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HOW TO MAKE
AND USE
ANTI-HOG CHOLERA
SERUM

By

MASON S. PETERS

President of

The National Anti-Hog Cholera
Serum Company



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Book P. 5

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AND USE
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" President of
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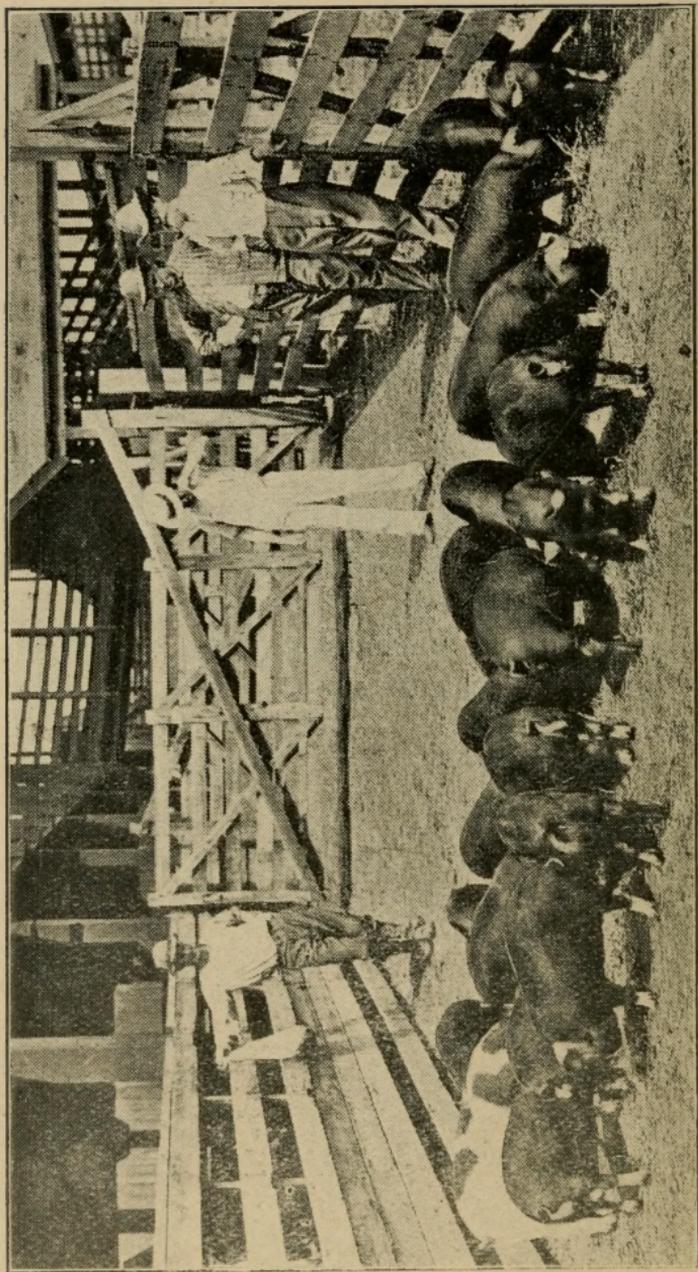
Kansas City, Mo

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THIS book is dedicated to the American hog raiser and is written for the express purpose of enabling him to make his own serum and vaccinate his own hogs therewith, all previous information written on this subject having been too technical and complex to achieve such result.

THE AUTHOR.



The Poison Squad. (Used in the Government Test, 1908)

CHAPTER I.

INTRODUCTION,

The prevention and cure of disease by inoculation is a subject which in recent years has engaged the attention of leading scientific men of the world. Anti-toxic serums are being used with varying success in the treatment of diphtheria, typhoid fever, etc., and are growing in favor in the profession. Much has been accomplished and much is hoped for in controlling and eventually eradicating many diseases which have been the scourge of humanity.

Anti-toxic serums are being successfully used also in the prevention and cure of diseases among the lower animals. By far the most important discovery along this line is that of anti-hog cholera serum.

Hog cholera made its first appearance as an epidemic in the United States in 1833 in the state of Ohio. Since that time it has existed continuously in some part of the United States, claiming for its victims thousands of animals and exacting from twenty-five to forty million dollars from the people every year. It is a greater factor in the finances of this country than any other known pestilence of man or beast. Pork is high because the hog is scarce and the hog is scarce because the hog raiser refuses to cope with an unseen enemy that lays waste his labors and wreaks ruin without warning. Not infrequently has the satisfied farmer looked with pride on his herd at night to find the animals dead and dying at their troughs in the morning. C. E. Sutton, president of the Kansas State

Board of Agriculture, said in an interview in the Kansas City Star: "In the year 1908 I lost 133 hogs from my herd while over the state the loss must have been two millions of dollars. I have seen hogs walk over to troughs, eat and fall over dead. One neighbor was looking at his herd just before he went to bed and remarked what a fine healthy lot of hogs he had. When he came out to feed them he found fifteen dead."— (Kansas City Star, Nov. 26, 1909.)

The result is that the bankrupt hog raiser changes his business. According to the Agricultural Department, in the year 1909, 54,147,000 hogs were raised in the United States, and in the year 1910, only 47,782,000 were raised.

The scientific world is wholly in the dark as to what hog cholera really is. The germ—if it is a germ—has never been filtered by the finest filters yet invented and has never been seen under the strongest microscope known to man.

The disease is found all over the world wherever swine are known to exist, and strange to say, it is found in no other animal than the hog, nor is it communicable to other animals. It has been wrongly named hog cholera as it bears no resemblance to cholera in man and has no characteristics of the disease of the Orient. It is a disease which attacks the lungs and intestines and its most marked characteristic is the internal hemorrhage or blood spots.

How Transmitted.

