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University of Tennessee Agricultural Experiment Station

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PREVENTION OF HOG CHOLERA

A PRELIMINARY REPORT

BY

MOSES JACOB

KNOXVILLE, TENNESSEE

The Agricultural Experiment Station

OF THE UNIVERSITY OF TENNESSEE

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 The Experiment Station building, containing the offices and laboratories, and the plant house and part of the Horticultural Department, are located on the University campus, 15 minutes walk from the Custom House in Knoxville. The experiment farm, the barns, stables, dairy building, etc., are located one mile west of the University, on the Kingston Pike. The fruit farm is adjacent to the Industrial School and is easily reached by the Lonsdale car line. Farmers are cordially invited to visit the buildings and experimental grounds.

Bulletins of this Station will be sent, upon application, free of charge, to any farmer in the State.

PREVENTION OF HOG CHOLERA

A PRELIMINARY REPORT

INTRODUCTORY NOTE BY H. A. MORGAN.

In co-operation with the State Department of Agriculture, the Experiment Station has made an investigation of the method of preventing hog cholera discovered by the Bureau of Animal Industry, United States Department of Agriculture. In July, 1908, Dr. M. Jacob, the Station veterinarian, attended an inoculation demonstration and conference conducted by the Bureau of Animal Industry, at Ames, Iowa. On Dr. Jacob's return a part of the Station herd was isolated and preparations were begun for the development of the serum and blood in sufficient quantities to make preliminary tests upon one or more herds in Middle Tennessee. The tests at the Station were convincing as to the efficacy of the Bureau's method.

In November, 1908, word was received at the Station of an outbreak of cholera on the farm of H. D. Cooper & Sons, of Nashville. At this time sufficient serum was on hand to inoculate 96 head. Dr. Jacob inoculated the Cooper herd on November 22, and the results have proved so satisfactory as to warrant the Station in giving this matter an important place in the co-operative and extension work in Middle Tennessee.

The following detailed report of Dr. Jacob, veterinarian of the Experiment Station, will be of much interest to the hog raisers of the State:

It is indeed gratifying to be able to state positively that epidemics of hog cholera can now be successfully controlled by a process of vaccination. The production and application of the vaccine I will discuss later in this report. This important discovery has been the result of many years of tedious research on the part of the noted scientists connected with the United States Bureau of Animal Industry.

The American swine breeder and raiser has always had a wholesome fear of hog cholera, as it is not an uncommon occurrence to have herds partially or completely destroyed by the appearance of this disease. This has been true not only in Tennessee, but in every state in the Union. According to the Twenty-first Annual Report of the Bureau of Animal Industry, United States Department of Agriculture, the estimated losses of hogs during the year ended March 31, 1904, is given as 2,401,796. Of this number 73,841 were credited to the State of Tennessee, and it is safe to say 90 per cent of this loss among hogs in Tennessee was due to hog

cholera. According to this same report, Tennessee in 1904 had 1,011,516 hogs, with a valuation of \$4,754,125. We can readily understand, then, how such an enormous industry is more or less at the mercy of swine diseases. The protection of our swine industry was in reality the incentive for the production of a successful means of controlling hog cholera.

CONFERENCE ON HOG CHOLERA

In the calling of the Iowa Conference three objects were prominently in mind:

1. To instruct the representatives of the various states in the method of producing the immunizing serum and its practical application in an outbreak of hog cholera.

2. To discuss ways and means by which the production of hog cholera vaccine in each state may be given financial support.

3. To disseminate the benefit resulting from this important discovery among the swine raisers throughout the United States.

The method of producing the serum for immunizing hogs is somewhat complicated and should be carried out only under the direction of one who is entirely qualified for the work. An unreliable serum might bring about serious losses. No serum should leave the laboratory until it has first been subjected to a thorough test, which consists in vaccinating susceptible hogs and then exposing them to infection; non-immunized susceptible hogs being exposed to the same infection as a check. If after a reasonable length of time the non-vaccinated hogs contract cholera, and the vaccinated hogs do not, the serum is considered reliable. Again, it is essential that absolute aseptic precautions should be observed in the handling of instruments, pans, and bottles, and in all the operations. Young pigs weighing in the neighborhood of 100 pounds are most desirable for this work.

METHOD ADOPTED AT THE EXPERIMENT STATION

The method as carried on at the Experiment Station is that used at the Government hog-cholera farm, and is about as follows:

A pig is immunized by the serum-simultaneous method, that is, injected with 20 to 30 c. c. of blood-serum obtained from a previously hyper-immunized hog, and 2 to 3 c. c. of virulent blood obtained from a hog sick with hog cholera. These injections are made with a hypodermic syringe under the skin (subcutaneously) and into the muscle tissue, preferably on the inside of the thighs, high up toward the body. The serum is usually injected on one side and the virulent blood on the other.

The pig is then placed in a clean, comfortable pen, and about one week later is subjected to hyperimmunization. In other words, it receives an injection of virulent blood from which the clot has been removed. This virulent blood is obtained from a hog sick with cholera. The amount of virulent blood to be used depends upon the size of the hog, usually about

10 to 12 c. c. for every pound of body weight. Consequently, to hyperimmunize a 100-pound hog, about 1000 c. c. of virulent blood is used. This injection may be made by one of two methods, subcutaneously or intravenously. By the intravenous method about one-half as much virulent blood is used as by the subcutaneous method and the injection is made into the veins of the ear. The subcutaneous method is the most simple and may be carried out by either the "quick" or the "slow" method. In the "quick" method the injection is made at one time. In the "slow" method three injections are made, at intervals of about one week. For the first injection about 1 c. c. of virulent blood for every pound of body weight is used (100 c. c. for a 100-pound hog), for the second $2\frac{1}{2}$ c. c. for every pound of body weight (250 c. c. for a 100-pound hog), and for the third, 5 c. c. for every pound of body weight (500 c. c. for a 100-pound hog).

