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Hog Cholera and Its Prevention

By S. W. ALFORD

Hog cholera is an acute, infectious disease of swine. No other domesticated animal is susceptible to this disease. It has become so widespread that there is scarcely a section in the United States where hog raising is carried on that does not have this disease with which to contend. These remarks, however, will apply particularly to conditions as they exist in Nebraska.

Hog cholera is by far the worst infectious disease with which the hog raiser has to contend. If hog cholera could be eradicated entirely the loss from other infectious diseases would be of minor importance. When a sickness which spreads from one animal to another within a few days appears in a herd of non-immune swine, one should always suspect hog cholera. Frequently, in a case of this kind, the owner endeavors to find everything else wrong, only to find in the end, after it is too late, that he had hog cholera to deal with from the very beginning.

SYMPTOMS

Cholera presents various symptoms in swine, but the typical cases present rather constant characteristic signs with which every hog raiser should be acquainted. The first symptom is a fever, usually present for a few to several days before the animal shows any other sign of sickness. Consequently, by the time the owner's attention is attracted by noticeably sick pigs, the infection has had time to gain considerable headway in the herd. Frequently herds in this condition are treated with serum and virus with the idea that those few showing visible signs of sickness are the only ones in the herd infected with cholera, when there might be many more with a high fever which would show signs of sickness within the next day or so. Such conditions are often responsible for unsatisfactory results obtained from the use of serum and virus.

Other common characteristic symptoms are: inflamed eyes with an excretion which sometimes dries, causing the eyelids to stick together; tucked up flank, arched back, unsteady gait with appearance of being weak in the back; cocked ankle in hind legs; and a nasal discharge which has a tendency to dry around the nostrils. Sometimes a diarrhea is present, although frequently it is delayed in its appearance and develops later as the disease has had time to advance, or it may never appear.

DIAGNOSIS OF DISEASES

No attempt to give any of the lesions found post-mortem in hog cholera is included in this bulletin, for only a trained person with considerable experience is capable of rendering with any degree of certainty a diagnosis by post-mortem examination.

PREVENTION OF DISEASE

Hog cholera can be successfully prevented by the use of anti-hog-cholera serum. It should be used as a preventive and not as a cure, although its curative properties should not be entirely overlooked.

There are two methods of immunizing swine, namely: the serum-only or single treatment which produces only a temporary immunity, and the simultaneous or double treatment which produces a permanent immunity. The simultaneous or double treatment is the method most generally used in this state and in experimental work done along these lines it has proved to be the most satisfatory. The serum-only treatment also has its place and is preferred in some instances to the double treatment.

WHAT IS SERUM? VIRUS?

Serum is blood taken from a healthy hog which has been hyper-immunized against cholera, consequently it can be used without fear of producing the disease. One can also readily see that no harm can come from overdosing with serum, an idea still existing in the minds of the inexperienced.

Virus is made from blood taken from pigs sick of cholera and contains the disease-producing element of this disease. It should be manipulated more carefully than serum and should not, under any circumstances, be handled in such a manner as to allow any of it to be spilled about the premises.

DEFIBRINATED-BLOOD SERUM *

Anti-hog-cholera serum as originally prepared consists of defibrinated hyperimmune blood and a solution of carbolic acid, which is added to prevent the product from spoiling. For many years it was the only type of serum available for the prevention of cholera. It is sometimes referred to as "ordinary serum," "whole-blood serum," "bloody serum," etc., but the name "defibrinated-blood serum" will be used here. The true or protective serum content of defibrinated-blood serum constitutes about 65 per cent of the product, while the remaining 35 per cent is nonprotective (25 per cent cells and 10 per cent preserving solution). The source of all anti-hog-cholera serum is the blood of hogs which have been

* From U. S. D. A. Circular No. 11.

made hyperimmune or overimmune to hog cholera by injecting into their blood streams large quantities of defibrinated blood taken from young pigs very sick of cholera. Several days after this treatment, which generates protective substances that are antagonistic to cholera, blood is taken from these hyperimmune hogs in large quantities and used in serum production.

