THE SERUM TREATMENT OF HOG CHOLERA

BY ROBERT GRAHAM

CLEANING AND DISINFECTION OF HOG HOUSES AND FEED LOTS DESTROYS HOG-CHOLERA INFECTION

HYGIENIC MEASURES are fundamental in the prevention of hog cholera and, when combined with immunization, the losses from this disease may be reduced to a minimum. Potent anti-hog-cholera serum properly administered to healthy hogs provides an immunity to hog cholera. The serum should be injected by competent veterinarians. Hogs in sick herds, but not visibly affected, and healthy herds dangerously exposed to cholera should be treated without delay. Serum is a preventive rather than a curative agent, and the best results are therefore obtained before animals develop the disease. The enforcement of quarantine measures on infected farms, followed by a thorough cleaning and disinfection of hog houses, hog lots, and feeding places, will prevent the spread of cholera.

SERUM SAVES HOGS
SUMMARY

1. Sanitary measures will aid in keeping farms free from hog cholera and other swine infections (see Circular 203).

2. All sick animals should be isolated promptly and an expert diagnosis obtained. One or more pigs should be sacrificed in making a diagnosis.

3. A fatal contagious disease in swine accompanied by high temperature invariably proves to be cholera.

4. Lesions of cholera may be recognized on post-mortem examination by the presence of small hemorrhages on the surface of the lungs, heart, kidney, and outer wall of the intestines. The lymphatic glands may be congestion and the inner wall of the stomach and intestines may show areas of inflammation or the formation of button-like ulcers. Diagnosis based on lesions alone may, however, be misleading.

5. All animals fatally afflicted with the disease should be killed and the carcasses burned.

6. Anti-hog-cholera serum properly injected will prevent the development of cholera in healthy animals; hence all susceptible animals on premises adjoining outbreaks of hog cholera should be immunized. Serum is not a curative agent.

7. There are two methods of immunizing hogs: (a) Serum-alone method, which produces a passive immunity generally lasting from 30 to 60 days; and (b) Simultaneous method, which produces a permanent immunity.

8. Record the temperature of each animal before inoculation. If any should register a temperature higher than 104° F., inject an increased dose of serum but no virus. Provide clean quarters free from dust for the administration of the treatment.

9. The syringes and needles should be sterilized, the point of inoculation washed with soap and water, followed by the application of a reliable disinfectant, and every precaution taken to inject the serum in an aseptic manner.

10. Following inoculation, animals should be placed in comfortable quarters free from dust and filth, and given a light ration for ten days.

11. Quarantine, clean, and disinfect infected premises to prevent the spread of the disease to adjoining farms and to render the premises safe for re-stocking.

12. Employ sanitary measures to keep herds free from cholera and rely upon the use of serum to prevent losses from the disease in dangerously exposed or infected herds.
THE SERUM TREATMENT OF HOG CHOLERA

BY ROBERT GRAHAM, CHIEF IN ANIMAL PATHOLOGY AND HYGIENE

Hog cholera is a highly fatal and contagious disease resulting in enormous losses to the swine industry. According to the report of the Bureau of Crop Estimates, 229,250 hogs died from disease in Illinois during the year ending May 1, 1921, involving the loss of approximately two million dollars. It is estimated that 90 percent of this loss may be traceable to cholera. The low prices of farm products during the period of readjustment has had a general tendency to defer immunization against cholera. Many serious losses from cholera in mature swine which have occurred during the past year may be laid to negligence in treating young pigs. Sucking pigs in the spring farrow of 1922 have also been more frequently affected with cholera than in previous years. In view of the widespread infection which may reappear and spread to other localities, it becomes incumbent upon every farmer to employ all possible agencies to safeguard his herd against disease. This can be accomplished, in a large measure, by the employment of sanitary measures (see Circular 203); but if cholera appears in the herd or should the herd be dangerously exposed, serum will effectually prevent the development of the disease and insure the owner against immediate losses. Inoculation of healthy pigs in infected herds also provides an opportunity to fatten the animals not in marketable condition, thereby eliminating the necessity of selling immature stock at a loss.

The Dorset-Niles anti-hog-cholera serum is the only specific agent recognized in the prevention of hog cholera. Inoculation of healthy hogs renders temporary or permanent immunity to the disease. It is advisable to rely upon the serum treatment and to disregard all advertised medicines of a cure-all character for the treatment of hog cholera. Success following the serum treatment depends upon: (1) a healthy condition of the animals at the time of treatment, (2) the proper administration of a potent serum. Favorable results can be expected only when the hogs to be immunized are in a healthy condition. Anti-hog-cholera serum has no effect upon the course of other swine diseases and therefore should be employed in healthy animals to suppress outbreaks of hog cholera only.