Experiments are now being conducted with the intra-peritoneal injections, but this method is not as yet to be recommended for general use.

About one week after hyperimmunization has been completed, the pig is ready to produce the immunizing serum. Consequently it is now subjected to bleeding at regular intervals. Bleeding is performed by amputating the tail. The first amputation is made just below the middle of the tail, and each time the operation is made a little higher up. These bleedings are usually made at intervals of about one week. As a rule the animal is bled only three times, for the reason that the blood loses its potency and therefore can not be depended upon to produce a reliable serum after a definite time. The amount of blood obtained at each bleeding varies considerably, probably from 300 to 600 c. c. This blood is now defibrinated by being allowed to clot and filter through sterile gauze. The filtrate obtained in this way is the immunizing serum and is ready to be used for vaccinating purposes. It is, however, first mixed with a 5 per cent solution of carbolic acid, in the proportion of 9 parts of serum to 1 part of the acid solution. The dose, varying from 20 to 30 c. c., is given with a hypodermic syringe under the skin and into the muscle tissue. Fortunately this serum keeps almost indefinitely in an air-tight sterile vessel at ordinary cellar temperature, and may be used as needed.

There are two methods of vaccination, one in which the serum alone is used, which produces an immunity lasting 3 to 6 weeks; and one in which the serum is used in conjunction with 2 to 3 c. c. of fresh blood obtained from a hog sick with hog cholera. This latter method is known as the serum-simultaneous method and produces an immunity which is considered practically permanent. When injecting in the second method it is best to use separate syringes, injecting the serum in one thigh and the virulent blood in the other. The serum from a hyperimmunized hog also possesses some curative effect when used very early in the disease. There is little or no danger in spreading the disease when vaccination is properly carried out.

The practical application of vaccinating against hog cholera is not by any means a difficult problem, when once the serum production has

been perfected in a given state. This, however, as already indicated, necessitates an expenditure of a certain amount of money for the equipment of premises, for hogs, and for qualified men. But the expense is not so great, when the annual losses from hog cholera are considered. The hyperimmune hogs after the final bleeding may be used for food purposes. Vaccination to produce temporary immunity, as above outlined, is very simple, consisting in the subcutaneous injection of the *serum alone*. This may be easily done by the average intelligent farmer, and is of special use when shipping hogs from one place to another, as is frequently done with show animals. The serum-simultaneous vaccination, to produce a permanent immunity, is more complicated, since it calls for the bleeding of diseased hogs to obtain the virulent blood. This latter method will demand trained men who can be sent to the seat of different outbreaks of hog cholera.

EXPERIMENTS ON THE STATION FARM

The hog cholera work was started at the Experiment Station farm August 22, 1908. Four pigs were inoculated with virulent blood for the purpose of producing hog cholera; these pigs to be later utilized in obtaining virulent blood to hyperimmunize the already immunized pigs. On the same day four pigs were immunized by the serum-simultaneous method. On August 29 all four pigs which had been inoculated with virulent blood showed typical symptoms of hog cholera. They were then bled until dead and their blood was used to hyperimmunize the pigs which had been immunized August 22. The "quick" method, already described in this report, was followed.

On September 10 and 21 the hyperimmunized pigs were subjected to their first and second bleedings from the tail for serum production. From these four pigs about 3000 c. c. of blood serum was obtained, which represents about 100 doses of hog cholera vaccine.

In order to test the efficiency of our serum, two pigs were utilized, one being inoculated with 2 c. c. of virulent blood to act as a check and the other with 2 c. c. of virulent blood and 30 c. c. of our serum. Both pigs were then placed in an infected pen which contained an already diseased hog. In about one week the check pig showed evidence of being sick and in a few days died with typical symptoms of hog cholera and the characteristic lesions on post-mortem. The vaccinated pig suffered no ill effects whatever and continued to thrive as if nothing had occurred.

INOCULATION OF COOPER HERD NEAR NASHVILLE

In the middle of November, 1908, we were notified of an outbreak of hog cholera on the farm of Mr. H. D. Cooper, near Nashville, Tennessee. A visit was made to the farm of Mr. Cooper on November 22 and upon investigation a serious outbreak of cholera was recognized, with one animal dead, one dying in the pen, and several showing marked physical symptoms. In addition there was the history of the loss of 64 hogs during the six weeks previous to November 22. We then vaccinated 96 hogs with the serum which we had produced at the Experiment Station. On Decem-

ber 31 a second visit was made to Mr. Cooper's farm to determine the results of vaccination. It was found that from November 22 to December 31 only 16 hogs had died, no deaths having occurred during the last two weeks of December, indicating that those that did die after vaccination were those that were probably already infected at the time of vaccination. During the course of this experiment the owner subjected these pigs to some proprietary medication with their feed, but I believe that this did not in any way affect the results of vaccination. On January 5, 1909, we sent two pigs which we had immunized at the Experiment Station to Mr. Cooper to be placed among his hogs to test the efficiency of their vaccination. From these we have had no report up to the present time.

From what has been said, it is evident that we can produce a successful hog cholera serum. On the strength of recent developments along this line the Missouri Experiment Station is asking for \$45,000.00 and the Ohio Station for \$25,000.00 from their respective States to fight hog cholera. It is to be hoped that Tennessee, with equally as much at stake, will give us the necessary financial support, that we may conduct such a campaign against hog cholera and do justice to the swine industry in this State.