loading pens, to be moved under permit in approved manner.
7. Public stock yards to be under close supervision and cleaned and disinfected at intervals determined by the proper state authorities.
8. Railway cars for the transportation of swine other than such as are intended for immediate slaughter to be cleaned, washed and disinfected before swine are loaded.
9. All cars in which diseased swine are found, or in which exposed swine were shipped for immediate slaughter, to be cleaned, washed and disinfected within twenty-four hours after unloading, or cars to be held until the presence or absence of diseases has been determined.
10. All cars or vehicles of transportation carrying cholera exposed swine to be placarded in a conspicuous manner, "Cholera Exposed Swine for Immediate Slaughter."
11. Owners of swine and persons in charge, including attending veterinarians, to report without delay to state authorities all outbreaks of cholera among swine.
12. Live stock sanitary authorities to quarantine all infected herds and premises, but may permit shipment of exposed swine for immediate slaughter as above provided.
13. Infected premises to be quarantined not less than sixty days after last traces of disease have disappeared and premises have been cleaned and disinfected.
14. Infected premises to be cleaned and disinfected under supervision prescribed by live stock sanitary authorities.

15. The live stock sanitary authorities to be given power to provide in a practicable manner against the dangerous pollution of streams with hog cholera virus and provide for the safe disposal of garbage liable to be infected with hog cholera virus.

16. To prevent the spread of hog cholera by swine shown for exhibition purposes, such swine to be treated with serum and virus not less than forty days prior to the opening date of the exhibit, or with serum alone not more than fifteen days before such time.

17. Provision for controlling for thirty days, by quarantine or otherwise, when deemed advisable by the proper authority, of all swine treated with serum-virus, or premises on which such swine are kept, to prevent danger of possible spread of infection from inoculated animals.

18. Penalty for failure to comply with regulations made under authority of this act by the live stock sanitary authorities of the state to be made punishable by fine, ten dollars for first offense, one hundred dollars, or imprisonment, or both, for second offense.

Note: Dissemination of the Hog Cholera Virus. While the committee does not feel prepared to make specific recommendations in regard to legislation on this subject, it is suggested that provision be made for thorough investigation as to the role played in the dissemination of hog cholera by carnivorous animals and carrion-feeding birds and mammals.

B.

Providing for the Production, Distribution and Administration of Hog Cholera Serum and Regulations of the Sale of Proprietary Remedies for Hog Cholera.

I. Production.

a. Location of buildings.
b. Construction of buildings.
c. Arrangement of plant.
d. Operation.

a. Location to be such that surroundings will not interfere with sanitary production and that their operation will not contaminate surrounding areas.

b. The construction of buildings to be of material that will permit of daily cleaning and disinfection, stone, brick, tile and concrete being especially recommended.

c. The arrangement and equipment of buildings to be such as to insure the production of a pure and uncontaminated product.

21. Swine to be kept in separate buildings located a sufficient distance from the building containing the bleeding (either virus or serum) and hyperimmunizing rooms and in which swine are to be placed for the latter purpose only.

22. The serum bleeding room, the virus bleeding room and the hyperimmunizing room to be separate and distinct rooms.

23. The preparation of serum, and the preparation of virus from the whole blood to be operations conducted in separate and distinct rooms without direct communication with each other or with the foregoing not
larger than an opening which will permit the transfer of receptacles containing the freshly drawn blood, and to be used for no other purpose.

25. Separate washing and sterilizing rooms to be provided.

26. The prepared serum and virus to be stored in properly cooled rooms.

27. Swine kept for virus production and the testing of serum to be properly isolated so as to reduce to a minimum the danger of spreading infection. Separate and distinct feed rooms to be provided for such animals.

28. Mortuary, crematory, abattoir and desicating or rendering plant operated for utilizing the waste products of the establishment to be located so as to prevent contamination from this source.

29. Necessary dressing and toilet rooms, properly equipped and located to be provided. Also bottling and packing rooms.

30. Provision for the sanitary disposal of all manure, offal and debris.

d.

31. The operation of serum plants to be under the direct supervision of a competent veterinarian or other professional man whose training and experience have fitted him for this work.

32. Prohibition of the sale of serum and virus produced from animals affected with any contagious disease other than hog cholera and of any contaminated serum or virus.

33. Provision requiring full and complete records of all steps in the manufacture and test of serum or virus.

34. The label on the container of serum or virus to show, the true name of the product, the name or number of the manufacturer, the date of preparation, or the date after which the manufacturer no longer guarantees the product and a serial number to identify the product with the records of the establishment.

II. Distribution and Administration.

35. Virus in connection with serum, or virus alone, to be administered by specially licensed persons only and under state supervision.

III. Regulation of the Sale of Proprietary Remedies for Hog Cholera.

36. Providing for the disclosure of the nature of advertised proprietary remedies and investigation of their merits by the livestock sanitary authorities of a state and publication of results of such investigation.

37. Providing for the enforcement of the laws, suggested in the foregoing, and regulations made under authority of the same by the proper authorities charged with the control of animal diseases.

38. Providing adequate penalty for violation of the provisions of such laws or of regulations made under authority of the same.

39. Specifying methods to be followed in prosecutions of violations.

40. Appropriation of necessary funds to administer the law.

PAUL FISCHER, Chairman.
REPORT OF COMMITTEE ON SUGGESTED MEETING AT PANAMA-PACIFIC INTERNATIONAL EXPOSITION,
SAN FRANCISCO, 1915.

Mr. D. O. Lively, Chief, Department of Live Stock Panama-Pacific International Exposition, addressed this Association at our last meeting, presenting a formal invitation from Hon. Charles B. Moore, President of the Panama-Pacific International Exposition, inviting us to hold our 1915 meeting as above indicated.

This Committee was appointed after preliminary consideration of the matter.

We have had considerable correspondence with several Exposition officials. We have maintained a strictly neutral attitude pending a further expression of the matter from the Association as a whole.

There seems to be very general sentiment favoring our meeting at San Francisco, providing the American Veterinary Medical Association meets there same time.

It has been suggested that a meeting of historical importance might be advisable to which would be invited live stock sanitary officials of other countries, making the meeting both National and International in character and scope.

Your Committee presents this report without recommendation, respectfully requesting that the whole matter receive careful consideration of the Association in Business Session.

This Committee respectfully recommends that it be continued.

S. H. WARD, Chairman.
W. H. DALRYMPLE,
J. J. FERGUSON.

REPORT OF THE SECRETARY-TREASURER:

Following our Sixteenth Annual Meeting, this office conveyed to the Chairman of the Committee on Agriculture and Forestry, United States Senate and Chairman of Committee on Agriculture, House of Representatives, resolutions passed by this Association calling upon Congress to confer upon the Secretary of Agriculture authority to permit the importation of certain Serums, Antitoxins, Vaccines and analogous products under such regulations as the Secretary might deem necessary, and that the preparation, sale and distribution of such products within the United States by establishments engaged in inter-state commerce be under the supervision of and subject to the regulations of the United States Department of Agriculture. Our communications were favorably acknowledged by both these gentlemen, and I have since been given to understand were material factors in encouraging the passing of B. A. I. order 196, effective July 1, 1913, regulating preparation, sale, barter, exchange, shipment and importation of above products. Copies of this order were mailed from this office to our entire mailing list.

The special committee, Mr. W. N. Waddell, chairman; Dr. J. I. Gibson and Dr. S. H. Ward, appointed by this Association to draft a letter to be addressed to members of the United States Congress praying Congress to increase appropriations for the use of Bureau of Animal Industry in its work towards Tick Eradication and control and eradication of Hog Cholera, presented the resolution which was approved by this Association. The resolution was subsequently transmitted in the form of a memorial to each member of Congress. Many favorable acknowledgments were received.
In line with the resolution passed by this Association, your Secretary addressed the Governor of Wisconsin and the President of the Wisconsin Live Stock Sanitary Board regarding the desirability of immediately conforming to the recognized policy of this Association regarding lay-testing of cattle for tuberculosis, which up to that time the Wisconsin Live Stock Board had officially recognized; and stating further that the Association had recommended to all State Live Stock Sanitary officials that certificates for inter-state shipments issued by the Sanitary Board of the State of Wisconsin be not accepted by other State Live Stock Sanitary Boards then members of this Association. Our communication was acknowledged by the Governor and by Mr. George Wylie, President Live Stock Sanitary Board, as follows:

“I acknowledge herewith receipt of your letter of December 19th, 1912. In reply will say that a Wisconsin State Law allows lay-men to administer the tuberculin test under certain restrictions after passing an examination given by the Live Stock Sanitary Board. Permits for such testing are issued subject to revocation at any time by said Board.

“In no case are tests made by lay-men approved for inter-state shipment by the State Veterinarian of Wisconsin, nor have they ever been. The matter of approving certificates of health for inter-state shipments is wholly in the hands of the State Veterinarian.”

A special circular on Mr. Wylie’s letter was mailed each member of the Association.

As per instructions from the Association, a letter was addressed all Medical Institutions in good standing conveying the following resolution:

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

“WHEREAS, The majority of medical schools do not include the subjects of comparative pathology and hygiene; in their curricul;

“THEREFORE BE IT RESOLVED, That this association urge the establishment of such chairs in all universities where medical instruction is given, and BE IT FURTHER RESOLVED

“That copies of this resolution be transmitted to all Institutions of Medical Training.”

One hundred and nineteen copies were mailed, acknowledgments received from 38 institutions, who reported as follows:

Such instructions being given, 7; reported would consider, 23; reported impossible to comply, 2; noncommittal acknowledgments, 6.

During the past year unusual interest has been shown in Hog Cholera Control Work. The more general use of serum involving in many cases careless and insanitary methods of vaccination has opened up a possibility of considerable damage resulting to valuable portions of hog carcasses. In this connection your Secretary, after consultation with several of our members, presented a Memorial on this subject to the American Veterinary Medical Association in Annual Convention Assembled at New York City, September 5, as follows:

Memorial.

“To the Members of the American Veterinary Medical Association in Convention Assembled:

“Gentlemen—As the result of much study and observation in connection with the slaughter of large numbers of hogs at packing houses under United States Government Inspection we deem the following observations of timely importance to the members of your Association and of even greater interest to the farmers and stockmen whom you serve.

219
"We recognize the Niles-Dorset Serum for the treatment of Hog Cholera as the most valuable agent now employed for this purpose. We recognize that in the hands of competent veterinarians this serum may be safely administered and prove of great value. We also believe that in the hands of the average farmer and unskilled operator the use of this serum may cause serious damage to portions of hog carcasses. We believe that improper serum, the use of dirty syringes, accompanied by general insanitary conditions after treatment, will result in serious damage.

"As the proper area for inoculation is still an open question, we wish to suggest that some place other than the ham be properly designated as suitable for the purpose. There is a probability of ham inoculation causing abscesses not discoverable until the ham is sliced for use.

"So serious has the situation become that one packing firm has undertaken a series of comparative experiments, in which groups of live hogs are being vaccinated in the neck, shoulder, flank and ham. These groups will be kept separate, slaughtered separately and injury to the carcasses carefully compared by United States Government Inspectors.

"We wish to bring this matter strongly before the attention of the American Veterinary Medical Association, with a recommendation that the matter be investigated and, if possible, some action taken to check this preventable damage.

"In our opinion serum should be used only by competent practicing veterinarians. The use of serum by farmers and incompetent lay-men should be discouraged as far as possible. Respectfully submitted,

"J. J. FERGUSON, Secretary-Treasurer."

Resolution was presented to Dr. C. J. Marshall, Secretary American Veterinary Medical Association, September 4, and referred to Committee on Resolutions, Dr. W. H. Dalrymple, Louisiana, Chairman.

Resolution was endorsed by Committee and referred to American Veterinary Medical Association, whereupon the following resolution was passed:

RESOLVED, That the recommendation contained in the attached Memorial from the United States Live Stock Sanitary Association, through its Secretary, Prof. J. J. Ferguson, be endorsed by this association. (Carried.)

Five thousand copies of this Memorial have been printed and distributed, bringing forth a great many letters from State Sanitary Live Stock Control officials and practicing veterinarians. This is a matter which should seriously engage the attention of this Association in our Special Session on Hog Cholera.

The writer has now under way a series of experiments with groups of hogs vaccinated in neck, shoulder, flank and ham. Six weeks from vaccination the hogs are slaughtered under United States Government Inspection. Careful records are made of post-mortem findings.

It is gratifying to note the steadily increasing interest in this Convention shown by many organizations concerned in live stock industry. Live stock and farm papers have been specially cordial in their co-operation and support during the year.