NOTE.—This circular is largely a revision of the material which appeared in Circular 207 of the same title.
SYMPTOMS OF CHOLERA

Hogs suffering from cholera show a rise in body temperature, refuse to eat, appear drowsy, and suffer from diarrhea or constipation. Emaciation, weakness, and a staggering gait especially noticeable in the hind quarters are frequently observed. The coat becomes rough, and the skin about the snout, ears, and abdomen may be red and purplish in color. The eyes are frequently inflamed, and about the lids a mucous discharge collects. Respiration may be quickened, accompanied by a short, hacking cough.

The symptoms of hog cholera are not easily differentiated from symptoms exhibited in other swine diseases, and it is therefore difficult to make a positive diagnosis of the disease from physical symptoms alone. **Hogs sick from any cause should be regarded with suspicion, immediately isolated, and maintained in strict quarantine pending an expert diagnosis.** The course of hog cholera in a herd may be rapid and fatal (acute cholera), or animals may be mildly affected and linger for several days or weeks before death (chronic cholera). In the same herd animals may be affected with either the acute or the chronic type. Chronic cholera may exist in a herd several days before it is recognized and often gains a foothold before the owner is aware that cholera is present. In the acute form of the disease, animals sometimes succumb without premonitory symptoms of illness, or die following a short illness.

**Fig. 1.—Stomach of a Cholera Pig, Showing Diffuse Hemorrhagic Areas**
LESIONS OF HOG CHOLERA

To determine the existence of cholera in the herd, a sick animal should be killed and a post-mortem examination held by a qualified person.

In animals suffering from cholera, the skin in the region of the abdomen, neck, and ears may be red and purplish in color. In cases of long standing, superficial necrotic areas (sores) and sloughing of the skin may occur. The surface of the lungs may show small red spots (hemorrhages) of varying size. It is not uncommon to find solid darkened areas in the lungs, as well as reddish areas of inflammation (pneumonia), accompanied by the formation of pus. On the outer wall of the heart, hemorrhages are sometimes present. The peritoneum, or covering of the abdominal organs, may show hemorrhages, frequently located along the large and small intestines. The inner walls of the small and large intestines may be inflamed and intestinal ulcers may develop in animals that are affected several days before death. Hemorrhages are generally found on the kidneys, giving them

FIG. 2.—LUNGS OF CHOLERA PIG, SHOWING HEMORRHAGES ON THE SURFACE
a turkey-egg appearance. The spleen, or melt, may be enlarged,
darkened in color, and soft in texture. The lymph glands (body and
visceral) are generally swollen, dark, and congested.

Lesions of cholera in all organs rarely appear in one animal. Often
it is necessary to destroy and examine several sick animals before
characteristic lesions in different organs can be found. Experienced
persons may, however, be able to recognize a highly contagious disease

![Kidneys of a Cholera Pig, Showing Turkey-Egg Appearance](image)

of swine in a community as hog cholera before the infection is far
advanced, by the presence of well-defined lesions in one or two organs,
together with a history substantiating cholera infection.

ANTI-HOG-CHOLERA SERUM

Anti-hog-cholera serum consists of the defibrinated blood (unrefined
serum) of hogs that have been highly immunized against cholera. A
small amount of phenol is added to the serum as a preservative.
Serum can be purchased from commercial manufactures or in some
states from the agricultural college. The University of Illinois, how-
ever, does not manufacture or distribute anti-hog-cholera serum.
Reliable commercial firms operate under a government license issued
by the United States Department of Agriculture, which involves the
preparation and testing of serum as prescribed by the Bureau of
Animal Industry. On each bottle containing serum or virus the
federal license number of the establishment is printed.

Some commercial manufacturers of hog-cholera serum produce, in
addition to the unrefined serum, a clear, straw-colored serum (refined
The Serum Treatment of Hog Cholera

1922]

serum), which apparently possesses the same immunizing power as the unrefined serum. The clear serum, following injection, is more rapidly absorbed than unrefined serum. Furthermore clear serum is often more free from bacteria than the unrefined product. The contaminating organisms, however, encountered in both clear and unrefined serum, usually saprophytic in character, are held in abeyance by cleanly methods of production, the use of preservatives, and storage at low temperature until injected. For many years the unrefined anti-hog-cholera serum was the only anti-hog-cholera serum available. While the clear, or refined, hog-cholera serum is a comparatively new commercial product, it is steadily gaining in favor with the swine breeders and veterinarians. The clear serum, if sterile, is of special merit during the prevalence of contagious epizooties, as foot-and-mouth disease, wherein there is danger of the serum becoming contaminated and further spreading the disease to healthy herds. Refined serum of equal potency is generally preferred to unrefined serum, the favorable results follow the proper use of either.