The extremely contagious nature of the disease makes it a fearful enemy and the farmer who walks across his neighbor's feed lot where there is the least trace of the germ may carry upon his feet enough contagion to lay low his own herd. The dog which comes upon a friendly visit carries about him an infection

harmless to himself, but which means death to the swine about the place and to every hog which may be brought to feed in the germ-infested place thereafter. How rapidly the germ must multiply is incalculable. Almost every railroad shipping pen passed in what is known as the "Great Corn Belt," is alive with the death dealing enemy. Every stock yards is a hot-bed of contagion to such an extent that states have passed laws prohibiting hogs being taken from the stock yards to be fattened and resold, as are cattle and sheep. Hence the "closed market for stock hogs," condemning each hog that enters its gates to die by the packer's knife before the disease claims it for a victim.*

However, the disease has not wrought its havoc in the United States, at least, without earnest endeavor and constant diligence on the part of the Government officials to eradicate it. Though fighting an unseen enemy science through practical experiments has found the means of preventing the dread disease, though it is yet to be learned how to cope with the malady once it has attacked its victim. In 1876 the scientist Pasteur attempted to make a vaccine to lessen the virulence of the germ as in the treatment of anthrax in cattle, but was unsuccessful. In 1878 the United States Congress appropriated \$10,000 and a Dr. Salmon, then Chief of the Bureau of Animal Industry, and a Dr. Law, devoted their energies in attempting to lessen the virulence of the germ by transmitting it to horses and to other animals. Numerous other appropriations were made and much experimenting carried on all over the country, but no satisfactory results were accomplished until Dr. Marion Dorset, of the Bureau of Animal Industry, per-

**Since the discovery of anti-hog cholera serum the state of Kansas permits hogs to be taken from the stock yards to quarantined yards (yards where they can be fed for a time and then returned to the stock yards).*

fecting the serum as now used along entirely different lines from the treatment formerly attempted. He does not attempt to lessen the power of the germ, but strengthens the resisting power of the hog. Into the blood of the hog serum is injected. This serum is made up of the blood of a hog which is not only immune to cholera but into which new cholera germs have been injected so that the corpuscles are in fighting array. These fighting corpuscles are injected into the hog and at the same time cholera germs are put in the hog either by injecting cholera blood, and thus giving the animal a light form of the disease, or by exposing him to cholera. The fighting corpuscles in the serum act as policemen, as it were, and help the white corpuscles naturally in the hog's blood to drive out the poisonous germs. The corpuscles in the serum have been well called "veterans" in the fight with cholera germs. In short, the hog is given or contracts a light form of the disease and the resisting power in the serum overcomes the disease and the hog is then immune to cholera. Simple enough, but who but a genius could have evolved the theory and proved its worth? When the hog has taken cholera before the serum is injected it is too late. The cholera germs are too numerous, they win the battle and the hog dies. The serum is not an infallible cure, but numerous tests have proved beyond a doubt that as a preventive it is entirely reliable when properly administered, and the value of Dr. Dorset's discovery cannot be overestimated.

Introduction of Anti-Hog Cholera Serum

To the Public.

During the epidemic of hog cholera in the latter part of the seventies the states of Kansas and Missouri each appropriated thousands of dollars for the purpose of trying to eradicate the disease. Experts were sent to

the live stock centers, all to no purpose. During this time the writer was engaged in the breeding of fancy hogs and experimented extensively in attempts to find a cholera preventive or cure, employing an eminent specialist to make post-mortem examinations, but all without any good results. He has been engaged in the hog business ever since and has followed with keen interest the efforts which have been made along this line and witnessed the failures resulting. To his personal knowledge no definite results had been secured towards checking the disease prior to Dr. Dorset's discovery. During all these years hog breeders and shippers had vainly endeavored to find some means which would make it possible to take hogs from the stock yards to the country to be fattened and resold.

After the discovery of anti-hog cholera serum, a number of men began buying hogs in the Kansas City Stock Yards, vaccinating them and taking them to quarantine yards in Kansas with but little or no loss, except when hogs had been exposed several days previous to vaccination. I saw the matter tested frequently and became convinced that if hogs could be made immune in the Kansas City Stock Yards, a hot-bed of contagion, they could be made immune anywhere, and conceived the idea of making a public demonstration in order to convince the people at large of the practicability of using the serum. I took the matter up with Secretary James Wilson at Washington and Hon. Charles F. Scott, then Chairman of the Committee on Agriculture. The following letter is one of many communications received relative to the matter:

SIXTY-FIFTH CONGRESS.

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Committee on Agriculture,

House of Representatives U. S.,

Washington, D. C.

Dear Mr. Peters:

Yours of June 7th is just received and I have read it with great interest. I believe you are right in your opinion that a demonstration at Kansas City would attract attention all over the country and be of inestimable value. It would certainly be a ten-strike if, as a result of it, Kansas City could be made an open market for stock hogs as it is for stock cattle. I shall carry your letter over to the Department and discuss it with the Secretary the very first hour I can get away, and let you know the result.

Sincerely yours,

Chas. F. Smith

The interest thus created among the department officials resulted in what proved to be one of the most remarkable and convincing demonstrations ever made. This demonstration was made by Dr. W. B. Niles, head of the Government Experimental Station at Ames, Iowa.

At the time of the test the Kansas City Star printed a detailed account which was copied by thousands of other papers in the United States and Europe. A portion of the article follows:

"Of a poison squad of thirty-five hogs, thirteen of which were not immunized at the beginning of the test, died, and the twenty-two which were so treated were perfectly healthy. The twenty-two hogs were sub-

jected to every conceivable form of exposure to cholera and the thirteen which succumbed to the disease died in the pens with the twenty-two at various times during the process of the tests. The carcasses of the dead hogs were permitted to remain in the pens with the immunized animals, sometimes two or three days. Every opportunity was given the twenty-two to succumb to the disease. Under normal conditions every hog would be dead. The fact that twenty-two did not die is absolute proof, those who conducted the test declare, that the serum is an unfailing preventive of hog cholera."

The Drovers Telegram had the following to say:

"The discovery of this immunizing agent is perhaps the most useful service that veterinary science has rendered live stock and the world. * * * Furthermore and most significant will be the convenience of inoculating feeding hogs, which eventually will be allowed to go to any part of the country as healthy feeding cattle go now. That will be the best triumph of the serum after all."

The results of this public test more than justified the hopes of those who inaugurated it. The farmers and hog raisers eagerly welcomed a means so thoroughly, convincingly, and scientifically demonstrated, and bearing the stamp of Government approval.

Similar tests made at other stock centers were equally successful. Innumerable tests have been made by the agricultural colleges of the various states and with one accord it is agreed that if the farmers and hog raisers were to have their herds, including every unweaned pig born upon their farms, vaccinated, the terrible scourge would be wiped off the face of the earth.

The demand for the serum far exceeds the possible production. In addition to the limited supply which

can be produced at the agricultural colleges several private companies have been formed for the manufacture and sale of serum.

The Hog Raiser Must Protect Himself.