Hoard's Dairyman, in a specially strong editorial, endorsed the work of this Association, calling upon philanthropically inclined people to support our work with financial aid. Mr. J. Raymond Bent, a farmer at Oglesby, Ill., sent us a fine letter of encouragement with $10.

We have had an unusual amount of correspondence with State officials regarding present laws and future legislation affecting our interests.
As might be expected, we have had numerous evidence of a desire on the part of State Officials, who have troubles of their own within their States, to use this Association as a Court of Arbitration for their domestic difficulties. We have consistently refused to permit this Association to become involved in controversies originating in and pertaining to any individual State.

Our attention has several times been called, during the year, to operations of unreliable concerns distributing cheap, so-called serums and commercial disinfectants. I suggest the appointment of a standing committee to which members could refer such matters originating in their several States for investigation and report to the proper authorities. This matter is especially serious in the Central Corn Belt States where Hog Cholera is a big problem.

At our 1913 meeting we reported 149 members in good standing. We have today 174 and a long list of applicants, which is a very satisfactory showing, but our list includes only a fraction of those eligible. Every member is urged to help bring these in.

I beg to submit herewith my report as Treasurer from November 30, 1912, to November 30, 1913:

Receipts.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance on hand November 30, 1912</td>
<td>$519.00</td>
</tr>
<tr>
<td>Advertising in program 1912</td>
<td>$270.00</td>
</tr>
<tr>
<td>B. A. I. for Moving Picture Machine used at convention</td>
<td>25.00</td>
</tr>
<tr>
<td>Donation J. Raymond Bent, Oglesby, Illinois</td>
<td>10.00</td>
</tr>
<tr>
<td>Membership dues 1911-12</td>
<td>9.10</td>
</tr>
<tr>
<td>Membership dues 1912-13</td>
<td>167.00</td>
</tr>
<tr>
<td>Sixteenth Annual Reports</td>
<td>192.10</td>
</tr>
<tr>
<td>Membership dues 1913-14</td>
<td>3.00</td>
</tr>
<tr>
<td>Fifteenth Annual Reports</td>
<td>6.00</td>
</tr>
<tr>
<td>Fourteenth Annual Reports</td>
<td>4.00</td>
</tr>
<tr>
<td>Thirteenth Annual Reports</td>
<td>4.00</td>
</tr>
<tr>
<td>Twelfth Annual Reports</td>
<td>4.00</td>
</tr>
<tr>
<td>Interest on Deposit</td>
<td>12.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>706.20</td>
</tr>
</tbody>
</table>

Bills receivable from program advertising.............. 320.00

**Total Receipts:** $1,225.20

Expenses.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office expense, printing circulars, stationery, postage, exchange, etc., as per vouchers</td>
<td>746.37</td>
</tr>
<tr>
<td><strong>Balance on hand November 30, 1913</strong></td>
<td>$798.83</td>
</tr>
<tr>
<td>All of which is respectfully submitted.</td>
<td></td>
</tr>
</tbody>
</table>

J. J. FERGUSON, Secretary-Treasurer.
COMMISSION ON MILK STANDARDS.


[Reprint from the Public Health Reports, Vol. XXVIII., No. 34, August 22, 1913.]

Introduction.

PERSONNEL.

The New York Milk Committee, which is a voluntary organization working in the interests of improving the milk supply of New York City, decided, in March, 1911, to appoint a commission on milk standards. The men who compose the commission are as follows:

Dr. W. A. Evans, professor preventive medicine, Northwestern University; health editor, Chicago Tribune, Chicago, Ill., chairman.

Dr. B. L. Arms, assistant, department biology and public health, Massachusetts Institute Technology, Boston, Mass.

Dr. John F. Anderson, director hygienic laboratory, United States Public Health Service, Washington, D. C., vice chairman.

Prof. H. W. Conn, director bacteriological laboratory, Connecticut State Board of Health; department of biology, Wesleyan University, Middletown, Conn.

Dr. E. C. Levy, health officer, Richmond, Va.

Dr. A. D. Melvin, chief bureau of animal industry, United States Department of Agriculture, Washington, D. C.

Dr. William H. Park, director of laboratories, Department of Health of New York City; professor of bacteriology and hygiene, New York University, New York City.

Mr. Raymond A. Pearson, president State College of Agriculture, Ames, Iowa.

Dr. M. P. Ravenel, director hygienic laboratory, University of Wisconsin, Madison, Wis.

Prof. M. J. Rosenau, department of hygiene and preventive medicine, Harvard Medical School, Boston, Mass.

Mr. Chester H Wells, health officer, Montclair, N. J.

Prof. Henry C. Sherman, department of chemistry, Columbia University, New York City.

Dr. L. L. Van Slyke, department of chemistry, New York Agricultural Experiment Station, Geneva, N. Y.

Dr. Charles E. North consulting sanitarian; member New York Milk Committee, New York, secretary.

Dr. J. N. Hurty, secretary State Board of Health, Indianapolis, Ind.

Dr. Joseph S. Neff, director Department Public Health and Charities, Philadelphia, Pa.

Dr. John S. Fulton, director State Department of Health, Baltimore, Md.

ORIGIN AND ORGANIZATION.

The appointment of this commission was the direct result of the observation of the New York Milk Committee that there was great incompleteness and lack of uniformity in the milk standards, milk ordi-
nances, and rules and regulations of public health authorities throughout the country for the control of public milk supplies. There was a need that health officers be furnished conclusions drawn from large experience and mature judgment and that ordinances should be as free from erroneous positions and as uniform as possible.

A special committee of the New York Milk Committee was appointed to consider names of more than 200 men of prominence in medicine, sanitation, public health, and laboratory work, particularly those recognized as authorities on the milk question. Since regulations are based on standards and standards are based chiefly on laboratory analyses, the subcommittee selected 20 names of men distinguished for their knowledge of the bacteriological and chemical examination of milk and for the enforcement of standards based on such laboratory examinations. Two of those chosen declined to serve and another resigned after the first meeting, so that there were 17 members who have taken an active part in the work of the commission.

PURPOSES.

While this commission was created by and its expenses were borne by the New York Milk Committee, it has not been the intention of that committee that the commission should have the New York City milk problem solely in mind. It was desired that the commission should make recommendations that might be adopted by any city or town in the country.

MEETINGS.

The first meeting of the commission was held in the New York Academy of Medicine on May 22, 1911. The chief work of that meeting consisted in a general discussion of the scope of the commission's purpose and the appointment of a number of standing committees to which the several divisions of the work were assigned. The subjects included bacteriological standards, chemical standards, grades and classes of milk, standard ordinances, laws and licenses, and new questions.

The second meeting of the commission was held at the New York Academy of Medicine on October 5 and 6, 1911, at which time the reports of the standing committees were received and modified, and the major part of them tentatively adopted. Special committees were appointed at this time to consider certain specific matters which were presented and final action on all matters was deferred until the third and final meeting.

The third meeting of the commission was held in Homer, N. Y., on January 25, and at the New York Academy of Medicine, January 26 and 27, 1912. The commission visited Homer in order that the members might inspect the central station and the dairy farms of the New York Dairy Demonstration Company as a means of helping them to form a correct judgment of the relative value to be given to methods and equipment in the rules and regulations that they might recommend.

At this meeting it was voted to publish the first report of the commission, with an understanding that one year later the commission would meet for the purpose of reconsidering this report and modifying it in such manner as deemed advisable. In consonance with this resolution the first report was submitted to the Public Health Service and was published by that Service in the Public Health Reports, Volume XXVII, No. 19, May 10, 1912; 70,000 copies were distributed.

The fourth meeting was held in Chicago, October 29 and 30, 1912, at the time of the National Dairy Show. At this meeting the commission attended the annual convention of the International Milk Dealers'
Association and took part in a discussion of classification of milk and milk standards. The largest milk dealers of the United States and Canada were present.

The fifth meeting of the commission was held in Richmond, Va., on May 2 and 3, 1913, at the Hotel Jefferson. The purpose of the commission in visiting Richmond was to inspect the dairies supplying milk to a city of moderate size, surrounded by farms which have been raised to a condition of sanitary excellence.

It was resolved at the fifth meeting to publish an amended report which would include certain new matters and from which some of the material in the first report would be eliminated. The commission voted to preface its report by a preamble of explanation showing the reasons for the commission's action on the matters in the report.

**Preamble.**

NEED OF MILK CONTROL.

Proper milk standards, while they are essential to efficient milk control by public health authorities and have as their object the protection of the milk consumer, are also necessary for the ultimate well-being of the milk industry itself. Public confidence is an asset of the highest value in the milk business. The milk producer is interested in proper standards for milk, since these contribute to the control of bovine tuberculosis and other cattle diseases and distinguish between the good producer and the bad producer. The milk dealer is immediately classified by milk standards, either into a seller of first-class milk or a seller of second-class milk, and such distinction gives to the seller of first-class milk the commercial rewards which he deserves, while it inflicts just penalties on the seller of second-class milk. For milk consumers, the setting of definite standards accompanied by proper labeling make it possible to know the character of the milk which is purchased and to distinguish good milk from bad milk. In the matter of public health administration, standards are absolutely necessary to furnish definitions around which the rules and regulations of city health departments can be drawn, and the milk supply efficiently controlled.

PUBLIC HEALTH AUTHORITIES.

While public health authorities must necessarily see that the source of supply and the chemical composition should correspond with established definitions of milk as a food, their most important duty is to prevent the transmission of disease through milk. This means the control of infantile diarrhea, typhoid fever, tuberculosis, diphtheria, scarlet fever, septic throat infections and other infectious diseases in so far as they are carried by milk.

SEPTIC SORE THROAT.

Septic sore throat deserves special mention because of the frequency in recent years with which outbreaks of this disease have been traced to milk supplies. The suggestion has been made that the infection of the milk is due to udder infection of the cow and, on the other hand, it has been suggested that it is due to contact with infected persons. The uncertainty cannot be dispelled until cases of septic sore throat are regularly reported and tabulated by public health authorities. The commission therefore recommends that public health authorities make septic sore throat a reportable disease.
ECONOMIC PROBLEM.

The commission recognizes the magnitude of the milk industry, and that the improvement of milk supplies is primarily an economic problem. The success achieved by the experiment in milk production, which has been carried out on a very large scale by the New York Dairy Demonstration Co., is an illustration of the fact that an extra price or premium paid to the producer for cleanliness and care will bring results far more quickly and certainly than instructions or official inspection. But while the basic problem is economic, and must eventually be solved by commerce, public health authorities must show the way and must establish standards and regulations in the interest of consumers, the value of which even the consumers themselves often fail to appreciate.

LEGAL REQUIREMENTS.

A prime requisite of effectiveness is that local milk laws shall not exceed sanitary limitations. The commission has not entered into a discussion of fundamental State laws, but it recommends that State laws be amended wherever necessary in order that every municipality may have the legal right to adopt whatever ordinances it sees fit for the improvement of the milk supply. The commission advocates that local health laws be carefully drawn with regard to their legality under the general laws of the localities to which they apply, since a decision against a milk law in one locality is liable to be used as a precedent against milk laws elsewhere.

STANDARD RULES AND REGULATIONS.

The commission has drawn up a set of standard rules and regulations for the control of milk. These are the result of a study of the printed rules and regulations of the cities of the United States and of foreign countries and represent an immense amount of work on the part of the special committee of the commission to which the task was assigned. Some communities are in a position to adopt all of these rules and regulations at the present time, while other communities will be obliged to adopt a few rules at a time as public sentiment and local conditions warrant. It is realized that some of the rules may have to be modified to meet local conditions. It seems wise to the commission to divide the regulations into two parts: First, requirements, under which head are set down those provisions which are so fundamentally necessary that no community is justified in compromising on them; second, recommendations, under which head are set down provisions which are necessary for a good milk supply, but on which there can be a certain amount of latitude for compromise by those communities in which public sentiment is not ready to support more than a moderate degree of protection of human life.

ADMINISTRATIVE EQUIPMENT.

Another prime requisite is that the administrative departments shall be adequately equipped with men, money and laboratory facilities. In smaller communities co-operation between local boards of health to the extent of exchanging reports would eliminate much duplication. Where a community cannot maintain a laboratory it can enter into laboratory arrangements with other communities, and several can combine in the use of a common laboratory. Much of the expense of tuberculin testing can be borne by the National and State Governments. The com-
mission is of the opinion that results cannot be expected from laws where there is not sufficient appropriation and where there is no machinery for their enforcement. On this subject the commission passed a resolution as follows:

WHEREAS, The appropriations generally made for the purposes of carrying on laboratory analyses of milk are now in most cases entirely inadequate: Therefore, be it

RESOLVED, That this commission recommends for the consideration of the authorities concerned, an appropriation of funds commensurate with the importance of laboratory methods, which are of paramount importance in the hygienic control of the milk supply.