IMPORTANCE OF PROPER DOSAGE

It is important that serum be administered in proper amounts to animals of varying weights. The dosage as recommended by the manufacturer is given on the bottle containing the serum. Many veterinarians increase the dose for certain animals or herds, depending on the condition. Care should be taken that the weights of the hogs are not underestimated. There is no bad effect following an increased dose of serum, while too small a dose may fail to completely protect against the virus injected and result in losses in cholera. In infected herds, therefore, it is advisable to increase the prescribed dose of serum 25 to 50 percent. The virus used in immunizing swine must be active and virulent to establish immunity and should be handled only by qualified persons.

METHODS OF IMMUNIZATION

There are two common methods of immunizing hogs against cholera; viz., the serum-alone-method and the simultaneous method. Each has certain advantages. The selection of the one to be employed in a herd is dependent largely on local conditions and the length of immunity desired.

Serum-Alone Method

The serum-alone method consists in the injection of serum only. The duration of the immunity produced by this method is variable, but lasts approximately thirty to sixty days. This treatment may be given without danger of causing cholera, and when supplemented by
vigorously premise disinfection, very satisfactory results may be expected. It is frequently employed for short feeding periods, but animals inoculated with serum only may again become susceptible and contract the disease at the expiration of the immunity period.

If animals treated with serum alone are immediately exposed to the disease, a permanent immunity may result, but under farm conditions animals may not pick up the infection until the immunity provided by a single injection of serum has expired. It is not advisable to rely upon a natural infection to definitely prolong the immunity period following the injection of serum only.

Simultaneous Method

The simultaneous treatment consists in the inoculation of serum as in the serum-alone method, supplemented by the injection of a small but fatal amount of hog-cholera virus. The serum and virus are injected simultaneously with different syringes on opposite sides of the body. The immunity resulting from this treatment in animals weighing over 40 to 50 pounds is generally permanent.

The injection of a fatal dose of hog-cholera virus in the simultaneous treatment involves an element of danger. In untrained hands the indiscriminate use of this treatment may result in "vaccination" cholera and new centers of infection. If the dose of serum is too small or if the serum is not potent, the animal may not be able to resist the virus injected. Moreover, if the virus is not sufficiently virulent, the animals may acquire only a passive immunity, as in the serum-alone method, and again be susceptible to the disease after the expiration of a few weeks. Unthrifty hogs or hogs suffering from any other disease should not be given the simultaneous treatment. The loss of apparently healthy hogs from cholera following immunization is traceable to a variety of factors, sometimes to the undetected presence of the disease in the herd at the time of treatment.

Properly prepared serum and virus carefully injected into healthy hogs reduce to a minimum the danger from the simultaneous method. The loss from all causes incident to administering the simultaneous treatment to healthy herds approximates 2 percent, but the method offers the advantage of conferring a permanent immunity and as a result is more extensively used than the serum-alone method. In order to decrease the danger involved, great care in injecting serum and virus must be employed by well qualified persons. Indiscriminate use of virus by careless persons is dangerous.

Animals immunized by the simultaneous method should be held in quarantine and observed very carefully for fourteen to twenty-one days following the treatment, and before being released should be dipped or sprayed with a reliable disinfectant,
PRACTICAL SUGGESTIONS WITH REGARD TO TREATMENT

During the hot weather arrange as far as possible to vaccinate either in the early morning or late in the afternoon, not during the heat of the day. The serum and virus should be kept in a cool place and used direct from the original container. Serum that has been open and exposed for the treatment of a herd should not be used later for immunization purposes. Destroy all unused virus by fire.

The pen or enclosure where the work is to be done should be thoroughly cleaned and made free from dust. A small table for the instruments, antiseptics, and records of the treatment should be provided in a convenient place for the operator.

Ample assistance to prepare and restrain the animals is essential, as the person administering the serum should not touch the animals. Withdraw the serum directly from the bottle into a hypodermic syringe and inject it deep into the loose tissue between the foreleg and the body or into the loose tissue of the flank.

