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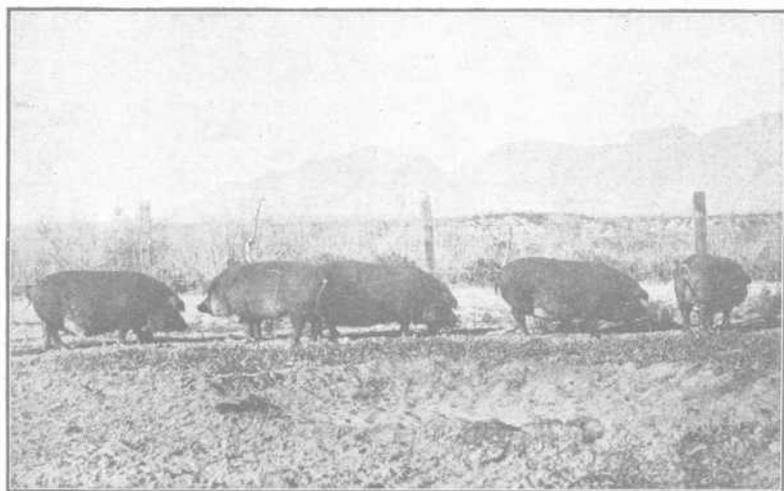
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HOG CHOLERA IN ARIZONA

BY R. H. WILLIAMS

Agricultural Extension Service, Wm. M. Cook, Director, Tucson, Arizona; Co-operative Extension Work in Agriculture and Home Economics, the University of Arizona College of Agriculture and the United States Department of Agriculture Co-operating. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

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HOG CHOLERA IN ARIZONA

By R. H. Williams

Hog cholera is widely spread over Arizona and has long been a menace to hog raising in the State. Outbreaks of this disease have taken place in all hog-producing districts. In 1897 the Salt River Valley was badly ravaged with cholera. Casa Grande had been a prominent hog-producing center, but this disease became so troublesome in 1898 that hog-raising was discontinued. In 1901 many hogs were afflicted at Vail. From time to time the Salt River Valley has had serious outbreaks of hog cholera, but it is probable that 1913 was one of the most trying years there. Outbreaks have been reported at Tucson each year since 1914. Yuma, Nogales, Globe, Tucson, and other places reported hog cholera in 1917. At the present time the disease is widely spread over almost all parts of the State.

It is unnecessary for hog raisers to lose many animals from cholera, as this disease may be controlled. Aim to keep the germs from gaining access to the district in which hogs are maintained, and when the disease is known to exist close to where hogs are kept, the animals should be made immune by means of vaccination. This is a very simple preventive, and there is no reason why every hog raiser should not prevent losses by the use of serum and virus.

Cholera affects hogs differently in Arizona than it does in more humid climates. Here the disease seems to be in a chronic form and not as active as elsewhere. Only a few of the animals in a herd become infected at one time, but of these almost all die. The disease, however, is in a lingering form, and seldom do many of the hogs die at a time. The characteristic behavior of hog cholera is for one of the pigs to contract the disease and die, and perhaps in a week or two another may have the same trouble. Periods of damp weather, notably the winter and spring months, are most favorable for hog cholera in Arizona. During these times an active form of the disease may cause most of the herd to die inside of a week or ten days.

CAUSE OF CHOLERA

The specific cause of hog cholera is not known, except that the infection will pass through a fine porcelain filter and is too small to

be seen under a high-power microscope. The infective agents are found chiefly in the blood and excretions which carry the disease to other pigs. The virus of the disease is extremely active and will cause animals to become sick in seven to twenty-one days from the time of infection.

SYMPTOMS

There are two forms of hog cholera, acute and chronic. In the former the animals die suddenly after being sick only a few days; but those suffering from the chronic form may live several weeks, or even months, before death. The first symptom is usually refusal of the animals to eat. They are depressed and may have chills, later becoming stiff and sore. The hair soon becomes roughened, the eyes dull, and frequently the skin develops purplish spots or blotches, especially over the flanks and belly. The nose and ears may also have these deep red spots just before death. The animals stir little, often droop the head or cross the legs when standing, and prefer to be by themselves in a corner, altho sometimes they huddle together. When roused they walk with an unsteady gait in the hind legs, indicating extreme weakness. They rarely cough, but frequently a hacking grunt may be noticed. The bowels are often costive, but in the last stages diarrhea may be common.