It is as necessary that the hog raiser fortify himself against loss by the disease as it is that the business man insure his property against loss by fire. But however desirous he may be to protect himself he stands a poor chance to do so when the total amount of serum supplied by the agricultural colleges and private firms would not supply serum for the hogs in twelve counties in Kansas. The supply made by the state agricultural colleges must necessarily be limited because of the enormous cost of serum production away from packing centers. The useless sacrifice of hogs makes the cost of manufacture at the colleges so great as to preclude the possibility of a general distribution. The alternative is, **the farmer or hog raiser must have the serum himself.**

The practical farmer is entirely capable of making his own serum and vaccinating his own hogs. This is being demonstrated every day by hog men in many parts of the country who do so successfully. Hog feeders near Kansas City are making their own serum and vaccinating their own hogs. One man is feeding more than four thousand immunized hogs which he bred, raised and immunized with serum of his own manufacture. A great many of his hogs were shipped to the stock yards, purchased by other persons, and actually fattened from corn left in the infected pens without a hog showing any symptoms whatever of cholera. Hogs not immunized, shipped in from the country and subjected to like treatment would all die with cholera within a few weeks. One of the largest manufacturers of serum at the Kansas City Stock Yards

employs a yard hand to make the serum, vaccinate hogs and to perform many of the other duties incidental to the business. He has acquired his knowledge merely from watching others do the work. Neither of these men possesses any greater medical or scientific knowledge than the average farmer and if they can make serum and successfully vaccinate hogs, other hog raisers can do the same.

When Vaccination With Anti-Hog Cholera Serum Fails.

Failure may result when hogs are vaccinated after they have already been exposed to cholera, even though they are apparently well. Many times after vaccination the hogs sicken and die and the vaccination is blamed, when in reality the herd has previously been exposed to the disease, perhaps before purchased, in the loading or unloading pens or in transit. Usually men wait until some of their hogs are sick before vaccinating and on a farm many animals may be saved if treated, even after a few die, because they are running at large and all are not inoculated with the disease at the same time, so that the vaccination takes place with some before many germs are in the system and thus the serum can overcome them, but the proper time to vaccinate is before the disease appears at all.

In some instances the serum is spoiled before it is used. It cannot be exposed to heat and air. If a part of a bottle of serum is used the rest of the serum is useless and must not be used later. Sometimes the cholera blood is injected after it is more than twenty-four hours old. Sometimes a wrong diagnosis is made in obtaining cholera blood and the blood of animals suffering from some disease other than cholera is used. Then, too, sanitation is not always properly observed. The

strictest observance of sterilization and the free use of antiseptics are most imperative.

The act of vaccination is simple and can be learned by a ten-year-old boy:—nothing complicated about it, and if the instructions in this book are carefully followed your hogs will be saved, which is the object desired.

CHAPTER II.

MAKING OF ANTI-HOG CHOLERA SERUM.

In the beginning let it be thoroughly understood that anti-hog cholera serum is a preventive and not a cure. The hog is vaccinated against cholera as man is vaccinated against smallpox. Anti-hog cholera serum will keep indefinitely when it is sealed properly and kept in a cool place, and it should be kept at hand in small quantities for use when necessary. Every unweaned pig should be made permanently immune. The vaccination of four weeks old pigs should be as much a part of the farmer's routine as any other necessary care of his stock. The serum can be obtained from any reliable company and kept for use, but the expense is as needless to the hog raiser as the purchase of feed is to the farmer. After the hog raiser has once made his serum he will consider it as much a part of his business to keep a supply of "home made serum" on hand for use, as the farmer considers it his business to grow sufficient corn for his milk cows.

Anti-hog cholera serum is made from the blood of a hyper-immune hog. That is the blood of an immune hog into which cholera blood has been injected. The hog must be absolutely immune to cholera, that is he must have had cholera and recovered, or have been made immune by vaccination. Into this immune hog is injected a quantity of cholera blood and about ten days later he is hyper-immune and his blood may be drawn for serum. The fact that a hog can thus be

made artificially immune proves beyond question that the serum prevents cholera, otherwise a hog after being injected with cholera blood would inevitably succumb to the disease. If a hog which has had cholera and recovered is not available it will be necessary to make an immune by vaccination.

As has been stated there are two cases to be considered in the making of anti-hog cholera serum. The first, where a naturally immune hog is available, that is, a hog which has had cholera and recovered; and the second, where it is necessary to make an immune. The second process, that of making the immune, is more complicated. Therefore, it is more practical to secure a naturally immune hog if possible*

In selecting the immune hog or the one to be made immune it is best to choose one weighing about one hundred and fifty pounds. As the hog is bled from the tail, and about half an inch cut off at each bleeding, choose one with a long tail, so that three or four bleedings can be made.

The person who cannot procure an immune hog can obtain the serum and cholera blood for making one from a reliable serum company. The process of making this immune is described beginning on Page 34, under "Simultaneous Injection."

TO MAKE ANTI-HOG CHOLERA SERUM AFTER AN IMMUNE HOG IS PROCURED.

After the immune hog is procured the only thing necessary for making serum is a quart of cholera blood and the necessary instruments and antiseptics.

**It is seldom difficult to secure an immune hog as many farmers have one or more hogs which have recovered from cholera.*

Obtaining Cholera Blood For Hyper-Immunizing.

The word hyper-immunize sounds rather technical but it merely means the injection of cholera blood into an immune hog, after which process the hog is hyper-immune and **serum can only be made from the blood of a hyper-immune hog.**

After the hog which is known to be absolutely immune is selected, the next step is to secure a quart of cholera blood. The importance of care in obtaining cholera blood cannot be too strongly emphasized. It may be bought from a reliable serum company and shipped, but since no preservative for it has been found and it will not keep more than thirty-six hours, it is very much safer to secure the blood locally and cholera being as prevalent as it is, this can usually be done. It is absolutely necessary that the cholera blood be secured from a hog with acute cholera so that the germ may be of the highest virulence, and **under no circumstances can the blood be used after it is thirty-six hours old. It must be kept cold, preferably upon ice; it must not be contaminated with outside germs through uncleanness or carelessness; it must be absolutely unspoiled (which means it must never be allowed to get too warm), and positively it must be cholera blood.**

In obtaining the cholera hog, therefore, to be bled to death for the quart of blood, an absolute recognition of the disease is necessary. It can readily be seen how useless and perhaps fatal an injection of blood from a hog suffering with any other malady, such as pneumonia, tuberculosis, etc., would be.

Complications with other diseases and the varying symptoms of hog cholera might result in a wrong diagnosis, but its highly contagious characteristic is an unfailing symptom of hog cholera. Usually one or two sick hogs appear in a herd and in a short time many of the hogs are attacked.

There are two types of the disease, chronic and acute, the difference being in the degree of virulence of the germ and in the power of resistance of the animals. **The blood from a hog with chronic cholera is not of sufficient strength for immunization.** In the acute form the animals die suddenly after a short illness. The fever runs high from 106 to 107 degrees. The normal temperature of a hog is 103 degrees. **It is necessary that the animal be killed when the fever is high.** The short duration of the disease necessitates quick action in order to secure blood in proper condition. In some cases the hogs die within a few hours with no characteristic symptoms other than would result from a malignant disease of any kind. In other cases there is diarrhoea, sluggishness, sometimes vomiting and occasionally nosebleed, loss of appetite, a gumming of the eyes, sometimes the eyes becoming entirely closed, and dark red or purplish blotches may be seen on the skin of the belly and inside of the legs.