CLASSIFICATION OF MILKS.

There is no escape from the conclusion that milk must be graded and sold on grade, just as wheat, corn, cotton, beef and other products are graded. The milk merchant must judge of the food value and also of the sanitary character of the commodity in which he deals. The high-grade product must get a better price than at present. The low-grade product must bring less. In separating milk into grades and classes the commission has endeavored to make its classification as simple as possible and at the same time to distinguish between milks which are essentially different in sanitary character.

In general two great classes of milk are recognized, namely, raw milk and pasteurized milk. Under these general classes there are different grades, as indicated in the report of the committee on classification.

Report.

PASTEURIZATION.

While the process of pasteurization is a matter which has attracted a great deal of attention in recent years, the commission has not entered into any discussion of its merits or demerits, but has given it recognition in its classification as a process necessary for the treatment of milk which is not otherwise protected against infection.

The commission thinks that pasteurization is necessary for all milk at all times, excepting grade A, raw milk. The majority of the commissioners voted in favor of the pasteurization of all milk, including grade A, raw milk. Since this was not unanimous, the commission recommends that the pasteurization of grade A, raw milk, be optional.

The process of pasteurization should be under official supervision. The supervision should consist of a personal inspection by the milk inspector; the inspections shall be as frequent as possible. Automatic temperature regulators and recording thermometers should be required and the efficiency of the process frequently determined by laboratory testing.

PASTEURIZING TEMPERATURES.

The destruction of the chemical constituents of milk by heat occurs at higher temperatures than those necessary for the destruction of the bacteria of infectious diseases transmissible by milk. (See chart in appendix.)

The commission passed a resolution regarding the temperature of pasteurization as follows:

That pasteurization of milk should be between the limits of 140° F. and 155° F. At 140° F. the minimum exposure should be 20 minutes. For every degree above 140° F. the time may be reduced by 1 minute. In no case should the exposure be for less than five minutes.
In order to allow a margin of safety under commercial conditions the commission recommends that the minimum temperature during the period of holding should be made 145° F. and the holding time 30 minutes. Pasteurization in bulk when properly carried out has proven satisfactory, but pasteurization in the final container is preferable.

It is the sense of the commission that pasteurization in the final container should be encouraged.

LABELING AND DATING OF MILK.

The commission voted that all milk should be labeled and marked with the grade in which it is to be sold. In dating milk uniform methods should be adopted for all grades of both raw milk and pasteurized milk, both using the day of the week or both using the day of the month. All milk should be dated uniformly with the date of delivery to the consumer. Raw milk should not be dated with the date of production while pasteurized milk is dated with the date of pasteurization, since this places certified milk at a disadvantage by making it possible for pasteurized milk of a lower grade to carry a later date. The stamping on the label of the day of the week is sufficient for dating.

BACTERIA.

The subject of bacteria in milk received more attention than any other matter brought before the commission. The commission recognizes that bacteria in milk in the majority of instances indicate dirt, or lack of refrigeration, or age, while in the minority of instances the bacteria of disease may be present. The routine laboratory methods for examining milk have as their purpose only the control over dirt, refrigeration, and age, and it is a rare thing for a laboratory to undertake the examination of milk for the bacteria of disease because of the extreme difficulties in detecting them. The more efficacious method of protecting milk from infection by the bacteria of human contagion is by medical, veterinary, and sanitary inspection, and by pasteurization. Milk with a high bacteria count is not necessarily harmful, but when used as a food, particularly for children, is a hazard too great to be warranted. Milk with a high bacteria count, therefore, should be condemned. Milks with small numbers of bacteria are presumed to be wholesome, unless there is reasonable ground for suspecting that they have been exposed to contagion.

BACTERIAL STANDARDS.

The commission recognizes the difficulty in interpreting bacteria counts. At times misleading conclusions have been drawn from such counts. In establishing the bacterial standards for a city it is always necessary to take into consideration the necessary age of the milk and in lesser measure the distance hauled and methods employed in its hauling. It will always be possible for a community which consumes milk produced on its own premises, or within 12 hours of its production, to insist upon and maintain a lower bacterial standard than can one where the milk is hauled many miles into town in a wagon, to be consumed within 24 hours after it is produced. In like manner this second type of city can always maintain a lower bacterial standard than a city where the general milk supply is hauled by railroad long distances and is several days old when consumed. In drawing conclusions as to the relative efficacy of milk control in cities comparisons must be made between cities of the same class.
The commission deems it of the utmost importance that some standard method should be adopted for estimating and comparing the bacterial character of milks, since by this means only is it possible to grade and classify milks and to enforce bacterial standards. There is much diversity of opinion as to the best method of valuing bacteria counts. The average of a series gives results which are misleading about as frequently as otherwise. In the average a single high figure may unduly overbalance a large number of exceedingly low counts. There are objections to the use of the "median" or middle number when the counts are arranged in order of size, for the reason that the middle figure does not distinguish between two groups in one of which there may be some very high counts above the median and in the other of which there are none. The method of dividing results into groups as recommended by the American Public Health Association, while a step in the right direction, is cumbersome and does not clearly indicate whether or not a milk conforms to a given bacterial standard.

The commission passed a resolution at its last meeting regarding the number of bacterial tests necessary to determine the grade into which a milk falls, as follows:

1. That the grade into which a milk falls shall be determined bacteriologically by at least five consecutive bacteria counts taken over a period of not less than one week nor more than one month, and at least 80 per cent (four out of five) must fall below the limit set for the grade for which the classification is desired.

LABORATORY EXAMINATIONS FOR BACTERIA.

On the subject of laboratory examinations of milk for bacteria the commission passed the following resolutions:

1. That the interests of public health demand that the control of milk supplies, both as to production and distribution, shall include regular laboratory examinations of milk by bacteriological methods.

2. That among present available routine laboratory methods for determining the sanitary quality of milk the bacteria count occupies first place.

3. That bacteriological standards should be a factor in classifying or grading milks of different degrees of excellence.

4. That in determining the grade or class of a raw milk the specimen taken for bacteriological examination should be of milk as offered for sale.

5. That there should be bacteriological standards for pasteurized milk which should require laboratory examination of samples immediately before pasteurization as well as of milk offered for sale.

6. That the bacteria count of milk indicates its quality and history as it is modified by contamination, handling, dirt, temperature, or age. A high count indicates the necessity of investigation and inspection.

7. That there be adopted as standards for making the bacteria count the standard methods of the American Public Health Association, laboratory section, recommending, however, the following amendments:

A. That the culture medium used for testing milk be identical in its composition and reaction with the culture medium used for the testing of water provided in the standard methods of water analyses of the American Public Health Association.
B. That incubation of plate cultures be made at 37° C. for 48 hours.

The bacterial standards given in the report are the work of a special committee of bacteriologists who considered all of the bacterial standards now in use. It is believed that the standards suggested are fair and wise and give full consideration to the state of the industry and of public health control. The commission believes that the adoption and enforcement of these bacterial standards will be more effective than any other one thing in improving the sanitary character of public milk supplies. The enforcement of these standards can be carried out only by the regular and frequent laboratory examinations of milks for the numbers of bacteria they may contain.

CHEMICAL STANDARDS.

The chemical standards suggested are the work of a special committee, composed of chemists, which has carefully considered the natural composition of milk and the Federal and State standards already established. The standard of 3.25 per cent fat and 8.6 per cent solids, not fat, here proposed is in accordance with the recommendations of the Association of Official Agricultural Chemists and has been adopted by the United States Department of Agriculture and by a larger number of States than has any other standard. The simplification of the Babcock test makes the determination of fats and solids not fat an easy procedure quickly applied. Such chemical examinations of milk can be readily adopted and executed by any health-board laboratory at a very moderate expense. It is believed that such chemical standards as are suggested will inflict no real hardship on the milk producers of this country and that the provision regarding substandard milks is a liberal one.

MICROSCOPIC EXAMINATIONS OF MILK.

Because of studies which have been made during the past year the commission thinks it wise to omit temporarily any definite statement on the subject of microscopical examination of milk, and the determination of pus and bacteria by sedimentation methods, until further studies have been made. A special subcommittee has been appointed for this purpose which will make studies during the present year and the commission will take action on this matter at one of its later meetings.

MISLABELING.

The commission resolved that the sale of milk which is mislabeled or misbranded shall be punished by suitable penalties.

PUBLICITY.

The commission fully considered the matter of the publication of laboratory examinations of milk by city and town health authorities. When proper standards and regulations are established and adequate facilities furnished for laboratory work, it is believed that the laboratory tests will give an index of the character of the milk delivered to the public by milk sellers which is entirely fair and impartial. There can be no objection to publicity under such circumstances. It is an advantage to the seller of high-grade milk. It is an advantage to the consumer who desires to select a high-grade milk. It has much educational value both to producer and consumer. Therefore the commission recommends "that the reports of laboratory analyses of milk made by departments of health be regularly published."
MEDICAL INSPECTION.

It is the sense of the commission that the medical inspection of dairy employees should be emphasized in all ways possible.

Milk Dealer's License.

The commission resolved that a dealer shall be required to have a permit or license to sell any grade or class of milk and to use a label for such class or grade. Such permit or license shall be revoked and the use of the label forbidden when the local health authorities shall determine that the milk is not in the class or grade designated.

Designation of Grade.

The commission resolved that the grade of milk shall be designated by letter. It is the sense of the commission that the essential part is the lettering and that all other words on the label are explanatory.

In addition to the letters of the alphabet, used on caps or labels, the use of other terms may be permitted, so long as such terms are not the cause of deception.

Caps and labels shall state whether milk is raw or pasteurized. The letter designating the grade to which milk belongs shall be conspicuously displayed on the caps of bottles or the labels on cans.

Classification of Milk.

It was resolved that the classification of milk contained in the first report of the commission be amended as follows:

Milk shall be divided into three grades, which shall be the same for both large and small cities and towns, and which shall be designated by the first three letters of the alphabet. The requirements shall be as follows:

GRADE A.

Raw Milk.—Milk of this class shall come from cows free from disease as determined by tuberculin tests and physical examinations by a qualified veterinarian, and shall be produced and handled by employees free from disease as determined by medical inspection of a qualified physician, under sanitary conditions such that the bacteria count shall not exceed 100,000 per cubic centimeter at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtained shall score at least 80 on the United States Bureau of Animal Industry score card.

Pasteurized Milk.—Milk of this class shall come from cows free from disease as determined by physical examinations by a qualified veterinarian and shall be produced and handled under sanitary conditions such that the bacteria count at no time exceeds 200,000 per cubic centimeter. All milk of this class shall be pasteurized under official supervision, and the bacteria count shall not exceed 10,000 per cubic centimeter at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtained should score 65 on the United States Bureau of Animal Industry score card.

The above represents only the minimum standards under which milk may be classified in grade A. The commission recognizes, however, that there are grades of milk which are produced under unusually good conditions, in especially sanitary dairies, many of which are operated under the supervision of medical associations. Such milks clearly stand at the head of this grade.
GRADE B.

Milk of this class shall come from cows free from disease as determined by physical examinations, of which one each year shall be by a qualified veterinarian, and shall be produced and handled under sanitary conditions such that the bacteria count at no time exceeds 1,000,000 per cubic centimeter. All milk of this class shall be pasteurized under official supervision, and the bacteria count shall not exceed 50,000 per cubic centimeter when delivered to the consumer.

It is recommended that dairies producing grade B milk should be scored and that the health departments or the controlling departments, whatever they may be, strive to bring these scores up as rapidly as possible.

GRADE C.

Milk of this class shall come from cows free from disease as determined by physical examinations and shall include all milk that is produced under conditions such that the bacteria count is in excess of 1,000,000 per cubic centimeter.

All milk of this class shall be pasteurized, or heated to a higher temperature, and shall contain less than 50,000 bacteria per cubic centimeter when delivered to the customer. It is recommended that this milk be used for cooking or manufacturing purposes only.

Whenever any large city or community finds it necessary, on account of the length of haul or other peculiar conditions, to allow the sale of grade C milk, its sale shall be surrounded by safeguards such as to insure the restriction of its use to cooking and manufacturing purposes.

CLASSIFICATION OF CREAM.

Cream should be classified in the same grades as milk, in accordance with the requirements for the grades of milk, excepting the bacterial standards which in 20 per cent cream shall not exceed five times the bacterial standard allowed in the grade of milk.

Cream containing other percentages of fat shall be allowed a modification of this required bacterial standard in proportion to the change in fat.

CHEMICAL STANDARDS.

Cow's Milk.—Standard milk should contain not less than 8.5 per cent of milk solids not fat and not less than 3.25 per cent of milk fat.