Ulcers and sores are sometimes found on the body and skin of hogs affected with cholera. The skin is roughened and covered with scales at first, later becoming gangrenous. In the chronic form of the disease these necrotic formations are not always present. It is thought that this condition is produced by another organism called necro-phorus or necro-bacillosis which is often associated with hog cholera.

When hogs have the chronic form of cholera, they lose in weight and present an unthrifty, stunted appearance. None of the symptoms are as pronounced as in the acute form. Usually the sick animals become particular about their feed, refusing to eat for a day or two and later selecting certain foods and refusing others. The tail hangs down, and the pigs lack energy and thrift, remaining by themselves and foraging little. Often they remain in a fence corner, pen, or straw pile at feeding time instead of fighting for their share of the feed. The bowels are irregular in action with periods of constipation followed by diarrhea. The feces are frequently streaked with blood, and shreds of ulcerated bowel may be noticed. During periods of

diarrhea the feces are dark in color and have a fetid odor. Only a few red spots will be noticed inside the fore legs or back of the ears. The pigs lose flesh and strength, becoming weak and runty. These symptoms may become more pronounced till the animal dies from loss of strength. A few recover, but most of them waste away and die. Losses are greatest among the young pigs.

Post mortem examination of pigs that have died with the chronic form of cholera reveals much the same indications as described above. The large bowel may have button-like tumors, and the kidneys will probably have reddish splotches over their outer surface. Examinations usually reveal inflammation and ulceration in the intestines. The spleen is enlarged and dark in color, and the liver, kidneys, and lymphatic glands are often enlarged and covered with red specks or blotches. In the mild form of the disease these indications are not so pronounced, but usually an ulcer will be found at the ileocaecal valve.

Ulcers along the intestinal tract rarely are seen in post mortem hogs in Arizona, with exception of an ulcer at the ileocaecal valve. Sometimes the lung will appear solid and dark, resembling liver. One of the most positive signs may be found on the kidneys, as these will generally be inflamed and the surfaces covered with small black spots making them look speckled in appearance. Even in the carcasses after the animals have been dressed the disease may be readily identified by the purplish blotches on the skin and the condition of the lymphatic glands, and especially the dotted appearance of the kidneys after the outer covering has been removed. Although there are extremely wide differences in the general behavior of the disease, yet from the above description one should be able to determine whether hogs are suffering from cholera or not.

HOW CHOLERA IS SPREAD

This disease may be easily carried from place to place. The common means of infection are birds, dogs, cats, implements, tools, feed, litter, persons, and diseased hogs escaping. A small quantity of dust adhering to shoes, feet, wings, wagon, or tools may contain the virus and thus be the means of spreading infection. No doubt water and wind facilitate the spread of the disease. It is next to impossible to avoid the spread of hog cholera. The virus may live in mud, manure, or litter from one season to another and offer a ready means of spreading the disease.

PREVENTION

One cannot be too careful in guarding his herd from hog-cholera infection. It is necessary to use extreme precaution if the disease is within fifty miles of the premises. All animals purchased from other herds should be kept in a separate place where they may be quarantined for 21 days to make certain that they do not bring cholera with



Hogs that died of Cholera

them. Thorough disinfection and sanitation are especially necessary at all times. The disease germs increase most rapidly where herds are maintained in unsanitary surroundings and poorly fed. All litter, stagnant water, wallows, and filth should be removed. The pens and runways should be disinfected at least once a month with a good antiseptic, such as a 5 percent solution of carbolic acid, or corrosive sublimate in proportion of three parts to 1,000 of water. After applying the disinfectants the ground and buildings should be well dusted with air-slaked lime. When the disease is known to exist in a herd it is important that everything be disinfected twice

a week to keep the germs from spreading to other places. The carcasses should be thoroughly burned or buried deeply with quicklime and then covered.

The modern way to protect hogs from cholera is to observe all reasonable precautions in preventing the disease from reaching the herd; and when cholera is found in the district all animals should be treated promptly with serum. It is important that stockmen should be in touch with makers of potent serum so that it may be secured on short notice. As soon as the disease comes within one-half mile of where hogs are maintained serum should be secured at once, and every animal in the lot treated with both serum and virus.