The point of inoculation should be cleaned with soap and water, if necessary, and thoroly washed with a reliable antiseptic before the needle is inserted. Do not allow the serum or the virus to become contaminated when filling the syringes. The syringes and needles for both the serum and the virus should be sterilized by boiling before using. After each injection, the serum needle should be completely immersed in a germicidal solution, thus providing a clean needle for each animal. The needle on the virus syringe should also be cleansed by dipping in an antiseptic solution after each treatment. Changing the virus needle for each animal is inadvisable in view of the danger of dropping the virus from the needle.

Insist that the animals to be injected be handled as quietly as possible. Pregnant sows and heavy animals may conveniently be restrained by a rope thru the mouth. The temperature of every animal should be taken before the injection. Animals in infected herds registering temperature over 104° F., indicating hog-cholera infection, should not be given virus, but an increased dose of serum. These animals can be retreated in ten days or two weeks with serum and virus.

Sucking pigs of all ages, if threatened with cholera, may be given serum and virus, but following weaning they should be re-treated with the usual amount of serum and double the amount of virus. The length of immunity established in sucking pigs by the double treatment has not been sufficiently tested at this time to justify the procedure as a general practice. Dr. W. B. Niles of the U. S. Department of Agriculture reports permanent immunity in sucking pigs given the simultaneous treatment. The results reported by field veterinarians, however, are as yet somewhat conflicting.
CARE OF THE HERD

Hogs to be treated should be confined the night before without feed and handled as quietly and expeditiously as possible. For ten or twelve days after treatment the feed should consist preferably of a thin slop of shorts or bran; the animals may then be returned to full feed slowly. Following inoculation, clean quarters, free from dust and dirt, should be provided to prevent infection thru the needle puncture.

WHEN TO USE SERUM ALONE

It is not necessary to treat herds in communities free from cholera. Sanitary measures, however, should be carefully employed at all times. Pure-bred herds, as the result of a demand for immune breeding stock, are generally immunized. Certain states have regulations requiring the immunization of pure-bred swine when shipped from other states, while federal regulations require that stock hogs shipped from market centers or other recognized points of infection, be double-treated before shipment or upon arrival at destination. The treatment of home-raised hogs should be largely governed by the prevalence of the disease in the community, the size of the herd, and other factors which endanger them to cholera. Many hogs can be marketed without the expense of the serum treatment if sanitary measures are rigidly employed, tho serious losses have resulted from delaying the treatment. Serum can be given to advantage when the herd has been exposed and losses from cholera seem imminent. Following an outbreak of cholera, it is advisable to immunize all new stock until the premises are made free from cholera or for at least one year.

Immune dams confer a passive immunity upon their pigs, which generally expires about weaning time. In order to produce a permanent immunity, therefore, it is necessary to inoculate the pigs on or about weaning time. Pregnant sows in exposed herds may be treated with serum alone or, with an increased risk, may be given the simultaneous treatment, but it is important that pregnant animals be handled cautiously and inoculated in a standing position.

The efficacy of the serum treatment in immunizing hogs against cholera is firmly established. The best of results in controlling hog cholera are consistently obtained by the careful use of serum in combination with sanitary measures.
(Copy of an order issued by the Illinois Department of Agriculture, Springfield)

ILLINOIS DEPARTMENT OF AGRICULTURE
Springfield

DIVISION OF ANIMAL INDUSTRY—ORDER NO. 2

The following regulations, effective August 15, 1917, have been formulated to supersede all previous regulations, in force within the state of Illinois, to govern the sale, distribution and use of anti-hog-cholera serum and hog-cholera virus:

1. All anti-hog-cholera serum sold within or imported into the state of Illinois for sale, distribution or use shall be produced under license granted by the United States Bureau of Animal Industry.

2. All hog-cholera virus used for immunizing hogs against cholera shall be administered by licensed veterinarians, or by owners to whom a permit has been issued by the Chief Veterinarian.

In the matter of controlling outbreaks of cholera any violations of the following provisions of "An Act to prevent the spread of contagious and infectious diseases among swine," should be promptly reported to local authorities and compliance therewith demanded:

"It shall be the duty of the owner or person having charge of any swine, to burn or deeply bury in quick lime, the carcasses of all hogs dying of cholera, and to thoroughly clean and disinfect by a liberal use of air-slacked lime or other standard disinfectants, all yards and feed lots accessible to hogs affected with cholera."

"No person shall convey upon, or along any public highway or other grounds or any private lands, any swine known to be affected with cholera."

All hogs transplanted or driven into the State of Illinois for purposes other than immediate slaughter, which are not coming through public stock yards, shall be accompanied by a certificate of health issued by the State Veterinarian, or some duly authorized Deputy of the State of origin.

ILLINOIS DEPARTMENT OF AGRICULTURE

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