Skim Milk.—Standard skim milk should contain not less than 8.75 per cent of milk solids.

Cream.—Standard cream contains not less than 18 per cent of milk fat and is free from all constituents foreign to normal milk. The percentage of milk fat in cream over or under that standard should be stated on the label.

Buttermilk.—Buttermilk is the product that remains when fat is removed from milk or cream, sweet or sour, in the process of churning. Standard buttermilk contains not less than 8.5 per cent of milk solids. When milk is skimmed, soured, or treated so as to resemble buttermilk, it should be known by some distinctive name.

HOMOGENIZED MILK OR CREAM.

The commission is of the opinion that in the compounding of milk no fats other than milk fats from the milk in process should be used.
and that no substance foreign to milk should be added to it. The commission is opposed to the use of condensed milk or other materials for the thickening of cream unless the facts are clearly set forth on the label of the retail package. Regarding the process of homogenizing, the commission resolved as follows:

That homogenized milk or cream should be so marked, stating the percentage of fat that it contains.

ADJUSTED MILKS.

On the question of milks and creams in which the ratio of the fats to the solids not fat has been changed by the addition to or subtraction of cream or milk fat the commission has hesitated to take a position. On the one hand they are in favor of every procedure which will increase the market for good milk and make the most profitable use of every portion of it. On the other, they recognize the sensitiveness of milk, the ease with which it is contaminated, and the difficulty of controlling, standardizing, skimming, homogenizing, souring, etc., so that contaminations do not occur and inferior materials are not used. On this subject the commission passed a resolution presented by a special committee as follows:

Milk in which the ratio of the fats to the solids not fat has been changed by the addition to or subtraction of cream should be labeled "adjusted milk"; the label should show the minimum guaranteed percentage of fat and should comply with the same sanitary or chemical requirements as for milk not so standardized or modified.

REGULATION OF MARKET MILK ON BASIS OF GUARANTEED PERCENTAGE COMPOSITION.

1. Sellers of milk should be permitted choice of one of two systems in handling market milk. Milk can be sold, first, under the regular standard, or, second, under a guaranteed statement of composition.

2. Any normal milk may be sold if its per cent of fat is stated. In case the per cent of fat is not stated, the sale will be regarded as a violation unless the milk contains at least 3.25 per cent of milk fat.

3. As a further protection to consumers, it is desirable that when the guaranty system is used there be also a minimum guaranty of milk solids not fat of not less than 8.5 per cent.

4. Dealers electing to sell milk under the guaranty system should be required to state conspicuously the guaranty on all containers in which such milk is handled by the dealer or delivered to the consumer.

5. The sale of milk on a guaranty system should be by special permission obtained from some proper local authority.

EXTENSION WORK.

The commission endorsed the efforts of the New York Milk Committee to obtain funds for the formation of a bureau of extension work, such bureau to act as a collecting station for information regarding standards and regulations as to milk adopted by cities and towns in the United States. The bureau should also furnish information to such cities and towns as appeal for aid in the adoption of milk standards and should conduct a constructive program by placing in the field a man who would visit communities interested in establishing milk standards; and it may use the members of the commission on milk standards for carrying on the work of the bureau so far as possible in their own localities.
Preface to Appendix.

The commission has confined its report rather closely to the standard requirements for milk. These requirements can not be met unless proper measures are taken. For instance: The milk must be produced from healthy cows in clean surroundings, and must then be promptly chilled and kept cool thereafter. The handling at all points must be done by healthy employees—employees who are not carriers of contagion.

The report of the subcommittee on the methods of production, handling, and distribution, while not properly a part of the report itself, are set forth in the following appendix.

Appendix.

STANDARD RULES FOR THE PRODUCTION, HANDLING AND DISTRIBUTION OF MILK.

As a basis for the promulgation of rules and recommendations governing the production, handling, and distribution of milk, it is recognized that we have to deal with two kinds of milk, raw and pasteurized, although there may be several grades of each of these two kinds. In order for any grade to be safe, it is recommended that the regulations herein set forth under the heading "Requirements" should be enforced. The regulations herein set forth under the heading "Recommendations" should be adopted wherever practicable as a means of improving the milk supply above the actual point of safety. (The term "milk" shall be construed to include the fluid derivatives of milk wherever such construction of the term is applicable.)

LICENSES.

REQUIREMENTS.

No person shall engage in the sale, handling, or distribution of milk until he has obtained a license therefor from the health authorities. This license shall be renewed on or before the 1st day of .......... of each year and may be suspended or revoked at any time for cause.

RECOMMENDATIONS.

The application for the license shall include the following statements:

(1) Kind of milk to be handled or sold.
(2) Names of producers with their addresses and permit numbers.
(3) Names of middlemen with their addresses.
(4) Names and addresses of all stores, hotels, factories, and restaurants at which milk is delivered.
(5) A statement of the approximate number of quarts of milk, cream, buttermilk, and skim milk sold per day.
(6) Source of water supply at farms and bottling plants.
(7) Permission to inspect all local and out-of-town premises on which milk is produced and handled.
(8) Agreement to abide by all the provisions of State and local regulations.
PERMITS.
REQUIREMENTS.

No person shall engage in the production of milk for sale in . . . . . , nor shall any person engage in the handling of milk for shipment into . . . . . until he has obtained a permit therefor from the health authorities. This permit shall be renewed on or before the 1st day of . . . . . of each year and may be suspended or revoked at any time for cause.

Raw Milk.

COW STABLES.
REQUIREMENTS.

1. They shall be used for no other purpose than for the keeping of cows, and shall be light, well ventilated, and clean.
2. They shall be ceiled overhead if there is a loft above.
3. The floors shall be tight and sound.
4. The gutters shall be water-tight.

RECOMMENDATIONS.

1. The window area shall be at least 2 square feet per 500 cubic feet of air space and shall be uniformly distributed, if possible. If uniform distribution is impossible, sufficient additional window area must be provided so that all portions of the barn shall be adequately lighted.
2. The amount of air space shall be at least 500 cubic feet per cow, and adequate ventilation besides windows shall be provided.
3. The walls and ceilings shall be whitewashed at least once every six months, unless the construction renders it unnecessary, and shall be kept free from cobwebs and dirt.
4. All manure shall be removed at least twice daily, and disposed of so as not to be a source of danger to the milk either as furnishing a breeding place for flies or otherwise.
5. Horse manure shall not be used in the cow stable for any purpose.

MILK ROOM.
REQUIREMENTS.

Every milk farm shall be provided with a milk room that is clean, light, and well screened. It shall be used for no other purpose than for the cooling, bottling, and storage of milk and the operations incident thereto.

RECOMMENDATIONS.

1. It shall have no direct connection with any stable or dwelling.
2. The floors shall be of cement or other impervious material, properly graded and drained.
3. It shall be provided with a sterilizer unless the milk is sent to a bottling plant, in which case the cans shall be sterilized at the plant.
4. Cooling and storage tanks shall be drained and cleaned at least twice each week.
5. All drains shall discharge at least 100 feet from any milk house or cow stable.
COWS.
REQUIREMENTS.
1. A physical examination of all cows shall be made at least once every six months by a veterinarian approved by the health authorities.
2. Every diseased cow shall be removed from the herd at once and no milk from such cows shall be offered for sale.
3. The tuberculin test shall be applied at least once a year by a veterinarian approved by the health authorities.
4. All cows which react shall be removed from the herd at once, and no milk from such cows shall be sold as raw milk.
5. No new cows shall be added to a herd until they have passed a physical examination and the tuberculin test.
6. Cows, especially the udders, shall be clean at the time of milking.
7. No milk that is obtained from a cow within 15 days before or 5 days after parturition, nor any milk that has an unnatural odor or appearance, shall be sold.
8. No unwholesome food shall be used.
RECOMMENDATIONS.
1. Every producer shall allow a veterinarian employed by the health authorities to examine his herd at any time under the penalty of having his supply excluded.
2. Certificates showing the results of all examinations shall be filed with the health authorities within 10 days of such examinations.
3. The tuberculin tests shall be applied at least once every six months by a veterinarian approved by the health authorities, unless on the last previous test no tuberculosis was present in the herd, or in the herds from which new cows were obtained, in which event the test may be postponed an additional six months.
4. Charts showing the results of all tuberculin tests shall be filed with the health authorities within 10 days of the date of such test.
5. The udders shall be washed and wiped before milking.
EMPLOYEES.
REQUIREMENTS.
1. All employees connected in any way with the production and handling of milk shall be personally clean and shall wear clean outer garments.
2. The health authorities shall be notified at once of any communicable disease in any person that is in any way connected with the production or handling of milk, or of the exposure of such person to any communicable disease.
3. Milking shall be done only with dry hands.
RECOMMENDATIONS.
1. Clean suits shall be put on immediately before milking.
2. The hands shall be washed immediately before milking each cow, in order to avoid conveyance of infection to the milk.
UTENSILS.
REQUIREMENTS.
1. All utensils and apparatus with which milk comes in contact shall be thoroughly washed and sterilized, and no milk utensil or apparatus shall be used for any other purpose than that for which it was designed.
2. The owner's name, license number, or other identification mark, the nature of which shall be made known to the health authorities, shall appear in a conspicuous place on every milk container.

3. No bottle or can shall be removed from a house in which there is, or in which there recently has been, a case of communicable disease until permission in writing has been granted by the health authorities.

4. All metal containers and piping shall be in good condition at all times. All piping shall be sanitary milk piping, in couples short enough to be taken apart and cleaned with a brush.

5. Small-top milking pails shall be used.

RECOMMENDATIONS.

1. All cans and bottles shall be cleaned as soon as possible after being emptied.

2. Every conveyance used for the transportation or delivery of milk, public carriers excepted, shall bear the owner's name, milk-license number, and business address in uncondensed gothic characters at least 2 inches in height.

MILK.

REQUIREMENTS.

1. It shall not be strained in the cow stable, but shall be removed to the milk room as soon as it is drawn from the cow.

2. It shall be cooled to 50° F. or below within two hours after it is drawn from the cow and it shall be kept cold until it is delivered to the consumer.

3. It shall not be adulterated by the addition to or the subtraction of any substance or compound, except for the production of the fluid derivatives allowed by law.

4. It shall not be tested by taste at any bottling plant, milk house, or other place in any way that may render it liable to contamination.

5. It shall be bottled only in a milk room or bottling plant for which a license or permit has been issued.

6. It shall be delivered in bottles, or single service containers, with the exception that 20 quarts or more may be delivered in bulk in the following cases:

   (a) To establishments in which milk is to be consumed or used on the premises.

   (b) To infant-feeding stations that are under competent medical supervision.

7. It shall not be stored in or sold from a living room or from any other place which might render it liable to contamination.

RECOMMENDATIONS.

1. It shall be cooled to 50° F. or below immediately after milking and shall be kept at or below that temperature until it is delivered to the consumer.

2. It shall contain no visible foreign material.

3. It shall be labeled with the date of production.
RECEIVING STATIONS AND BOTTLING PLANTS.

REQUIREMENTS.
1. They shall be clean, well screened, and lighted and shall be used for no other purpose than the proper handling of milk and the operations incident thereto, and shall be open to inspection by the health authorities at any time.
2. They shall have smooth, impervious floors, properly graded and drained.
3. They shall be equipped with hot and cold water and steam.
4. Ample provision shall be made for steam sterilization of all utensils, and no empty milk containers shall be sent out until after such sterilization.
5. All utensils, piping, and tanks shall be kept clean and shall be sterilized daily.

RECOMMENDATIONS.
1. Containers and utensils shall not be washed in the same room in which milk is handled.

STORES.

REQUIREMENTS.
1. All stores in which milk is handled shall be provided with a suitable room or compartment in which the milk shall be kept. Said compartment shall be clean and shall be so arranged that the milk will not be liable to contamination of any kind.
2. Milk shall be kept at a temperature not exceeding 50° F.

RECOMMENDATIONS.
1. Milk to be consumed off the premises may be sold from stores only in the original unopened package.

GENERAL REGULATIONS.

REQUIREMENTS.
1. The United States Bureau of Animal Industry score card shall be used, and it is recommended that dairies from which milk is to be sold in a raw state shall score at least 80 points.
2. Every place where milk is produced or handled and every conveyance used for the transportation of milk shall be clean.
3. All water supplies shall be from uncontaminated sources and from sources not liable to become contaminated.
4. The license or permit shall be kept posted in a conspicuous place in every establishment for the operation of which a milk license or permit is required.
5. No milk license or permit shall at any time be used by any person other than the one to whom it was granted.
6. No place for the operation of which a license or permit is granted shall be located within 100 feet of a privy or other possible source of contamination, nor shall it contain or open into a room which contains a water-closet.
7. No skim milk or buttermilk shall be stored in or sold from cans or other containers unless such containers are of a distinctive color and permanently and conspicuously labeled "skim milk" or "buttermilk," as the case may be.
8. No container shall be used for any other purpose than that for which it is labeled.