TREATMENT

Medical treatment is not a satisfactory method for overcoming hog cholera, as fully 80 percent or more of the animals will die, and recovery is so slow that those which do survive are impaired for future usefulness. On this account preventive measures alone must be used. By killing all infected animals and doing away with the carcasses, so that the germs will not spread, and moving all well animals to clean pasture or pens every time a new hog is infected, the ravages of the disease may be reduced. Even this is more expensive and much less effective than the simple use of hog cholera vaccine.

WHEN TO VACCINATE

The use of vaccine or serum is the only effective method of controlling hog cholera. The proper time to vaccinate is when the pigs are weaned. One is then sure of the pig crop and proper vaccination at this age by the simultaneous method will insure you against hog cholera for the life of the animal. The cost at this age is comparatively small in proportion to the benefits derived. Farmers, as a rule, do not vaccinate early enough, but delay until the outbreak occurs in the herd. It is best to guard against loss before any of the hogs have contracted the disease. One can easily plan on this time by keeping in touch with the progress of the disease in the immediate vicinity. Be careful to take prompt action in using the serum before the hogs become sick, as serum is entirely preventive in character, having no effect on animals that are sick.

METHODS OF ADMINISTERING SERUM

There are two methods used for protecting hogs from cholera. These are known as Serum-Alone and Serum-Virus or simultaneous treatments.

SERUM-ALONE

The serum-alone method is advised when veterinary service cannot be obtained, as the farmer would endanger himself or his neighbors by careless handling of the serum. This method is recommended when immunity is desired over a short period, as when the animals will be marketed inside of a few weeks. For valuable breeding animals this method may be used as a protection before taking them to fairs, or during time of advanced pregnancy, and when shipping from one place to another. Purchasers should always insist on having their hogs treated by the serum-virus method as a condition of sale. Small pigs are tender at birth and may not withstand the simultaneous treatment, but they may be carried for a few weeks, or past the weaning time, by the serum-alone method, and then given the double treatment. By using the serum-alone method one does not introduce living germs with a chance of their escaping to other herds.

SIMULTANEOUS OR SERUM AND VIRUS TREATMENT

To effect permanent resistance to hog cholera it is necessary to use the simultaneous method. This consists of injecting the living virus of hog cholera along with the preventive serum. Considerable risk attends the use of the living organisms, and it is recommended that expert veterinarians be secured to take charge of the treatment. Sometimes the virus may be good but the preventive serum weak, in which case a spread of the disease is certain to take place in the herd.

When hog cholera is known to be in the district the simultaneous treatment is recommended. This perhaps renders permanent immunity in small pigs, and larger animals will be permanently immune. The method consists of the injection of a small quantity of virus blood and a suitable amount of protective serum. These should be placed in the animal at different parts of the body, or one will offset the effect of the other. The same kind of serum is used as with the serum-alone method, but approximately one-half more is required.

VIRUS

The active principle of the disease is secured from the blood of animals sick with cholera. A very small amount of the defibrinated blood is sufficient to produce the disease among well hogs. This virus will not keep over long periods; it must be obtained fresh from diseased animals or from commercial sources.

INJECTION

The first consideration in applying the serum is to secure the pig where it can be controlled. A small animal may be held by an attendant by the hind legs or placed on a table. Larger animals may be secured by tying them by the leg or better still by slipping a noose round their upper jaw, snubbing them to a fence or post. The place where the animal is to be inoculated should first be scrubbed clean with warm water and soap, then dried and a strong antiseptic applied to the place. A 3 percent carbolic acid solution or 4 percent creolin solution, or corrosive sublimate, three parts to 1,000 parts of water, will prove satisfactory.

Extreme pains are required to keep everything clean and aseptic around the operation. A person should be employed who understands this method of treatment. A good arrangement is to have one man scrub and disinfect the animals, another hold them in place, while the third performs the operation. The operator should handle nothing except syringes and liquids to be injected, and from time to time he should cleanse his hands and instruments in the disinfectant to make certain that everything is absolutely clean. It is a good plan to confine the hogs in a small pen or even a crate so arranged that they may be handled without unduly exciting them. Each animal should be carefully estimated or weighed, and the amount of serum to be injected should be figured from the actual weight. When only a few pigs are to be treated it is best to weigh them if facilities are available for this purpose, but do not underestimate the weight of the animal; for an overdose of serum is attended with no harm, while too small a dose will not protect.