CLEAR OR REFINED SERUM

In producing clear serum according to the method of Dorset and Henley hyperimmune blood is treated with certain harmless materials in solution to aid in separating the clear protective serum from the cells. This solution of hyperimmune blood and clarifying materials then is passed through a separator or centrifuge to effect separation much the same as cream is separated from milk. The clear portion when preserved is now known commercially as clear, refined, anti-hog-cholera serum. In the process of separation the clarifying solutions can not be eliminated and are retained in the completed product. These solutions with preserving solution dilute the serum but otherwise are without effect. The product may be marketed in this form or have added to it a quantity of sterile normal salt solution containing carbolic acid, the volume of which is equal to that lost by removing the blood cells. The latter practice has resulted in the marketing of two types of clear serum described in the two following paragraphs:

CLEAR, UNCONCENTRATED SERUM

This type of serum contains sterile normal salt solution which is added to take the place of blood cells in defibrinated-blood serum. The product carries the same protection as does defibrinated-blood serum in like quantities but is diluted in comparison to clear, concentrated serum. It therefore likewise contains 65 per cent of true or protective serum while 35 per cent of the product is nonprotective (25 per cent diluent with clarifying solutions and 10 per cent preserving solution). It sometimes is referred to as "filled serum," "dilute serum," and the like, but the name "unconcentrated serum" is used here.

CLEAR, CONCENTRATED SERUM

The volume lost by removing the blood cells is not replaced in this type of clear serum; therefore, the protective part constitutes a much greater percentage of the whole than it does in other serums. Its protective part represents over 80 per cent (four-fifths) of the whole, while its nonprotective part is less than 20 per cent (one-fifth). For these reasons it is regarded as concentrated in comparison to other cholera

serums. In view of the high percentage of protective serum in the clear, concentrated serum, the Bureau of Animal Industry permits it to be recommended for use in doses smaller than those required for either of the other serums.

AGE FOR VACCINATION

Pigs may be vaccinated at any age, but the most convenient and economic time to do it is around weaning time. Experience teaches not to vaccinate just at weaning time, but either two weeks before or after. If cholera makes its appearance in the herd when the pigs are only three or four weeks old, vaccinate the young pigs also, using the double treatment. A very large majority of them will be made permanently immune. Pigs sucking immune sows are *not* immune to cholera until weaning time, as was a common belief among hog raisers.

HANDLING PREGNANT SOWS AND SOWS WITH PIGS

Regardless of the stage of pregnancy, vaccinating pregnant sows is associated with more or less danger of abortion if the double treatment is used. They can be immunized, however, by increasing the dose of serum considerably. The increase tends to fortify the sow against a too severe reaction from the virus which is usually the cause of the death of the pigs in the uterus, and the subsequent expulsion of the same, termed abortion. Abortions caused by throwing pregnant sows for vaccination are uncommon.

The best way to avoid trouble of this kind is to keep nothing but immune sows for breeding purposes. If one wants to be absolutely safe and it becomes necessary to protect one's pregnant sows against cholera, the serum-only treatment may be used, but the immunity established thereby will be of short duration. Never give the double treatment to sows suckling pigs without vaccinating the pigs also.

VACCINATION PRACTICES

Serum and virus are most satisfactorily injected either under the forelegs or into the hams. Do not get the idea that serum has to be injected under the forelegs in order to get results, for it could just as well be injected into the hams and the virus under the forelegs. Meat packers have objected to the deep injections into the hams because of occasional abcesses. In either case the dose of serum should always be divided between at least two points of injection. If a pig is to receive 40 c.c. of serum, inject 20 c.c. at one point and 20 c.c. at another. The same holds true with little pigs, if one is giving only 20 c.c. Forty c.c. may well be injected at one point on animals weighing 200 pounds or over. The dose of

virus is small and is always injected at one point. In injecting both serum and virus, insert the needle deep into the flesh, but avoid striking a bone.

DOSAGE OF SERUM AND VIRUS

The dosage of serum is very important and should be studied more carefully than the dosage of virus. The *minimum* dosage of serum recommended by the United States department of Agriculture is as follows:

Size of animal	Concentrated serum	Unconcentrated serum	Defibrinated-blood serum
	Dose, c.c.	*Dose, c.c.*	*Dose, c.c.*
Suckling pigs	16	20	20
Pigs 20 to 40 pounds	24	30	30
Pigs 40 to 90 pounds	28	35	35
Pigs 90 to 120 pounds	36	45	45
Hogs 120 to 150 pounds	44	55	55
Hogs 150 to 180 pounds	52	65	65
Hogs 180 pounds and over	60	75	75

In vaccinating hogs weighing over 200 pounds it is good practice to increase the dose of serum 15 c.c. for each 50 pounds additional weight.