RECOMMENDATIONS.
1. Ice used for cooling purposes shall be clean and uncontaminated.
2. No person whose presence is not required shall be permitted to remain in any cow stable, milk house, or bottling room.

**SUBNORMAL MILK**

**REQUIREMENTS.**

1. Natural milk that contains less than 3.25 per cent, but more than 2.5 per cent milk fat, and that complies in all other respects with the requirements above set forth, may be sold, provided the percentage of fat does not fall below a definite percentage that is stated in a conspicuous manner on the container; and further provided that such container is conspicuously marked “substandard milk.”

**CREAM.**

**REQUIREMENTS AND RECOMMENDATIONS.**

1. It shall be obtained from milk that is produced and handled in accordance with the provisions hereinbefore set forth for the production and handling of milk.

**STANDARDS FOR MILK.**

**REQUIREMENTS.**

1. It shall not contain more than 100,000 bacteria per cubic centimeter.
2. It shall contain not less than 3.25 per cent milk fat.
3. It shall contain not less than 8.5 per cent solids not fat.

**RECOMMENDATIONS.**

1. The bacterial limit shall be lowered if possible.

**STANDARDS FOR CREAM.**

**REQUIREMENTS.**

1. There shall be a bacterial standard for cream corresponding to the grade of milk from which it is made and to its butter-fat content.
2. It shall contain not less than 18 per cent milk fat.

**RECOMMENDATIONS.**

Same as above for milk.

**STANDARDS FOR SKIM MILK.**

**REQUIREMENTS.**

1. It shall contain not less than 8.75 per cent milk solids.
2. Control of sale of skim milk: Whether skim milk is sold in wagons or in stores all containers holding skim milk should be painted some bright, distinctive color and prominently and legibly marked “skim milk.” When skim milk is placed in the buyer’s container, a label or tag bearing the words “skim milk” should be attached.

**PASTEURIZED MILK.**

Pasteurized milk is milk that is heated to a temperature of not less than 140°F. for not less than 20 minutes, or not over 155°F. for not less than 5 minutes, and for each degree of temperature over 140°F. the length of time may be 1 minute less than 20. Said milk shall be cooled immediately to 50°F. or below and kept at or below that temperature.

**COW STABLES.**

**REQUIREMENTS.**

The same as for the production of raw milk.
RECOMMENDATIONS.
The same as for the production of raw milk.

MILK ROOM.
The same as for the production of raw milk.

RECOMMENDATIONS.
The same as for the production of raw milk.

COWS.

REQUIREMENTS.
The same as for the production of raw milk, with the exception of the sections relating to the tuberculin test.

RECOMMENDATIONS.
That no cows be added to a herd excepting those found to be free from tuberculosis by the tuberculin test.

EMPLOYEES.

REQUIREMENTS.
The same as for the production of raw milk.

RECOMMENDATIONS.
The same as for the production of raw milk.

UTENSILS.

REQUIREMENTS.
The same as for the production of raw milk.

RECOMMENDATIONS.
The same as for the production of raw milk.

MILK FOR PASTEURIZATION.

REQUIREMENTS.
1. The same as for the production of raw milk, with the exception of sections 1, 2, and 6b.
   2. It shall be cooled to 60° F. or below within two hours after it is drawn from the cow, and it shall be held at or below that temperature until it is pasteurized. After pasteurization, it shall be held at a temperature not exceeding 50° F. until delivered to the consumer.
   3. Pasteurized milk shall be distinctly labeled as such, together with the temperature at which it is pasteurized and the shortest length of exposure to that temperature and the date of pasteurization.

RECOMMENDATIONS.
1. No milk shall be repasteurized.
   2. The requirements governing the production and handling of milk for pasteurization should be raised wherever practicable.

PASTEURIZING PLANTS.

REQUIREMENTS.
The same as under "Receiving stations and bottling plants" for raw milk.

RECOMMENDATIONS.
The same as under "Receiving stations and bottling plants" for raw milk.
STORES.  

REQUIREMENTS.  
The same as for raw milk.  

RECOMMENDATIONS.  
The same as for raw milk.  

GENERAL REGULATIONS.  

REQUIREMENTS.  

1. It is recommended that dairies producing milk which is to be pasteurized shall be scored on the United States Bureau of Animal Industry score card, and that health departments, or the controlling departments whatever they may be, strive to bring these scores up as rapidly as possible.  

2. Milk from cows that have been rejected by the tuberculin test, but which show no physical signs of tuberculosis, as well as those which have not been tested, may be sold provided that it is produced and handled in accordance with all other requirements herein set forth for pasteurized milk.  

3. Ice used for cooling purposes shall be clean.  

RECOMMENDATIONS.  
The same as for raw milk.  

PASTEURIZED CREAM.  

REQUIREMENTS.  

1. It shall be obtained only from milk that could legally be sold as milk under the requirements hereinbefore set forth.  

2. Pasteurized cream, or cream separated from pasteurized milk, shall be labeled in the manner herein provided for the labeling of pasteurized milk.  

STANDARDS FOR PASTEURIZED MILK.  

REQUIREMENTS.  

1. It shall not contain more than 1,000,000 bacteria per cubic centimeter before pasteurization, nor over 50,000 when delivered to the consumer.  

2. The standards for the percentage of milk fat and of total solids shall be the same as for raw milk.  

RECOMMENDATIONS.  

1. The limits for the bacterial count before pasteurization and after pasteurization should both be lowered if possible.  

STANDARDS FOR PASTEURIZED CREAM.  

REQUIREMENTS.  

1. No cream shall be sold that is obtained from pasteurized milk that could not be legally sold under the provisions herein set forth, nor shall any cream that is pasteurized after separation contain an excessive number of bacteria.  

2. There shall be a bacterial standard for pasteurized cream corresponding to the grade of milk from which it is made and to its butter-fat content.  

3. The percentage of milk fat shall be the same as for raw cream.  

PENALTY.  

Every milk ordinance should contain a penalty clause.
The laws of California concerning the importation of animals were amended at the last session of the Legislature of this State, the following being a synopsis:

**Horses, Mules and Asses—Health Certificate.**

**Cattle—(Dairy and Breeding Cattle)—Health Certificate,** including tuberculosis test certificate for dairy and breeding cattle over six months of age. Such certificate must show on its face the following: That each individual animal in the shipment has been carefully examined and subjected to a tuberculin test; that they are free from any suspicious symptoms of tuberculosis or other infectious or contagious disease; that each has failed to react to said test; certificate must contain complete temperature record of the test; there must be attached to said certificate signed statement by owner, consignor or shipper, certifying that none of the animals had previously reacted to the tuberculin test within three months, and that none of the animals had been subjected to any treatment designed to negative the action of the tuberculin test.

**Cattle—(Exhibition Purposes)—May be shipped into California without tuberculosis test on permit from State Veterinarian of California.** In such case permit must be attached to the way bill.

**Cattle—(Slaughter and Feeding Cattle)—No Health Certificate or tuberculosis test required when such cattle are shipped from States or parts of States not quarantined by the United States Department of Agriculture for southern cattle fever or other infectious or contagious diseases. Cattle intended for slaughter and feeding purposes must, however, be accompanied by a signed statement of the owner or the shipper showing the purposes for which such cattle are being brought into California.**

**Hogs—Health Certificate.**

**Sheep—In accordance with Federal regulations.**

**Who May Inspect—Any qualified veterinarian who is a graduate of a duly recognized and accredited veterinary college.**

Concerning difficulties which this office has to contend with in the enforcement of regulations, as far as the internal work of controlling and eradicating infectious diseases of live stock is concerned, we have no real difficulties, other than an occasional injunction suit which is brought by owners to prevent us from destroying occult cases of glanders. Such suits, however, are very few.

The work of controlling and eradicating infectious diseases of animals in this State has been progressing very satisfactorily, two of our principal economic diseases, namely, southern cattle fever and scabies in sheep, are now practically eradicated.

A systematic and State-wide campaign against glanders has been waged for several years past. In this campaign it has been our practice to destroy all visibly affected animals, test contacts, destroy typical reactors, disinfect premises and trace the history of the affected animals, and in this latter manner we have been able to clean up many foci of infection. The wisdom of this procedure has been proven by a considerable reduction in glanders cases over previous years.

The principal problem which we have difficulty in solving is the proper enforcement of the law requiring the intelligent inspection and testing of dairy and breeding cattle, and physical inspection alone of horses, mules and asses before being brought into California.
I am afraid that many veterinarians who make such inspections and tests think more of the fee concerned in such employment rather than the matter of co-operation with sanitary authorities.

Many of the test records which accompany such shipments of dairy and breeding cattle are absolutely worthless and the veterinarians who subscribed their names to such certificates are either ignorant of what constitutes a proper tuberculin test, or they are extremely careless in the manner in which they conduct such tests.

This office recently received a tuberculin test certificate and record issued and applied by a State veterinarian. The face of this certificate showed that the last temperature subsequent to injection of the tuberculin was taken on the twelfth hour.

If such certificates are issued by State veterinarians what may we expect from private practitioners?

CHARLES KEANE, State Veterinarian.

Colorado.

At the last session of the Legislature the following legislation was passed:
1st. Law requiring the compulsory mallein test of horses and mules and a health certificate.
2d. Law regulating the shipment of hogs other than for immediate slaughter.

We have had a Tuberculin law for two years regulating the importation of dairy and breeding cattle.

The chief difficulty in the enforcement of sanitary regulations is due to the small sum provided for their enforcement. Our sanitary laws are sufficient for all needs and this board can make any regulations it considers proper for the treatment of stock, and as occasion requires such regulations are passed by this board which is much better than having to wait the pleasure of the Legislature.

The diseases which I am trying to control at this time are tuberculosis, hog cholera, infectious or enzootic pneumonia, glanders and anthrax which has covered quite an area in the southern part of the state and, as a whole I consider that as to sanitary conditions we are no worse than many other states and much better than many.

WM. W. YARD, State Veterinarian.

Delaware.

The State Live Stock Sanitary Board of Delaware has done no systematic work to stamp out tuberculosis, but has superintended the testing with tuberculin of all cattle brought into the State for dairy and breeding purposes, and has tested a good many herds. The imported cattle were mostly young and less than one in a hundred reacted to the test. In herd testing we use the intradermal method. About twenty per cent of our dairy cows in the herds examined reacted.

For the first time in the history of the State we had two or three cases of blackleg. Prompt action was taken to stamp out the disease.

Hog cholera is always more or less prevalent, and this year has been no exception. We have no accurate statistics of the loss from this disease, but we find that the use of hog cholera serum administered promptly saves the greater part of the herd.

State Live Stock Sanitary Board.
J. R. KUHNS, Secretary.
Iowa.

During the past year conditions as to the health of live stock in Iowa have been generally satisfactory, hog cholera being the only source of any considerable loss to the live stock men of our state.

The outbreak of dourine in Taylor county has narrowed down to six animals that have not been released from quarantine. We feel quite sure that no other cases will develop as a result of this outbreak.

We have had a number of calls to investigate supposed cases of glanders, but in most instances found the call to be a false alarm.

A large number of cattle throughout the state have been tested for tuberculosis and a much smaller percent of reactors have been found than in years past. This we believe is due to the fact that people generally are becoming better informed as to the nature of this disease and the rule is that unthrifty or suspicious individuals are taken from the herd and sent to slaughter.

The loss from hog cholera has been quite serious in some parts of the state due to either inability to procure serum or lack of faith in the serum. The unbelievers are fewer in number this year than ever before and I believe all will eventually come to accept the serum treatment.

There has never been a time since the serum has been offered to the public when the demand so far exceeded the supply, as this past summer and all indications point to a greater demand for serum as a result of the convincing of additional numbers of people of its value. In a short time the press will be full of statistics with figures showing just what can be accomplished by the judicious use of serum and the figures will be so convincing that even a "doubting Thomas" will be compelled to acknowledge its value.

During the past year the Animal Health Commission has put in force three rules concerning the importation, exhibition and home treatment of hogs which we believe will be of great value to our swine industry.

These rules are as follows:

"Rule 18, Section 5. All swine imported into the state of Iowa, except for immediate slaughter, must be accompanied by a certificate of health, certifying that they have been immunized with Dorset-McBryde-Niles anti-hog cholera serum not more than thirty days prior to date of importation when the serum alone is used and not less than thirty days prior to date of importation when the simultaneous method is used."