The serum should be placed in a suitable receptacle such as a Mason jar which has been carefully sterilized. Two sterilized syringes must be available: One about 30 c.c. capacity for the vaccine and a small one with a scale graduated in tenths of a c.c. for the virus. The serum should be kept in a cool dark place and well corked. Where there are many sick animals in the herd, it is best to take the temperature and only use the serum on those that show a temperature of less than 104° F. Place the needle sufficiently deep into the muscle to facilitate the absorption of the liquid so that the serum does not leak out when the needle is removed. In large hogs it is wise to inject the serum in two places for this will make the absorption more

rapid. After the serum has been injected and a portion of it absorbed the needle should be removed and the surface disinfected.



Method of Treating Young Pigs

In giving the simultaneous treatment, all hogs should be treated. If not, those hogs which do not receive the serum should be removed some distance from those which receive virus, for after the injection of virus, an animal is capable of communicating the disease for a period of seven to fourteen days; consequently hogs receiving virus and serum should not be allowed to come in contact with other hogs which have not received serum.

DOSAGE

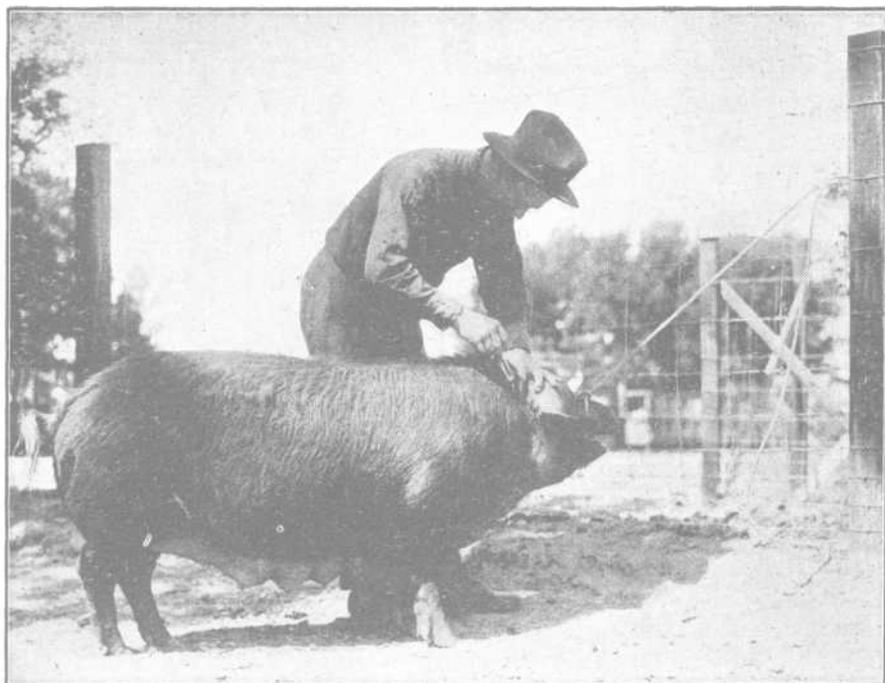
The amount of vaccine and virus required for pigs varies according to the size of the animals and the strength of the vaccine. The plan

recommended is to give the large hogs a certain amount of vaccine, say, 40 c.c. for the first 100 pounds and increase the dose 1 to 3 c.c. for each 10 pounds in excess of 100. The following table gives the amount of serum required for pigs of different sizes.

Live weight of hogs	Dose when serum-alone method is used	Dose when virus is used
Sucking pig 10-30 lb.	15 c.c.	20- 30 c.c.
Pigs 30- 50 lb.	20 c.c.	30- 35 c.c.
Pigs 50- 75 lb.	25 c.c.	35- 40 c.c.
Pigs 75-100 lb.	30 c.c.	40- 50 c.c.
Pigs 100-150 lb.	35 c.c.	50- 70 c.c.
Pigs 150-200 lb.	40 c.c.	70- 80 c.c.
Pigs 200-300 lb.	50 c.c.	80- 90 c.c.
Pigs 300-400 lb.	60 c.c.	90-100 c.c.
Pigs 400-500 lb.	65 c.c.	100-105 c.c.
Over 500 lb.	70 c.c.	100-110 c.c.

The amount of virus required for hogs depends upon the weight of the animals, as the following table indicates.