In the chronic form the characteristics are much the same excepting that the animal lives several weeks, becoming very emaciated and weak and finally staggers as he walks, the hind quarters wabbling from side to side. Sometimes the chronic cases develop a cough and breathing is labored. These cases must be studiously avoided in selecting the cholera specimen as no mild or chronic case will answer the purpose.

The diseases most easily confounded with acute cholera are pneumonia and occasionally anthrox. A close discrimination, however, will disclose that pneumonia does not spread from one hog to another as in cholera. Several hogs or the whole herd may have contracted the disease at the same time from the same cause, such as sudden changes of the weather or exposure in shipment. But the disease does not spread from one animal to another as in a contagion.

Anthrox occurs very rarely in hogs, the characteristic

which distinguishes it from acute hog cholera being a swelling of the throat and tongue and sometimes a bloody froth at the mouth.

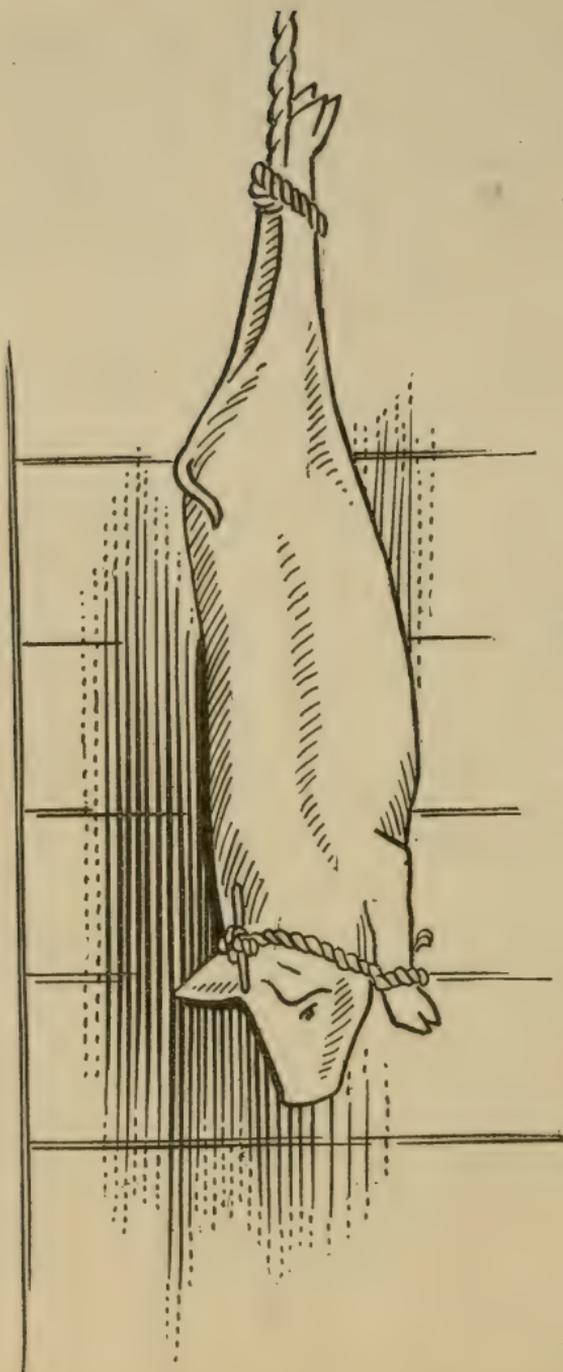
Symptoms are, however, so varied and so often characteristic of other diseases it can readily be seen how important a post-mortem examination is after extracting the blood.

Method of Extracting Cholera Blood.

For this operation a liberal supply of antiseptic solution, sterilized gauze, a glass or granite vessel, two knives and a tablespoon, all thoroughly sterilized, and a short piece of rope, are the only necessary implements. The antiseptic may be a solution of bichloride of mercury and water, (the bichloride of mercury coming in tablet form, with directions on the bottle, a 25 cent bottle being sufficient), or a 5 per cent solution of carbolic acid, which must be mixed by the druggist.*

As both are highly poisonous, care must be taken in their use. These and the antiseptic gauze, for straining the blood, may be procured at any drug store. The glass or granite vessel for catching the blood must be thoroughly sterilized. Submerge the vessel, together with the knives and spoons, in water in which has been put a few spoonfuls of the antiseptic, and bring to a boil and boil them for thirty minutes. Let the vessel cool in the water to avoid breaking. The knives, which must be sharp, should have blades at least three inches long, the ordinary butcher knife will answer the purpose. **Too much emphasis cannot be laid upon the importance of sterilization as the blood must be in no way contam-**

**Buy one gallon of 5 per cent carbolic acid solution, if no bichloride of mercury is used, using about one quart at this operation, but if bichloride is used, buy one quart of 5 per cent carbolic acid solution to use later.*



Method of tying
the hog for the
final bleeding for
serum.

This method of
tying also used
in bleeding of
Cholera hog.

inated and all danger of blood poisoning rigorously avoided.

Have all implements in readiness before the hog is selected, having two or three receptacles of antiseptic at hand. The hands must be dipped frequently in the antiseptic during the operation and care must be taken that there are no abrasions on the skin of the hands. The animal may be suffering from some disease communicable to man through a cut or scratch.

Let it be understood that the hog is alive. Tie the ends of a short rope to the hind legs and hang the animal at a convenient height for operating, raising by means of a block and tackle, if possible. Tie the front legs securely back of the head. This is most readily done by making a slip knot in the end of a rope and tying one front leg. The rope, which should be about two feet long after the leg is tied, is passed over the hog's head back of the ears and securely fastened to the other leg. Tighten by twisting the rope with a stick in the middle. (See Illustration No. 1.) This method of tying the hog is very important, as it prevents the hog's kicking and spilling the blood as it is caught. Wash with soap and water the under side of the animal to prevent dust particles from falling into the blood. With one knife shave the throat as clean as possible. Wash the shaven portion with the antiseptic solution. Then with the other knife stick the hog in the throat about an inch from the breast bone thrusting the knife in and then up. Thus the jugular vein is pierced, and the hog gradually bleeds to death. Take great care not to pierce the wind pipe. If this mistake is made a large portion of the blood gushes from the animal's nose and mouth and being thus contaminated is useless. Catch the blood in the granite or glass vessel, whipping vigorously with the spoon as the blood comes from the animal. Continue whipping after the blood is caught