"Rule 26. All hogs within the state of Iowa immunized by the double or simultaneous method of treatment against hog cholera shall be held in strict quarantine for a period of not less than thirty days."

"Rule 27. All swine exhibited at State, County or other Fairs or exhibitions in the State of Iowa must be accompanied by a certificate showing that they have been immunized with Dorset-McBryde-Niles anti-hog cholera serum not more than thirty days prior to date of such Fair or exhibition when serum alone is used and not less than thirty days prior to date of such Fair or exhibition when the simultaneous method is used."

Kentucky.

In the past few months a new serum laboratory was completed at the cost of approximately $11,000. With the addition of Dr. E. W. Mumma and O. S. Crisler, this laboratory has been capable of supplying the demand of the farmers for serum in Kentucky this year.
One of the greatest drawbacks heretofore in hog cholera control work was the inability to obtain serum at all times. It is hoped that the new equipment will be adequate to supply all orders henceforth. A capacity of three hundred (300) liters per week has been maintained most of the time.

Better sanitary laws controlling the outbreaks are very much in need and same will be recommended at the coming Legislature this winter.

An outbreak of malignant catarrhal fever in horses and mules caused considerable loss during the spring months, and it was necessary to establish strict quarantine to suppress it.

A reorganization of the live stock sanitary work in Kentucky will probably be brought before the Legislature, and all matters pertaining to animal diseases will be transferred to the State Live Stock Sanitary Board. Heretofore this work has been handled partly by the State Board of Health.

ROBERT GRAHAM, State Veterinarian.

Respecting new legislation we have the pleasure to report that the last Legislature increased our appropriation $5,000 per annum, $2,500 additional for general sanitary control work and $2,500 for office expenses.

This additional fund having been available for the past twelve months has enabled us to carry into effect excellent field control work in combating contagious and communicable outbreaks.

Anthrax has again been prevalent this season, having manifested itself in twelve parishes. From personal investigations and reports of inspectors, the mortality from this disease during the past year has not been as great as last year. With more available funds for fighting this disease, however, and the application of special regulations for its control, there have been universally satisfactory, concerted sanitary precautions observed respecting its combatment.

There have been but few extensive outbreaks of hog cholera in the State during the past ten months, and our hog cholera plant operated and maintained under the supervision of this Board has had no difficulty in promptly supplying all requests made upon us for serum. We are extremely gratified with the excellent results of our hog cholera serum, which has proven protective to a degree of 80 per cent. universally, and where used by ourselves and assistants as high as 90 per cent. During the past year we have manufactured and distributed 40,000 doses of potent serum, all of which was properly tested before prepared for distribution.

In the production of hog cholera serum we have endeavored to adopt modern suggestions relating to its preparation, together with a uniform system, with the view of producing a standard quality permanently of marked efficiency.

Blood collected from the throats of infected hogs inoculated with acute virulent material is finally prepared into one mixture after it has been properly defibrinated. Our available hyper-immunes are then placed upon the scales and weighed, and for every one pound weight there is injected intravenously five c.c. of this infectious blood. When the bleeding of each hyper-immune thereafter is effected the same careful defibrinization is observed, and the serum thus obtained phenolized and stored in a refrigerator. After a number of such bleedings from various hyper-immunes have been thus collected there is a general mixture made from the aggregate, which is bottled after being properly tested. This method has proven highly satisfactory to us.
and insures the distribution of a product of uniform standard and potency.

Three outbreaks of glanders have been investigated by this Board during the past year and proper sanitary control work instituted respecting suppression of same. The total number of animals destroyed as the result of mallein test and upon physical examination was forty-five head.

Several outbreaks of spinal meningitis have been reported from various localities, the majority of the animals affected having received damaged corn.

The importation of all live stock into this State must be accompanied by a certificate of inspection given by a qualified veterinarian, endorsed by the Live Stock Sanitary Board or State Veterinarian of the State in which shipment originates, or certificate given by a B. A. I. Inspector at least twenty-four hours preceding the shipment of such live stock. Additionally, we require that all cattle shipped into this State for breeding and dairy purposes be accompanied by a tuberculin test chart showing their freedom from tuberculosis.

The State Live Stock Sanitary Board is at the head of tick eradication in the State, and it is through the co-operation of this Board with the Federal Bureau of Animal Industry that this work is being systematically carried on for the benefit of our cattle owners.

LOUISIANA STATE LIVE STOCK SANITARY BOARD.
E. PEGRAM FLOWER, D. V. S., Secretary and Executive Officer.

Maine.

Maine has an estimated value of $26,000,000 worth of live stock; 110,000 horses, 255,000 head of cattle, 186,000 sheep and 101,000 swine; $50,000 a year is appropriated for the control of contagious diseases among its animals.

Our laws, I believe, are adequate and up to date. No live stock can enter our State without a permit and an inspection is required at place of destination, also the tuberculin test.

Unless an animal has been in Maine a year there is no compensation when condemned.

We pay an indemnity for grade cattle of a limited appraisal of $50 and $100 for a pure bred animal; for a glandered horse a limited appraisal of $50; for other animals, one-half their value.

Our farmers believe in the tuberculin test and a large amount of cattle are tested every year. The owner pays for testing, except when an investigation is ordered by the Live Stock Sanitary Commissioner.

We have, to a small extent, some hog cholera, in which case the State quarantines the premises, furnishes the serum for treatment, but the owner pays for the veterinary services.

In cases of contagious abortion the premises are quarantined and the owner is forbidden to sell his stock, except to go to the slaughter house.

When tuberculosis is found upon an animal slaughtered for beef the State pays an indemnity limited to $25.

Our cattle dealers are buying milch cows all over the State to ship to Brighton Market. Upon their arrival there they are tested, and when an animal is condemned the owner receives an indemnity limited to $50. During nine months from January 1, 1913, to October 1, 1913, 3,951 head have been tested and only 112 head were condemned; a percentage of less than 3 per cent. (2.83.)

These 3,951 head of cattle, I have reason to believe, come from as many different and scattered herds in the State, and I do not know
of any better source of information to go by, for any one to form an opinion of the percentage of tuberculosis among our dairies in Maine, which is less than 3 per cent.

We feel very much pleased with such figures. The large amount of money which has been expended in the past has not been wasted, and we claim, at this present time, that we have bovine tuberculosis under control. A. JOLY, Live Stock Sanitary Commissioner.

Mississippi.

During the past season the Live Stock Sanitary Board of this State in co-operation with the Bureau of Animal Industry succeeded in finishing the extermination of the cattle tick in the balance of fourteen counties, a part of which were released last spring, and four other new counties in which the work was started last spring; making in all nearly thirty counties that will be free from ticks and released from quarantine at the end of this season.

The fact that our law and the rules and regulations governing this work have not yet been passed upon by the Supreme Court has led a number of parties to violate our regulations and in this way have given considerable trouble, however, this matter will be adjusted very soon.

This State requires health certificates and tuberculin test for all breeding and dairy cattle, together with a health certificate for all other animals entering the state for breeding purposes, which must be made out by a competent veterinarian.

ARCHIBALD SMITH, Secretary, State Live Stock Sanitary Board.

Montana.

In addition to the regulations in force June 1, 1913, which have been published in the form of a booklet, regulations have been issued providing for the admission of live stock that originates in South Dakota (Order No. 3) and relative to eradication of tuberculosis in cattle (Order No. 5).

Summary of Inspections.

Glanders: December 1, 1912, to October 31, 1913.*

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mallein Test</td>
<td>330</td>
</tr>
<tr>
<td>Complement-Fixation Test</td>
<td>176</td>
</tr>
<tr>
<td>Clinically Inspected</td>
<td>1,043</td>
</tr>
</tbody>
</table>

Total Number Inspected: 1,549
Reacting to Mallein Test: 76
Reacting to Comp. Fix. Test: 45

Total Number Reactors: 121
Clinically Condemned: 34

Total Number Condemned: 155
Number Destroyed: 141
Reactors (1912): 3

Reactors (1913): 138

To be disposed of: 17

*Does not include horses inspected for interstate shipment.
Tuberculosis—Dairy Herds: December 1, 1912, to October 31, 1913.

Tuberculin Tested ........................................... 6,322

Reacting .................................................. 316

Destroyed .................................................. 269

To be disposed of ......................................... 47

Interstate Shipments: December 1, 1912, to October 31, 1913.

Horses mallein tested ..................................... 3,677
Cattle tuberculin tested .................................. 104
Horses clinically inspected ............................... 4,054
Cattle clinically inspected ............................... 3,159
Sheep clinically inspected ............................... 124,122
Swine clinically inspected ................................ 138

Total number animals inspected ......................... 135,254

W. J. BUTLER, Secretary,
Montana Live Stock Sanitary Board.

Nevada.

The work of this Commission is confined to the treating of scabies among the sheep of Nevada and the expenses are paid by a direct tax upon the owners of the flocks, consequently I am limited as to information going from this office. At this time I am unable to give you the number of sheep inspected during the year as my tabulated reports are not made up until November 30th. Last year's report shows less than 2 per cent of the sheep infected with scabies. To my knowledge, Nevada has no Live Stock Sanitary Board.

G. D. WOLFENSPARGER, Secretary,
Nevada State Sheep Commission.

New Jersey.

In addition to a Tuberculosis Commission which operates in this State, we have an Eastern Live Stock Sanitary Association, organized several years ago, which lapsed, however, for the past two years owing to the death and removal of some of its officers. It has been revived this year with new officers elected and we hope to do some good work along the line of improving dairy conditions and general legislation affecting New Jersey and other States constituting the Association. The Secretary is Dr. Osgood, State House, Boston, Mass.

FRANKLIN DYE, Secretary State Board of Agriculture.

New Mexico.

For the year 1913 the State has had no special legislation enacted having special reference to health or sanitary requirements of livestock. During the year 1909 the Territorial Legislature passed a bill entitled "An Act for the Repression of Contagious and Infectious Diseases Among Cattle, Horses, Mules and Asses and to Provide for the Extermination of Such Diseases and to Protect the Public Health." In general terms this bill provides for and restricts the importation of cattle into New Mexico without being accompanied by the proper health certificate signed by qualified County, State or Federal Veteri-
narian at point of origin of shipment. It is also made obligatory upon all owners of dairy cattle to have their cattle tested by the tuberculin test for tuberculosis, providing where any cattle were found infected to have them destroyed; the owners to be reimbursed upon a basis of two-thirds value of the appraised valuation. Since that time the entire dairy herds of New Mexico in towns of 500 inhabitants and over have been tested. And we have again now started the second test to retest all dairy cattle including all outside districts as well as towns. The provision also of this council bill provides that any horses infected with any contagious or infectious diseases, such as glanders or farcy, shall be treated in the same manner and the provision of reimbursement considered along similar lines as those of cattle.

W. J. LINWOOD, Secretary Cattle Sanitary Board.

New York.

There were no changes in State laws having reference to control of infectious diseases in domestic animals during the past year.

Conditions in reference to communicable diseases also show no particular change from those of previous years. Tuberculosis and glanders present two of the most important diseases.

The lack of funds with which to pay indemnities for horses and cattle destroyed on account of glanders and tuberculosis, respectively, has proven one of the greatest difficulties with which the Bureau of Veterinary Service has had to contend in the past year. It is to be hoped that legislation providing for a more systematic examination of horses and cattle and for uniform methods of testing or otherwise examining such animals will be arranged for; also that adequate appropriations will be made whereby indemnities due owners of such animals will be forthcoming as promptly as possible after the destruction of such horses or cattle.

The advisability of reducing allowances made for horses and cattle affected with advanced glanders or tuberculosis, respectively, is indicated.

Certificates of health for cattle intended for breeding and dairy purposes are required for animals brought within the state and it would seem that some requirements should be put into effect in relation to horses and swine brought from other districts in order to prevent the introduction of animals affected with glanders and hog cholera particularly, which are evidently being distributed by means of imported animals.

The necessity of uniform live stock regulations as regards interstate shipment is felt but owing to the difficulty of each state enacting laws that will conform to those of other states it is doubtful if any great progress in this respect can be made for some time.

The importance of supervision over various bacterins, serums and various biologic products is emphasized and some legal restrictions over such materials should be provided for.

J. G. WILLS, Chief Veterinarian.

North Dakota.

During the legislative session of the year 1913, the following laws pertaining to live stock sanitary control work were passed:

Senate Bill No. 25, provides for an appropriation of $25,000 to pay indemnity for animals destroyed for glanders.

House Bill No. 234 increased the appropriation for live stock sanitary work from $10,000 to $15,000 per annum.
House Bill No. 233 provided for a deficit of $3,700.