Weight of pig	Amount of virus to use
Sucking pigs.....	0.5 c.c.
Pigs 30-100 lb.....	1.0 c.c.
Pigs 100-200 lb.....	1.5 c.c.
Pigs 200-400 lb.....	2.0 c.c.
Pigs over 400 lb.....	2.0 c.c.



Injecting the Vaccine

WHERE TO INJECT SERUM

One may inject the serum almost anywhere in the animal, but it is important that places where muscles are abundant should be selected. The place of injection is not infrequently decided by the size of the pig to be treated. Small pigs are frequently held up by their hind legs and the vaccine injected into the under part of the thigh. This is considered an undesirable place, for not infrequently an abscess will form and the ham will be injured. It is probable that just behind the foreleg is as good a place as any for treating small pigs. These animals may be laid on their side on a table and held by two attendants.

For larger animals and especially pregnant sows the best place is to inject just back of the ears as there will be less handling of the animals required and less danger of injuring them and having them lose their pigs by rough handling.

HOGS AFTER INJECTION

The pigs should be confined in a clean pen after they are vaccinated to prevent filth and dirt entering the wounds. Give them fresh clean water, but no places for wallowing. Such hogs are more liable to abscesses from subsequent infection. They may be turned back into the infected pens; for this will make it all the more certain that they have received potent virus. It is best to turn them on green pasture and withhold grain for a period of ten days. Feed them lightly for a week on clean, wholesome foods. Animals should be watched closely for abscesses which frequently are formed in the places of injection. These abscesses should be opened as soon as they come to a head, and treated by syringing them with antiseptics. Do not kill hogs for human use within two weeks of treating with the serum-alone method and one month after treating by the serum and virus method.

Some care must be exercised in shipping hogs soon after giving serum and virus, as such animals seem to be especially susceptible to pneumonia when shipped in ordinary freight cars. This occurs in many cases that are held for a period of thirty days after vaccinating. No hogs should be shipped in any manner for at least three weeks after receiving serum and virus.

WHAT SERUM WILL DO

It has been definitely proved that good serum will protect healthy hogs from cholera. Serum will have little value to cure hogs if used after they have contracted the disease. It should be further understood that hogs diagnosed to be suffering from cholera, but actually suffering from other diseases, such as cottonseed poisoning, infectious pneumonia, or from garbage poisoning, cannot be helped by vaccine. This vaccine will not prevent the spread of germs, and it is always important that thorough disinfection of pens and yards be made to prevent the spread of cholera

WHERE TO PURCHASE HOG CHOLERA SERUM

Before serum is actually required one should learn where it may be secured. By consulting the local veterinarian or druggist one may often secure such information. It is wise to wire for the serum when urgently needed.

Serum stations are established in the State Veterinarian's office and by consulting the Live Stock Sanitary Board or State Veteri-

narian or by wiring an immediate supply of the serum can be obtained. It is unlawful for any biological house to ship virus into Arizona without a permit from the State Veterinarian.

NECESSARY EQUIPMENT FOR VACCINATION

A hypodermic syringe with capacity of 25-30 c.c. and a small hypodermic syringe holding 5 c.c. and graduated in tenths of a cubic centimeter should be used for injecting the serum and virus respectively. These should be properly graduated and provided with a good plunger so that they will inject the exact amounts indicated. The serum and virus should be drawn directly from the original container into the syringes. A basin or pail should be at hand for holding the disinfectant solutions. A quantity of clean muslin and a roll of absorbent cotton will also be needed. All of the instruments and containers must be properly sterilized by boiling in water for at least 15 minutes before using. This entire outfit need not cost more than 15 dollars and should be suitable for use over a long period of years.

COSTS

The expense of treating hogs to prevent cholera is very small indeed compared with the benefits to be derived. The serum and virus will cost from 30 cents to 2 dollars for each animal according to size. This amount of money should save pigs valued at many times the cost of actually performing the work.

NEEDED LEGISLATION

In Arizona, hog-producing centers are found in irrigated and dry-farming districts. These are long distances apart and afford much protection from the spread of the disease. Thus cholera may be prevalent at Tucson, Nogales, Yuma, and Globe, while the Upper Gila, Salt River Valley, and many other places may be entirely free from the scourge. The natural isolation of each hog-producing district offers admirable conditions for checking the spread of the disease. A stringent law should be enacted to prevent this and other infectious diseases among swine from spreading.