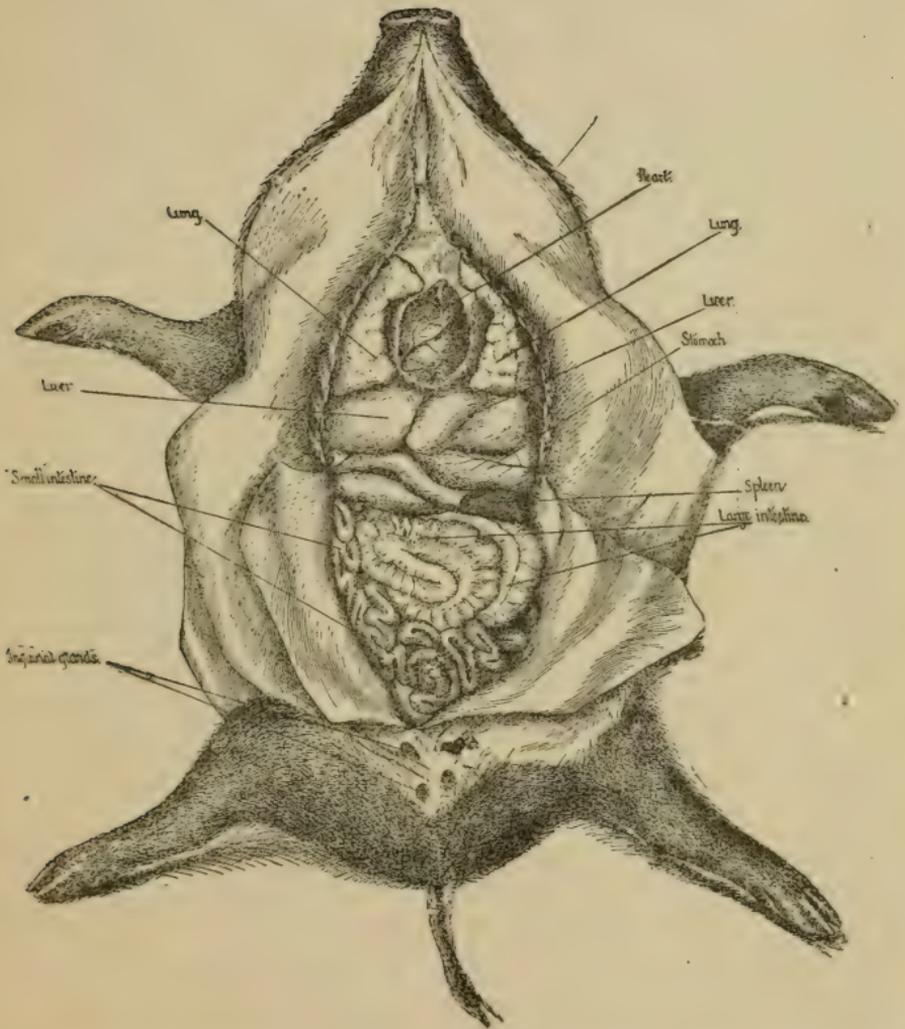
until it has thoroughly cooled and coagulation ceased. The blood should be covered until after the post-mortem examination when it should be strained through the sterilized gauze into a sterilized receptacle. It is best that the hands do not come in contact with the blood, but if from improper whipping the liquid portion of the blood has not separated from the fiber it may be necessary to squeeze with the hands the clot which has formed, being careful to have dipped the hands in an antiseptic just previously. Keep the blood covered in a cool place free from dust.

Post Mortem Examination.

A post-mortem examination is absolutely necessary in order to determine definitely whether or not the blood just drawn is that of an acute cholera hog and so fit for use. The examination must be made as soon after death as possible before any changes of decomposition begin. This necessitates the examination being made before the blood is strained. The hog is taken down and laid on his back. Examine the skin and belly for dark red or purple blotches, which if present, are indicative of cholera. Make a very shallow cut in the skin and underlying fat the entire length of the body from the point of the chin through the chest and belly to the tail, being careful not to cut any of the internal organs. Peel the skin and fat back and examine the lymph glands about the angle of the lower jaw. In the normal hog these are of a grayish color. Take out these glands and cut them crosswise, and generally in the acute cholera hog they are dark red or black. Observe in the same manner the glands of the flank. However, the hog may be suffering with cholera and the glands still be normal. Cholera is not always indicated in these glands .

Pull back the skin on the chest and expose the ribs.

(No. II)



Location of Organs Which may be Affected by Hog Cholera

Cut out the breast bone, cutting towards the head, cut the skin crosswise to each leg and press open the carcass, great care being taken not to injure the internal organs. (See Illustration No. 2.)

The normal lungs are pink and soft and collapse when the chest cavity is opened. Generally in acute cholera they are dark and the surface is covered with numerous small red spots which cannot be washed off. Frequently a straw-colored, cheesy, coagulated foul-smelling pus covers one or both lungs.

Examine for spots of hemorrhage the kidney and spleen (melt) where they are before removing. Take out the spleen and examine more closely. The healthy spleen is light, almost pink in color. In the majority of cases of cholera the spleen is larger and darker than the normal. Raised red spots may be found on the surface, especially underneath and the organ is soft when squeezed with thumb and fingers.

Remove the kidneys and carefully pull away the fibrous sack in which they are enclosed. Normally they are a light brown color. Occasionally there is a cholera hog with no indication on the kidneys, but this is most infrequent. Usually the kidney is darker and has blood spots scattered over the surface, the specks varying from one or two to a countless number. When pressed with the thumb and fingers the blood does not disappear temporarily as the fingers are lifted, and return again. The cholera "blood spot" remains the same and the blood can not be squeezed away temporarily. Cut the kidney open lengthwise and examine for blood clots. If the post-mortem is not made immediately after death and the kidney allowed to remain several hours in the animal before examination, clotted blood will greatly resemble cholera blood spots.

If one or more of these organs, lungs, kidneys, or spleen are as described the blood is that of an acute cholera hog and so fit for use for vaccinations. Let it

be remembered that the blood points of hemorrhage which can not be squeezed or washed away are characteristic of cholera and are seldom if ever found in other hog diseases.

Hyper-immunizing.

As has already been stated, hyper-immunizing means injecting cholera blood into an immune hog. As the cholera blood has been strained and the immune hog selected the next operation is to inject the cholera blood into the immune hog. One thousand cubic centimeters or one quart of cholera blood should be used for hyper-immunizing a hog weighing from 100 to 150 pounds. There are three different methods that may be employed in hyper-immunizing. One in which the blood is injected by means of an especially constructed instrument into the vein of the hog's ear; another in which the blood is injected into the abdominal cavity; and another in which the blood is injected through the skin by means of a hypodermic syringe. As it has been found by experience that the last method, that of injecting the cholera blood under the skin, is the most practical, this method alone will be treated in this text.