House Bill No. 13 changes the method of appraising and condemning animals infected with glanders, this work being entirely done by the agent of the Live Stock Sanitary Board.

Senate Bill No. 315 provides that the meat from all animals infected with tuberculosis must be stamped "Infected Meat" before being permitted sold.

Senate Bill No. 381 prohibits the sale of pure bred cattle for breeding and dairying purposes that originate without the State, unless properly tested and certified by the Live Stock Sanitary Board as being free from tuberculosis. This provision to be in force January 1st, 1914.

This State has required the certificate of health, including the tuberculin test, for breeding and dairying cattle during the past ten years.

W. F. CREWE, State Veterinarian.

Oregon.

The work of live stock sanitation is making a very satisfactory progress under our new laws creating a Live Stock Sanitary Board, which Board, consisting of seven members, is nominated and recommended to the Governor for appointment, two each by the Executive Committees of the Oregon Pure-bred Live Stock Association, Oregon State Dairymen's Association and the Oregon Wool Growers' Association. The Secretary of the State Board of Health constitutes ex-officio the seventh member of the Commission. The Board is non-political and naturally is closely in touch with the different classes of live stock as well as the public health.

An indemnity fund of fifty thousand dollars is available biennially for the payment of indemnity moneys for cattle slaughtered on account of tuberculosis.

The new laws provide for two Assistant State Veterinarians or field inspectors besides County Veterinarians in such counties as may experience a prevalence of any disease coming under the role of State sanitation. A provision is made wherein veterinarians are to receive commissions to be eligible to make inspections of live stock moving interstate. We have by means of a regulation provided all veterinarians, so approved to make interstate inspections, with a pocket authorization card. We find this a ready means of preventing the making of inspections by non-approved and non-authorized veterinarians.

New regulations of the Board require the mallein or complement fixation testing of all horses, mules and asses destined to Oregon points of entry, and certification or single vaccination of all hogs shipped into the State for purposes other than immediate slaughter. In addition, all cars or means of transportation used for moving hogs or other animals, for purposes other than immediate slaughter, inter or intra-state, must be cleaned and disinfected before loading will be permitted, or hogs or other animals released. Hog cholera serum is supplied through the Board at a cost of one cent per cubic centimeter to the user.

Oregon has demanded for some four years a certificate of tuberculin test for all breeding or dairy cattle. In addition, all cattle sold at public auction or exhibited at any fair or live stock show must be proven free from tuberculosis by means of the tuberculin test before such sale or exhibition will be permitted.

All bucks shipped into the State must be double dipped; in lieu of this certification as originating in scab free territory for a period of two years.
Difficulties experienced are chiefly in not being able to supply veterinarians to administer the tuberculin tests as requested. Some difficulty has been experienced in having animals properly and honestly tested prior to their entrance into the State.

The Board has received much co-operation from the United States Bureau of Animal Industry Inspectors, and with this assistance, feels that the confidence of Oregon stock owners in state sanitation has been rigorously maintained. WILLIAM H. LYTLE, State Veterinarian.

South Carolina.

The General Assembly of South Carolina has not passed any Acts relative to live stock sanitary work during the past year. Neither has there been any change in State regulations, except in regulations for the control of splenetic fever, which were amended to provide for the release of two counties from Federal quarantine and to allow the extension of tick eradication work into six additional counties.

South Carolina requires the tuberculin test for all breeding and dairy cattle and physical examination for feeding cattle, also for all horses, mules, sheep and swine.

M. RAY POWERS, State Veterinarian.

Texas.

We have nothing special to report in the matter of disease. Our inspection service is doing very well; we have at present eight border inspectors, practitioners, who are located at or close to the border, who examine all certificates; if they are official and correct the shipment is passed into the State, if not, or if no certificate accompanies the shipment the stock is then inspected. We have altogether fifty qualified veterinarians registered with the Live Stock Sanitary Commission for interstate inspection.

We use the uniform certificate in sets of three, the original accompanying the shipment, the duplicate being sent to the official of state of destination, while the third copy is sent to the Live Stock Sanitary Commission of Texas, where it is examined and filed away. All registered veterinarians are notified of any change in the requirements of the different States.

The following rules and regulations, or portions of same relative to control work are now in force.

Tuberculin Testing—(Addition to Old Regulations)—The certificate must show the various temperatures of the animal before and after the injection of tuberculin, the brand of tuberculin used, the amount injected, the hours at which the injection was made and the various temperatures taken and the registry name and number of such animals as are registered. In case any animal or animals in any lot so inspected for importation into the State of Texas shall show a possible reaction to the tuberculin test, and be thereby rejected, that fact shall be noted on the certificate.

All certificates must be made out on official forms issued by the State in which shipment originated.

Hog Cholera—(Addition to Old Regulations)—"And it is further ordered that no swine shall be imported into the State of Texas for immediate slaughter unless such swine are consigned to recognized slaughtering centers where Federal inspection is maintained.

"The use of the simultaneous method of vaccination in hog cholera (virulent blood) is hereby prohibited in the State of Texas, unless under the direct supervision of this Commission."
"All swine imported into or moved within the State of Texas, when in carload lots, must be handled under the following regulations:

1. That cars assigned for the loading of stock hogs shall be thoroughly cleaned and disinfected.

2. Shippers shall load such consignments light enough to obviate the necessity for unloading in transit, the shippers or representatives to be required to accompany the shipment through to destination, providing watering troughs for watering hogs and supply sufficient feed to last throughout the journey.

3. The transportation company to provide temporary loading chutes and load hogs direct to the car through the temporary chutes or from wagons, keeping them away from the stock yards proper altogether.

4. Placard car 'Stock Hogs;' do not unload in transit; switch in forward part of train as far apart from market hogs as possible. Way bills should bear the notation 'Stock Hogs.' Do not unload in transit.

5. Set the cars out at expiration of the twenty-eight (28) or thirty-six (36) hour limit for the purpose of watering the hogs and at the same time letting the hogs rest better in the car while it is standing still.

6. A temporary unloading chute or wagon to be provided at destination; unload car through the chute or wagon and drive directly away.

7. No person other than the one in charge of the car shall enter a car loaded with such stocker, feeder or breeding hogs between the point of origin and destination."

Health Certificate, Horses, Mules and Asses—All certificates must be made out on official forms issued by the State in which shipment originated.

Biological Products—"On and after July 1, 1913, in accordance with an act passed by Congress giving the Bureau of Animal Industry control of interstate shipment of all biological or analogous products, all veterinary biological products, such as tuberculin of all kinds, mallein, anthrax vaccine, black leg vaccine, hog cholera serum, influenza or shipping fever antitoxin, rabies virus, shall have the endorsement of the United States Bureau of Animal Industry and the Live Stock Sanitary Commission of Texas before said products shall be sold in Texas."

We have little difficulty in enforcing our regulations.

E. R. FORBES, State Veterinarian

Wyoming.

The last session of our Legislature met in January, 1913. A number of bills were presented in the interests of live stock. They were as follows:

To prevent the importation of horses affected with glanders; cattle affected with or exposed to mange; cattle for dairy or breeding purposes or for exhibition at County or State fairs that are affected with tuberculosis; swine that are affected with or exposed to any contagious or infectious swine disease.

To regulate the public service of stallions and jacks.

Regulating the practice of veterinary medicine.

Regulating the sale of horses at public auction; requiring the permission of the State Veterinarian to hold such a sale, and requiring the services of a veterinarian who would provide inspections and tests on horses destined to other States.
Requiring the testing of all dairy cattle supplying milk or cream to towns or creameries in the State.
Providing for the prevention of gathering of swill in incorporated towns or cities, or from county, State or Federal institutions when such swill is intended to be fed to swine.
All the above enumerated bills failed to pass, with the exception of the last mentioned.
The Sanitary Bill, providing for the inspection of milk and meats, slaughter houses, dairies, hotels and restaurants, was passed. This law is enforced by the State Dairy, Food and Oil Commissioner, who employs a veterinarian as an assistant.
As a result of the Legislature failing to pass laws governing the movement of live stock destined to this State, our Governor, on April 1st, 1913, issued a quarantine proclamation, and on June 19th, 1913, he issued a special quarantine regulation for cattle imported from the States of Illinois and New York.
The present condition of live stock sanitary control work in this State is good. This office received a liberal appropriation for its work; employs a Deputy Veterinarian, two Live Stock Inspectors and nine qualified veterinarians are available, should their assistance be required at any time.
But two cases of suspected glanders are known in the State at the present time.
Our greatest difficulty seems to be the eradication of scabies of cattle in the sections of our State where cattle range on the open without any restriction. Fortunately, this is a comparatively mild disease.
This State has received shipments of live stock (cattle) diseased with tuberculosis from the States of Illinois and New York, and several cars of swine which originated in Nebraska came into the State diseased with cholera.
I am of the opinion that the next session of our Legislature, which meets in 1915, will provide for the State the laws that should be enacted in the interests of our live stock, as the report which I will submit will plainly show our needs as a result of the previous two years' experience.
B. F. DAVIS, State Veterinarian.

Wyoming Board of Sheep Commissioners.
The sheep industry of this State has passed through a very profitable year. Lambs and mutton have been put on the market at a good price and wool at a fair price.
The State has held the counties of Natrona and Converse in quarantine for sheep scab since the 12th day of December, 1911. By constant and efficient work with diseased and exposed herds carried on under the direction of the State and B. A. I., the disease has been eradicated and the State Board raised the quarantine on the 20th day of November, 1913. We believe the State to be free from sheep scab at this time.
Comparing the number of sheep that were imported into this State during the years of 1912 and 1913, we find a decrease of 65 per cent. in the past twelve months.
Last year there was considerable trouble with necro-bacillosis in sections of this State, but this year reports in this office point to a decrease in the amount of infection in our flocks.

H. R. MILLARD, D. V. M., Secretary-Treasurer.
<table>
<thead>
<tr>
<th>Name</th>
<th>City, State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen, Dr. L. J.</td>
<td>Fort Worth, Tex.</td>
</tr>
<tr>
<td>Anderson, Wm. Penn</td>
<td>Amarillo, Tex.</td>
</tr>
<tr>
<td>Brinker, J. G.</td>
<td>Amarillo, Tex.</td>
</tr>
<tr>
<td>Herring, C. T.</td>
<td>Amarillo, Tex.</td>
</tr>
<tr>
<td>Mauldin, Dr. C. E.</td>
<td>Fort Worth, Tex.</td>
</tr>
<tr>
<td>McFadden, Al M.</td>
<td>Victoria, Tex.</td>
</tr>
<tr>
<td>Marsteller, Prof. R. P.</td>
<td>College Station, Tex.</td>
</tr>
<tr>
<td>Spiller, E. E.</td>
<td>Fort Worth, Tex.</td>
</tr>
<tr>
<td>Turner, Avery</td>
<td>Amarillo, Tex.</td>
</tr>
<tr>
<td>Waddell, W. N.</td>
<td>Fort Worth, Tex.</td>
</tr>
<tr>
<td>Forbes, Dr. E. R.</td>
<td>Fort Worth, Tex.</td>
</tr>
<tr>
<td>Fox, F. C.</td>
<td>Amarillo, Tex.</td>
</tr>
<tr>
<td>Archibald, Dr. R. A.</td>
<td>Oakland, Cal.</td>
</tr>
<tr>
<td>Keane, Dr. Chas.</td>
<td>Sacramento, Cal.</td>
</tr>
<tr>
<td>Lively, Mr. D. O.</td>
<td>San Francisco, Cal.</td>
</tr>
<tr>
<td>Longley, Dr. Otis A.</td>
<td>Fresno, Cal.</td>
</tr>
<tr>
<td>Mackellar, Dr. Wm. M.</td>
<td>San Diego, Cal.</td>
</tr>
<tr>
<td>Meyer, Dr. K. F.</td>
<td>Berkeley, Cal.</td>
</tr>
<tr>
<td>Haring, Dr. C. M.</td>
<td>Berkeley, Cal.</td>
</tr>
<tr>
<td>Atwood, Dr. Frank G.</td>
<td>New Haven, Conn.</td>
</tr>
<tr>
<td>Atwood, Dr. G. C.</td>
<td>New Haven, Conn.</td>
</tr>
<tr>
<td>Phelps, Jeffry O. Jr.</td>
<td>Hartford, Conn.</td>
</tr>
<tr>
<td>Ingram, Dr. Frank A.</td>
<td>Hartford, Conn.</td>
</tr>
<tr>
<td>Schreck, Dr. Oscar</td>
<td>New Haven, Conn.</td>
</tr>
<tr>
<td>DeVine, Dr. J. F.</td>
<td>Goshen, N. Y.</td>
</tr>
<tr>
<td>Ellis, Dr. Robt. W.</td>
<td>New York, N. Y.</td>
</tr>
<tr>
<td>Hollingworth, Dr. W. G.</td>
<td>Utica, N. Y.</td>
</tr>
<tr>
<td>Nichols, Dr. P. K.</td>
<td>Port Richmond, New York City</td>
</tr>
<tr>
<td>Moore, Dr. V. A.</td>
<td>Ithaca, N. Y.</td>
</tr>
<tr>
<td>Willis, Dr. J. G.</td>
<td>Albany, N. Y.</td>
</tr>
<tr>
<td>Weaver, Dr. P. V.</td>
<td>Glen Cove, N. Y.</td>
</tr>
<tr>
<td>Udall, Dr. D. K.</td>
<td>Ithaca, N. Y.</td>
</tr>
<tr>
<td>Wende, Dr. H. S.</td>
<td>Tonawanda, N. Y.</td>
</tr>
<tr>
<td>Linch, Dr. Chas.</td>
<td>Albany, N. Y.</td>
</tr>
<tr>
<td>Beer, Dr. Henry J.</td>
<td>Blue Island, Ill.</td>
</tr>
<tr>
<td>Bennett, Dr. S. E.</td>
<td>Chicago, Ill.</td>
</tr>
<tr>
<td>Baker, Dr. A. H.</td>
<td>Chicago, Ill.</td>
</tr>
<tr>
<td>Campbell, Dr. D. M.</td>
<td>Chicago, Ill.</td>
</tr>
<tr>
<td>Dyson, Dr. O. E.</td>
<td>Chicago, Ill.</td>
</tr>
<tr>
<td>Ferguson, John J.</td>
<td>Chicago, Ill.</td>
</tr>
<tr>
<td>Flanagan, Dr. D. J.</td>
<td>Chicago, Ill.</td>
</tr>
<tr>
<td>Godsal, Dr. F. W.</td>
<td>Kewanee, Ill.</td>
</tr>
<tr>
<td>Haner, Mr. Phil S.</td>
<td>Taylorville, Ill.</td>
</tr>
<tr>
<td>Hughes, Dr. Joseph</td>
<td>Chicago, Ill.</td>
</tr>
</tbody>
</table>