For the best results it is a good policy not to adhere to this minimum dosage too closely but to increase it. No harm can come from overdosing, so it is the safest plan to increase the dosage of serum. When one injects a dose of good virus into a pig, it is necessary that a sufficient amount of the serum be injected to counteract it or the pig will develop cholera and probably die. In order to prevent this from happening, be sure to always give enough serum to keep the virus under control. Practically all of the bad results immediately following vaccination come from insufficient doses of serum.

It is not necessary to be so particular about the dose of virus as has been the general belief. It makes little difference whether one gives a pig 1 c.c. or 5 c.c. of virus so far as temporary results are concerned. It is the virus that produces the permanent immunity and therefore it is absolutely necessary to give every pig enough virus to produce this desired immunity. Just how much virus it takes for each pig, no one knows. It has been found from experimental work that about two or three cubic centimeters are sufficient to establish a good immunity. This dosage may be increased or decreased. However, since the increased dose of virus has been put into general practice the number of so-called " long time breaks " sixty or ninety days following vaccination, have been reduced to the minimum, showing that the increased dose

of virus is establishing a more certain permanent immunity.

Do not let hope run too high when treating sick pigs. The dosage of serum should always be increased in sick herds and especially in the pigs already sick. The results will be the same whether virus is given to the sick pigs or not. Such results obtained from vaccinating sick pigs are very uncertain. They depend upon three things: first, the stage of the disease at which the serum is administered; second, the virulence of the disease; and third, the vitality of the pigs vaccinated. In certain herds in which conditions are favorable, the proportion of sick pigs saved by the use of serum may run as high as 100 per cent. Then again in herds in which the opposite conditions prevail, the loss may run equally as high.

HANDLING HOGS

Small pigs can be easily vaccinated while being held up by the hind legs. The dose of serum should be divided between the two hams and the virus injected in front of the stifle on the inside of the flank. A V-shaped trough also makes a convenient apparatus in which to place the pigs on their backs, with a man at each end to hold the legs. With this method the serum can be injected either under the fore legs or into the hams. Large hogs can be vaccinated more satisfactorily by snubbing them to a post or by throwing them on their sides. This is easily done by one man grasping the fore leg and another the hind leg on the same side on which they stand. Do not reach under the hog and grasp the legs on the opposite side from which you stand. Lift up quickly, when the animal falls, holding the respective legs, and step over to the back of the hog and drop onto it with your knees. Do not attempt to hold the two lower legs.

ANTISEPTIC PRECAUTIONS

Hogs should be dry and fairly clean before one attempts to vaccinate them. If it becomes necessary to vaccinate wet, muddy pigs, clean them well by washing at the point of injection and dry with cotton or cloth before applying the disinfectant. There is more danger of carrying infection in with the needle from a wet skin than from a dry one. Where the pigs are fairly clean and dry a little tincture of iodine applied to a small spot where the needle is to be inserted is all that is necessary. The ordinary crude antiseptic wash applied to the skin does little good, for the reason that the time which elapses between its application and the insertion of the needle is not sufficient for any antiseptic to disinfect a pig's skin. Tincture of iodine will come as near doing it as

anything and it dries quickly, giving one a dry surface which is preferable to a wet one.

Every sanitary precaution should be used in handling the serum and virus during the process of their administration. The contamination of serum, especially through unsanitary methods, is the cause of practically all of the abcesses and blood poisoning following vaccination. Do not pour the serum out into an open container to fill the syringes. If this method has to be resorted to, never, under any circumstances, place the equipment inside the shed in which the pigs are kept while being vaccinated. Even after all the sprinkling that may be done, it is impossible to handle the hogs without creating a dust. Place the equipment on the outside, and on the side which is free from dust.

A much more satisfactory method for filling a syringe is to insert a large needle through the cork and fill by inverting the bottle or to have a filling tube long enough to reach to the bottom of the bottle. This or a similar method will minimize the possibility of contamination, providing the syringes are clean and have been properly sterilized before starting to work. If they have not, abcesses and blood poisoning are likely to occur.

CARE AFTER VACCINATION

Pigs should be fed and watched carefully for ten to fifteen days after vaccination. They should be fed a light grain ration and allowed to run on alfalfa pasture if that is available, or they may be fed alfalfa hay. Some prefer oats which are good as a grain ration. Fresh water should be available at all times. Good sanitary quarters and surroundings are always necessary but even more desirable at vaccination time.