There are two methods of injecting the cholera blood through the skin, one in which there are three injections, a week apart, which is tedious and involves the unnecessary difficulty of procuring cholera blood three times, and one in which one injection is used which method alone is here considered, it being simpler and more practical.*

The instrument to be used in hyper-immunizing is

**Some authorities disagree, but it has been proved that this method is more practical and quite as successful.*

(No. III)



Method of Tying for Hyper-immunizing

a hypodermic syringe, holding 25 cubic centimeters. It is graduated in cubic centimeters marked on the piston of the syringe. On the piston there is a set-screw which secures an adjustment of the instrument so as to inject a desired quantity of liquid. The cylinder is of glass. The hypodermic needles, which are provided with the syringe, must slip into place on the instrument instead of screwing on as is the case with some hypodermic syringes. Each instrument must be thoroughly cleansed before using by being dipped into the antiseptic solution and filled and emptied several times with the solution. Sterilize another glass or granite vessel to be used for holding the cholera blood as needed during the operation. The same kind of antiseptic which was used in the operation of bleeding for cholera blood must be used freely in the process of vaccination.

As the hog must be held as still as possible during the operation it is very necessary that it be tied properly. Tie a slip knot in each end of an inch rope $2\frac{1}{2}$ feet in length. Throw the hog on his side with his back to a wall or fence or any solid structure. Slip the slip-knot in one end of the rope over the front leg which is not on the ground, and the other over the hind leg which is not on the ground. Put this rope over the hook of a block and tackle and raise the animal until his body barely rests on the ground, thus preventing his lower feet from thus getting a foothold. (See Illustration No. 3.)

If a block and tackle cannot be obtained for this operation tie the rope to the upper front leg, pass the rope over a post, then tie the upper hind leg with the other end of the rope having the rope just long enough so that the animal's body barely rests on the ground. Now tie a rope around through the mouth and over the upper jaw and nose, and then tie the other end of the rope to some nearby object, so as to raise the

head slightly from the ground. If the animal is tied in this manner it will be found that little inconvenience will result from his struggling.

Pour a small quantity of cholera blood into the sterilized glass or granite vessel and in another vessel of the same kind have at hand a liberal supply of antiseptic. Fill and unload the syringe with the antiseptic before using.

With clean water and soap wash thoroughly the inner sides of all four legs and the under part of the neck of the hog. With the antiseptic solution wash this same surface. Fill the syringe with cholera blood before the needle is attached, taking care to allow no air to enter.

To hyper-immunize it is necessary to use for a hog 125 to 150 pounds in weight, 1,000 cubic centimeters or one quart of cholera blood; that means forty syringes full of blood if the syringe is of 25 cubic centimeter capacity. To avoid making so many insertions of needles, two syringes full may be injected into the same place without removing the needle. These should be scattered over the surface of the hog as follows: About ten injections into the inside of each ham, eight under each shoulder and four in the neck, two on each side between shoulder and jaw about six inches back from center of neck.

Insert the needle first, then fix the syringe on the needle and inject the blood. Without moving the needle inject another syringe full in the same way. Remove the needle and squeeze the aperture made by the needle several times to prevent the blood from running out. Proceed in the same manner refilling the syringe until twenty insertions of the needle have been made and forty syringes full of blood have been injected. The insertions of the needle should be at least $1\frac{1}{2}$ inches apart. While great care should

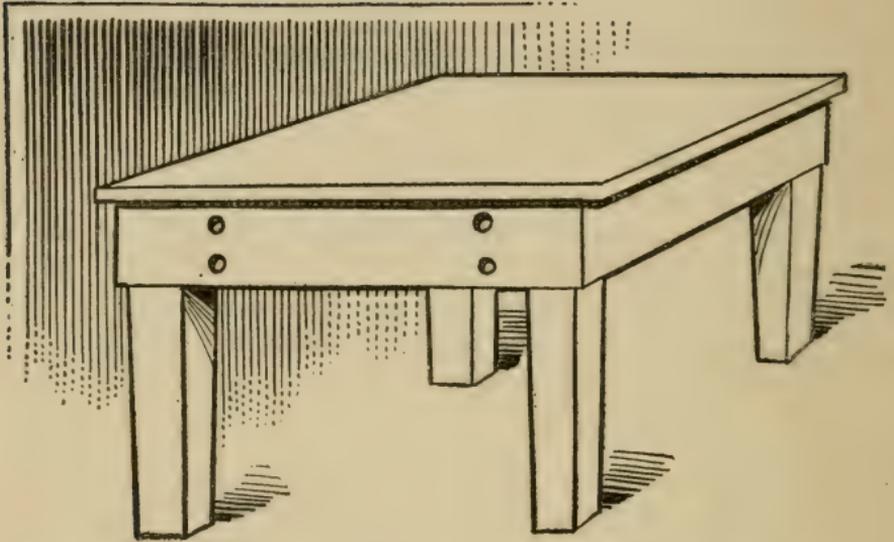
be exercised that the needle does not strike a bone, it must be deep enough to penetrate the skin and should a lump form as the blood is injected, the needle is not deep enough and should be pushed a little deeper and the lump squeezed out with the fingers. After every few injections the syringe and needle should be washed out with antiseptic by loading and unloading with antiseptic. After all forty injections have been made, wash the surface again thoroughly with antiseptic solution. Place the hog in a clean, dry, disinfected pen where he will have access to plenty of water. The only after effects of hyper-immunizing will probably be a slight rising of temperature and possible loss of appetite for a day.

Sometimes even if all sanitary precautions are taken lumps will form on the inside of the animal's hams and under the shoulders. These should be opened and the matter squeezed out. The incision should be made triangular so the pus will run out before the wound is healed. In opening the abscesses, especially under the shoulders, do not cut crosswise of ligaments or cords.

Bleeding the Hyper-immuned Hog for Serum.

A week or ten days after hyper-immunizing the hog, if he appears well and hearty he must be bled for serum. He may be bled three times from the tail and then killed and the blood caught, or he may be bled from the tail four times and re-hyper-immunized.

However, the best plan is to bleed him three times from the tail, at intervals of a week apart, then kill, catching the blood and making a post mortem of the carcass. By this method an examination of the internal organs determines whether the hog is suffering from any disease and thus a further safeguard is placed upon the serum. If no disease is indicated the serum is ready for use and the butchered animal is suitable for pork.