Henderson, Dr. A. M., Aurora, Ill.
Hawkins, Dr. J. D., National Stock Yards, Ill.
Lowery, C. A., Springfield, Ill.
Oliver, E. A., Chicago, Ill.
Peters, Dr. A. T., Springfield, Ill.
Quitman, Dr. E. L., Chicago, Ill.
Russell, T. F., Pana, Ill.
Ryan, Dr. John T., Chicago, Ill.
Rives, Dr. Robt., National Stock Yards, Ill.
Stringer, Dr. N. L., Paxton, Ill.
Schwarze, Dr. H. R., Springfield, Ill.
Taylor, Dr. C. H., DeKalb, Ill.
Wright, Dr. J. M., Chicago, Ill.
Way, Dr. Cassius, Harvard, Ill.
White, Dr. Lewis, Wyoming, Ill.
Wells, Dr. T. G., Arthur, Ill.
White, Dr. John L., Chicago, Ill.
Mattrall, Dr. I. C., National Stock Yards, Ill.
Holmes, Dr. W. B., Springfield, Ill.
Pierce, Dr. Chas., Elgin, Ill.
Presler, Dr. H. A., Fairbury, Ill.
Eagle, Dr. R. F., Chicago, Ill.
Shanley, Mr. B. J., Ottawa, Ill.
Brown, L. F., Galesburg, Ill.
Van Hagen, Geo. E., Barrington, Ill.
Bazley, Dr. V. S., Decatur, Ill.
Miller, Walter E., Abingdon, Ill.
Houck, Dr. S. E., East St. Louis, Ill.
Mayo, Dr. N. S., Chicago, Ill.
Brinmahl, Dr. S. D., Chicago, Ill.
Timson, Mr. Chas. E., Chicago, Ill.
Rasmussen, Dr. J. C., Wyanet, Ill.
Ryder, Dr. H. R., Chicago, Ill.
Roberts, Dr. G. H., Indianapolis, Ind.
Sullivan, Dr. W. A., Crawfordsville, Ind.
Whiting, Mr. Rex A., Lafayette, Ind.
Craig, Dr. R. A., Lafayette, Ind.
Nelson, Dr. Amos F., Indianapolis, Ind.
Houck, Dr. U. G., Crawfordsville, Ind.
Bolser, Dr. F. A., New Castle, Ind.
Gibson, Dr. Jas. J., Des Moines, Iowa
Greeder, Dr. Herman, Cedar Rapids, Iowa.
Stange, Dr. C. H., Ames, Iowa.
Schern, Prof. Kert, Ames, Iowa.
Hasenmiller, Fred, Eldridge, Iowa.

253
MEMBERS 1914

Stouder, Dr. K. W., Ames, Iowa.
Stouder, M. R., Newton, Iowa.
Griffith, Dr. J. W., Cedar Rapids, Iowa.
Underwood, Dr. J. R., Des Moines, Iowa.
Kinsley, Dr. Frank, McGregor, Iowa.
Downing, Dr. Tom, Washington, Ia.
Hecker, Dr. Frank, Jackson, Miss.
Ranck, Dr. E. N., Agricultural College, Miss.
Pierce, Dr. Benj. D., Springfield, Mass.
Peckham, N. Howard, Boston, Mass.
Paige, Dr. Jas. B., Amherst, Mass.
Walker, Fred F., Boston, Mass.
Schroeder, Dr. E. C., Bethesda, Md.
Kouns, C. W., Topeka, Kan.
Schoenleber, Dr. F. S., Manhattan, Kan.
Sihler, C. J., Kansas City, Kan.
Petersen, Dr. Phineas, Lindsborg, Kan.
Graybill, Sam S., Topeka, Kan.
Hoffman, Wm., Kansas City, Kan.
Elder, Dr. G. D., Douglass, Kan.
Wight, Dr. A. E., Little Rock, Ark.
Gow, Dr. R. M., Fayetteville, Ark.
Litye, Dr. W. H., Salem, Ore.
Nunn, Dr. Henry, McMinnville, Ore.
Plummer, Mr. O. M., North Portland, Ore.
Reedy, Dr. James E., Tillamook, Ore.
Powers, Dr. M. Ray, Clemson College, S. C.
Smith, Dr. Clarence E., Greenville, S. C.
Kaupp, Dr. B. F., Spartansburg, S.C.
Schumacher, Dr. Wm., Durango, Col.
Tomlinson, T. W., Denver, Col.
Yard, Dr. W. W., Denver, Col.
Edwards, Prof. S. F., Guelph, Ont., Canada.
Torrance, Dr. Fred, Ottawa, Ont., Canada.
Chittick, Mr. Hugh, Sao Paulo, S. A.
McNeill, Dr. John H., Sao Paulo, S. A.
Fitzgerald, Dr. A. D., Reynoldsburg, Ohio.
White, Dr. Davis S., Columbus, Ohio.
Fischer, Dr. Paul, Columbus, Ohio.
Flowe, Dr. B. B., Raleigh, N. C.
Gilliland, Dr. S. H., Marietta, Pa.
Marshall, Dr. C. J., Harrisburg, Pa.
Munce, Dr. T. E., Harrisburg, Pa.
Reichel, Dr. John, Glenolden, Pa.
Staley, Dr. R. M., Camp Hill, Pa.
Jones, Dr. F. K., Pittsburgh, Pa.
Gross, Dr. Herman, Webster, S. D.
Halverson, Dr. H. M., Yankton, S. D.
Hicks, Dr. Thos., Milbank, S. D.
Cock, Mr. Frank, Belle Fourche, S. D.
Pett, Dr. C. C., Brookings, S. D.
Giltnar, Dr. Ward, East Lansing, Mich.
Graham, Dr. G. G., Detroit, Mich.
Halladay, H. H., Clinton, Mich.
Lyman, Dr. R. F., East Lansing, Mich.
Schul, Dr. R. F., Grand Rapids, Mich.
Wilson, Dr. R. H., Rochester, Mich.
Krey, Dr. Theo. J., Detroit, Mich.
Dunphy, Dr. Geo. W., Rochester, Mich.
Hallan, Dr. E. T., East Lansing, Mich.
Graham, Dr. Robt., Lexington, Ky.
Good, Prof. E. S., Lexington, Ky.
Mumma, E. W., Lexington, Ky.
Hershey, Dr. S. R., Charleston, W. Va.
Cary, Dr. C. A., Auburn, Ala.
Klernan, Dr. J. A., Birmingham, Ala.
Chrisman, Dr. W. G., Blacksburg, Va.
Owen, Dr. Thomas, Norfolk, Va.
Cotton, Dr. Chas. E., Minneapolis, Minn.
Erickson, Dr. O., Pelican Rapids, Minn.
Gaumnitz, Prof. D. A., South St. Paul, Minn.
Hoskins, Dr. H. Preston, St. Paul, Minn.
Ketchum, Dr. F. D., South St. Paul, Minn.
Leech, Dr. G. Ed., Winona, Minn.
Lambrechts, Dr. T., Montevideo, Minn.
Reynolds, Dr. M. H., St. Anthony Park, Minn.
Ward, Dr. S. H., St. Paul, Minn.
Canfield, Thos. H., Lake Park, Minn.
MEMBERS 1914

Boyd, Prof. W. L., St. Anthony Park, Minn.
Flocken, Chas. F., St. Anthony Park, Minn.
Hoverstad, T. A., Minneapolis, Minn.
Dorset, Dr. M., Washington, D. C.
Ellenberger, Dr. W. P., Washington, D. C.
Hickman, Dr. R. W., Washington, D. C.
Melvin, Dr. A. Q., Washington, D. C.
Mohler, Dr. John R., Washington, D. C.
Ransom, Dr. B. H., Washington, D. C.
Ramsay, Dr. R. A., Washington, D. C.
Steddom, Dr. R. P., Washington, D. C.
Eichhorn, Dr. Adolph, Washington, D. C.
Dalrymple, Dr. W. H., Baton Rouge, La.
Flower, Dr. E. Pegram, Baton Rouge, La.
Davis, Mr. F. L., White River Jct., Vermont.
Davis, Dr. B. F., Cheyenne, Wyo.
Dawson, Dr. Chas. F., Jacksonville, Fla.
Bahnsen, Dr. P. F., Atlanta, Ga.
Nighbert, Dr. E. M., Atlanta, Ga.
Wundt, Karl R., Atlanta, Ga.
White, Dr. Geo. R., Nashville, Tenn.
Lowe, Dr. C. D., Morristown, Tenn.
Behnke, Dr. A. E., Milwaukee, Wis.
Halley, Prof. F. B., Madison, Wis.
Hernshein, Dr. J. T., Pleasant Prairie, Wis.
Hastings, Dr. E. G., Madison, Wis.
Ravenel, Dr. M. P., Madison, Wis.
Sullivan, Dr. E. M., Milwaukee, Wis.
Brewer, Dr. Frank W., Oklahoma City, Okla.
Bush, Leslie, Oklahoma City, Okla.
Bostrom, Dr. A., Lincoln, Neb.
Juckniss, Dr. Paul, South Omaha, Neb.
Miller, Dr. A. W., South Omaha, Neb.
Thomson, Dr. H., Newman Grove, Neb.
Thrower, Dr. John Dudley, South Omaha, Neb.
Morris, Dr. Harry R., Omaha, Neb.
Kiggin, Dr. L. C., Lincoln, Neb.
Brooks, Mr. F. S., Kansas City, Mo.
Connaway, Dr. J. W., Columbia, Mo.
Humphreys, Dr. John S., Laredo, Mo.
Kinsley, Dr. A. T., Kansas City, Mo.
Murphy, Dr. B. W., Sedalia, Mo.
Stewart, Dr. S., Kansas City, Mo.
Sheldon, Dr. S., Kansas City, Mo.
Grimes, Robt. B., Kansas City, Mo.
Gingery, Dr. J. B., Columbia, Mo.
Butin, Geo. E., Kansas City, Mo.
Fletcher, F. C., Kansas City, Mo.
Luckey, Dr. D. F., Columbia, Mo.
Crewe, Dr. W. F., Bismarck, N. D.
Cohenour, Dr. H. H., Bismarck, N. D.
Logan, Dr. J. A., Oakes, N. D.
Treacy, Dr. R. H., Bismarck, N. D.
Van Es, Dr. L., Agricultural College, N. D.
White, Dr. V. C., Boise, Idaho.
Wiggs, Mr. Chas. F., Billings, Mont.
Butler, Dr. W. J., Helena, Mont.
Joly, Dr. A., Waterville, Me.