AFTER EFFECTS WHICH MAY BE EXPECTED

If sickness appears in the herd as a result of vaccination, it usually does so from the sixth to the eighth day following. If it appears within two or three days after vaccination, infection was present in the herd at the time of vaccination, for it is impossible in that short time, to make pigs sick from a dose of virus alone. It is not uncommon to have a few pigs in a herd get sick and perhaps die as a result of vaccination. Some still have the idea that this is necessary in order to be sure the vaccination "took." That idea is erroneous. Many of these pigs can be saved if they are given another dose of serum, or better, a double dose, when first seeming to be off feed. That is a reason why it is a good plan to order enough serum so one will have a little left over. Sometimes it becomes necessary to give the entire herd another dose of serum. In case this happens, do it early. Such a need usually is the result of insufficient dosage of serum at first vaccination.

It is not good policy to use the double treatment on part of a herd and allow the rest to go untreated on the same premises, because of the danger of spreading cholera to the untreated hogs. The concensus of opinion is that simultaneously treated pigs do not become spreaders of cholera unless they become visibly sick following vaccination. The possibility of virus leaking out through the needle hole in the skin after the pig is turned loose should not be overlooked. There are perhaps certain sections, particularly in the western and northwestern part of the state where cholera is practically unknown, in which it might be unwise to be hasty in introducing or recommending the double treatment for fear of starting a center of infection as a result. But, in the eastern part of the state, where there will always be a dense hog population, no section or individual premises is exempt, with any degree of certainty, from the ravages of this disease and one should not hesitate to use the double treatment for fear of infecting the premises with cholera.

CARE OF INSTRUMENTS

The care of the syringes is important. New syringes are not sterile when purchased and should be made so before using. Do not be afraid of spoiling the syringes in any way by boiling, but be careful not to drop the glass barrels into hot water. Take the syringes apart to sterilize them, place them in cold water and let it come to a boiling heat slowly, in order not to hurt any part of the syringe. In putting the syringes together for use, do not use force in adjusting them; if that is necessary, something is wrong. Use glycerine, not oils, to lubricate the rubber plungers.

STATE SERUM AND VIRUS

For the past seven or eight years the State Serum Plant has been buying its supply of serum. All serum is bought subject to its own test before being paid for, consequently there is not only the test given it by the government at the plant where it was produced, but also an impartial test conducted by the State Serum Plant. The retesting of all the serum which the plant buys adds somewhat to the selling price, but the added protection is well worth it.

As there is no practical way of retesting virus, should the plant buy it, it produces its own. Good virus is just as essential as good serum, therefore the plant puts forth every effort to keep a pure strain of fresh, virulent virus for the trade. About every sixty or ninety days the inoculating virus is filtered and passed through small, susceptible pigs for the purpose of removing any possibility of contamination and to increase its virulence.

DISTRIBUTION OF SERUM AND VIRUS

When ordering serum and virus, write, telephone, or telegraph the State Serum Plant, Agricultural College, Lincoln, Nebraska. The telephone number is B 2481. All orders must be shipped C. O. D. unless a check accompanies the order. The C. O. D. shipment is the most satisfactory, for often when a check accompanies the order the amount is either insufficient or too much.

Serum and virus may be shipped by parcel post. When this method is desired or specified and a check accompanies the order, allowance should be made for the postage as the plant must pay it before it can be shipped. The plant does not pay the express or postage on shipments unless charged to the bill; neither does it pay for the telegram when orders are sent in that manner. In case an order is sent parcel post C. O. D. it requires 12 cents extra postage for the C. O. D. up to $10.00; 15 cents extra postage when the amount is $10.00 and does not exceed $50.00, and 25 cents extra when the amount is $50.00 or more. Parcel post packages do not receive the attention that first-class mail receives unless they carry a special delivery stamp, therefore packages must be in the main post office from two to three hours before train time in order to make certain trains. Parcel post packages must be in the main office by 4 p. m. in order to get out on the evening trains the same day. They cannot be mailed on the train.

The most satisfactory way of shipping serum and virus is by express. Express orders can be taken direct to the train and many times they are on their way within thirty minutes after they are received.

Serum is bottled in 500 c.c., 250 c.c., and 100 c.c. sizes, but the most of it is in the 500 c.c. bottles and only a limited amount in the small bottles. If an order for 1900 c.c. of serum is received, and the plant is out of small bottles, it necessarily must send 2000 c.c.

Virus is bottled in 60 c.c., 30 c.c., and 20 c.c. sizes. If one orders 115 c.c., the plant necessarily has to send either 110 c.c. or 120 c.c., so it usually sends the larger amount for fear the user will run out.

The State Serum Plant does not accept serum and virus returned for credit. Any serum left over, if kept properly, can be used at a future time, but unused virus should be burned and fresh obtained when needed.

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