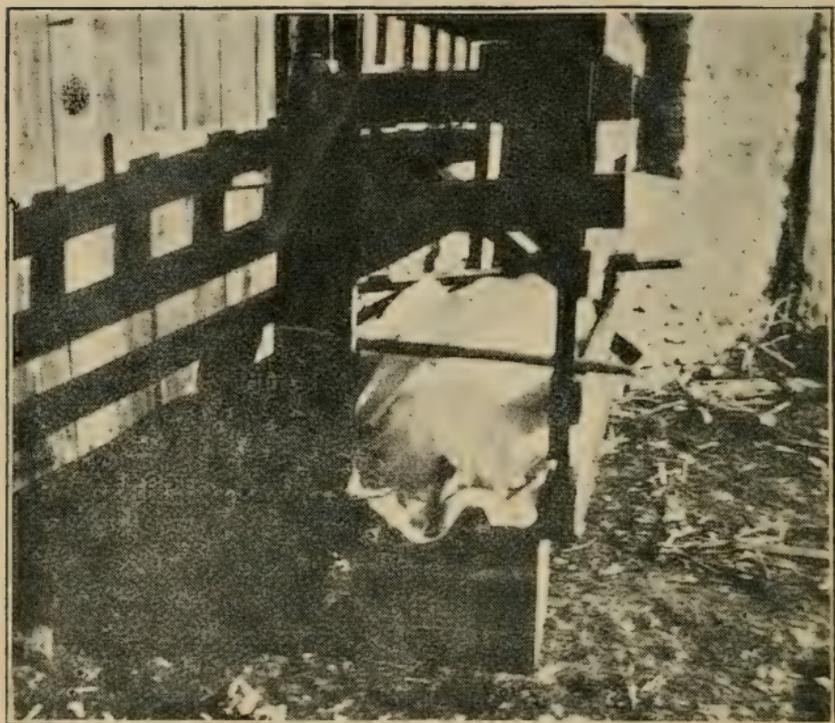


Holes in Ends of Table Through Which Ropes are Passed in Tying Hog on Table for Bleeding from Tail.

There are two ways of securely fastening the hyper-immuned hog for bleeding. The method commonly in use is to tie the animal on a table. This table which is about five feet long, three feet wide and three feet high has holes bored in the end braces between the legs. (See Illustration No. 4). When the hog has been lifted on the table, ropes are tied to each of the animal's legs, passed through the holes of the table and securely fastened, holding the animal, his legs rigid, on his belly.

The other method is to fasten the animal in a crate and this is more practical and more humane, especially with a heavy hog. The crate should be just large enough to hold the hog and should be made of strong material with a slide at the end, which shuts down to within six inches of the floor of the crate. The crate is elevated about two feet. An incline for running the hog into the crate is built in such a way that it may be removed when the animal is enclosed. When the hog has been driven into the crate and the slide fastened, pass two strong boards through the openings, put them on the hog's back and using them as levers pry down upon the hog's back. In a few moments he will lie down. Fasten him in this position by passing boards through the openings in the sides of the crate. This has been found much the easier and more practical way of securing the hyper-immune hog for bleeding. (See Illustration No. 5).

Extreme sanitary precautions are necessary during the operations of bleeding for serum; all vessels and instruments must be thoroughly sterilized—a glass or porcelain vessel, a large spoon or fork, antiseptic gauze, and knife or chisel. A liberal supply of antiseptic must be at hand. The crate should be covered with a clean cloth, a hole having been cut, through which the tail is slipped. The tail should now be washed with soap and water and then shaved with a sharp knife. After the tail is shaved it should be washed with antiseptic. The hands



Hog in Crate, Ready for Bleeding from the Tail.

of the person extracting the blood must be washed with the antiseptic. The tail should be cut about a quarter of an inch from the end unless the end is hard, if so it should be cut above the hard place. The flow of blood is more profuse when a thin long beveled chisel is used for severing the tail, though a thin knife may answer the purpose. Place the tail on a block which has been washed with antiseptic, place the blade across the tail and strike with a clean hammer, being sure to cut the tail square across in order that a good flow of blood may be obtained.

Have a piece of sterilized gauze tied over the top of the vessel for catching the blood—a fruit jar or milk bottle will answer the purpose. A hole should have been cut to allow the admission of the tail and another for the fork or spoon. As the blood is drawn it should be whipped constantly with the fork or spoon. The stirring prevents clotting and causes the fiber to gather together. This will save much trouble when the blood is strained. The amount of blood to be taken depends upon the weight of the animal. About a pint and a half may be drawn from a hog weighing 100 pounds, about a quart from a 150 pound hog, etc. However, much depends upon the condition of the animal; a thin hog will probably stand less bleeding than a fat one. When the proper amount of blood has been drawn the tail should be tied with a cord. Cut the string close to knot and wash in antiseptic. Care should be taken to tie the tail securely as there is danger of the animal bleeding to death, especially if the hog is small and the flow of blood profuse. The hog should be noticed for a few days to see whether the tail bleeds, if so he must be caught and the tail retied.

In this manner the hog is bled three times at intervals of a week apart in the same manner, each time cutting about one-half inch from the tail, getting the same quantity of blood. After each bleeding the blood

is strained through a sterilized cloth and in order to preserve the serum, mix with it a certain quantity of the 5 per cent carbolic acid solution. It is mixed in the proportion of 7 to 93; for instance, to a quart of the serum, or 1,000 cubic centimeters, there must be added 75 cubic centimeters or three syringes full of carbolic acid solution and great care must be exercised in using the proper quantity. Pour the solution gradually into the serum, stirring thoroughly as you pour. Put into sterilized bottles and cork and seal.

One week after the third drawing of serum the animal may be killed and his blood caught for serum or he may be re-hyper-immunized. However, it is recommended that he be bled to death that a post mortem may be made to further determine the purity of all the serum caught.

Final Catching of Blood.

The blood is caught just as it is from a cholera hog as previously described. (See Page 18.) After the hog is bled the last time a post mortem examination should be made also as previously described. The serum is now ready for use. It must be air tight and must be kept in a cool place to prevent spoiling.*

**After having made the serum some persons might desire to test its efficiency before using it on a herd. To do so vaccinate one or more pigs with the serum and turn them into a lot where there is cholera.*

CHAPTER III.

VACCINATION FOR CHOLERA PREVENTION.

There are two methods of vaccination known as the Simultaneous Injection Method and the Simple Injection Method.

The first method, that of simultaneous injection, or injection of serum and cholera blood at the same time, is attended with some danger, and should be used only by the hog raiser and not by the feeder.

Unweaned pigs should however be vaccinated by the simultaneous method and remember that unless the sow is immune she must be vaccinated at the same time but very preferably by the simple method, which will be described later.

Simultaneous Injection.

The instruments to be used are two hypodermic syringes, one holding from 20 to 30 cubic centimeters and the other 10 cubic centimeters, furnished with slip needles. The instruments are sterilized as has been described and plenty of antiseptic must be at hand. (As described on Page 18.)

The services of two persons are necessary for the operation, one to hold the animal and the other to use the syringes.

Syringes must be frequently loaded and unloaded with antiseptic. The vessels for holding serum must have been previously sterilized. (Do not use tin). Into one pour a small quantity of serum and into the other a small quantity of cholera blood. Keep all vessels



Method of Holding Shoats
and Lightweight Hogs for
Vaccination. Point x shows
where needle is placed.

covered when not actually in use. Load larger instrument with serum and smaller with cholera blood, with needles unattached. If air enters syringes, unload and refill. If air is injected into the animal lumps or abscesses will form.

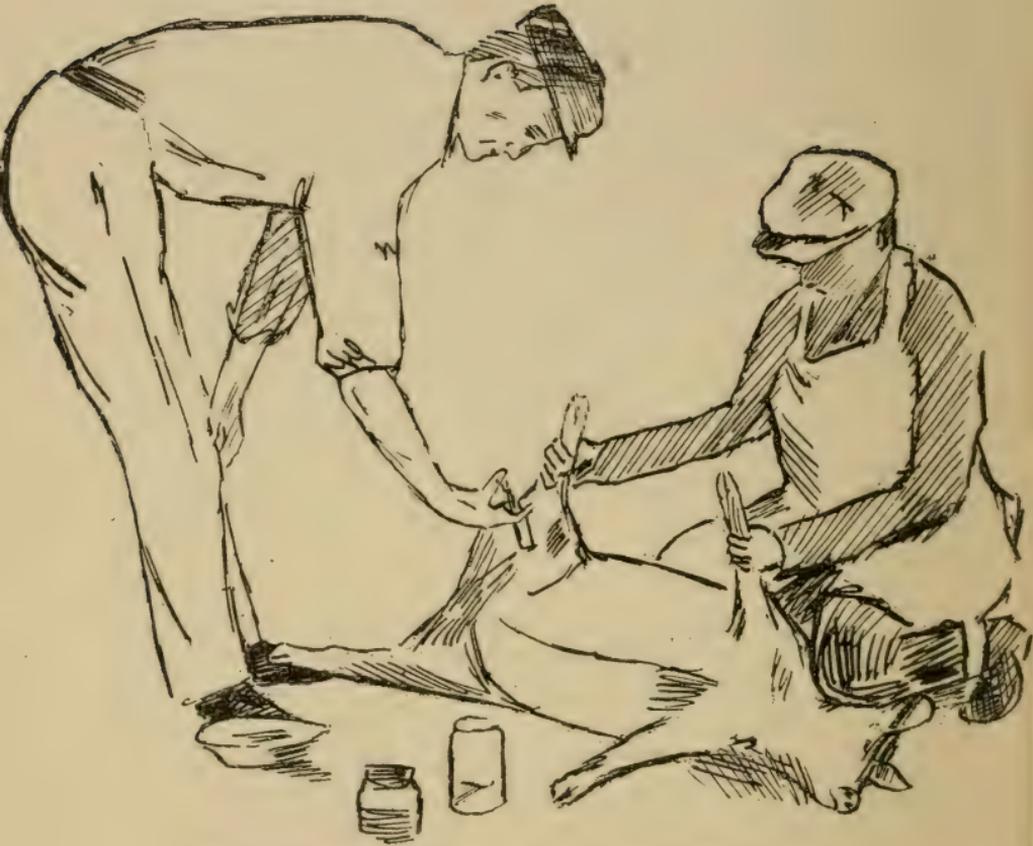
Hogs are vaccinated according to weight, 30 cubic centimeters of serum to the 100 pounds. For instance, for an animal weighing 150 pounds about 45 cubic centimeters of serum, for one weighing 200 pounds, 60 cubic centimeters. Only 2 cubic centimeters of cholera blood are injected for hogs weighing 100 to 150 pounds.*

Unweaned pigs should be vaccinated when about a month old, injecting 15 cubic centimeters of serum and one-half cubic centimeter of cholera blood.

There are two ways generally used for holding the animals for vaccination. Pigs and shoats are caught by the hind legs and raised so the belly faces the operator, the front legs resting on the ground to lessen the weight. The assistant holds the hog's back against him and stands astride its head and front part of the body, holding them firmly between his legs. (See Illustration No. 6.)

Heavier hogs which cannot be held in this way are thrown down. The assistant, facing the direction in which the animal's legs protrude, places his knee on the hog's neck, holding the hind leg and the front leg which are not on the ground. The hind leg is held backward, keeping the hind legs well apart. (See Illustration No. 7). With a sponge or clean cloth wash with antiseptic the fleshy part of the inner side of both thighs. Stick the needle belonging to the serum syringe into the place just washed, taking care not to strike the

**The man who must make his immune hog previous to making serum and selecting a hog weighing 150 pounds would therefore need to buy 45 cubic centimeters of serum and 2 cubic centimeters of cholera blood.*



Method of Holding Heavy Hogs for Vaccination

bone, but being sure to penetrate the muscle. Put the syringe on the needle and slowly inject. If a lump begins to form the needle is not deep enough. Push farther into the flesh and squeeze the lump; in this way the serum is forced from the lump into the leg. When the proper amount of serum has been injected remove the needle and pinch the wound several times to prevent the escaping of the serum. If the hog weighs over 100 pounds inject one-half of the serum into one leg and the other half into the other.

Then adjust the set-screw carefully on the syringe containing the cholera blood so that the proper proportion may be used. For unweaned pigs adjust the screw to enable the injection of one-half cubic centimeter of blood for each pig. For hogs weighing 100 pounds adjust screw for injection of one cubic centimeter; for hogs weighing 150 pounds adjust for injection of two cubic centimeters.

Be sure to use set screw. **If too much cholera blood is injected in proportion to serum the hogs will die of cholera.** Thrust the needle of the syringe containing the cholera blood into the opposite leg from that into which the serum was injected, or if the serum injection was made in each leg, at least 2 inches away from the point of serum injection. In the same manner that the serum was injected inject the cholera blood. Remove the needle and squeeze the wound made by the needle to prevent the cholera blood from escaping. If by any mistake too much cholera blood should be injected, more serum in the proper proportion at a new point should be injected. Wash thoroughly with antiseptic solution all the wounds made by needles. The vaccination will produce some soreness but will interfere very little with the appetite.

SIMPLE INJECTION METHOD.

The second method, that of simple injection (injection of serum alone) is attended with little or no danger. It is the method commonly in use. The state and veterinary colleges with scarcely an exception, use this method entirely.

It is the united action of serum and the cholera germ which makes permanent immunity, but when the cholera germ may be contracted and not injected and the serum alone used, there is little danger attached to vaccination and the immunity is usually permanent. Should the serum be injected alone and the hogs be absolutely free from cholera germs thereafter, only a temporary immunity of a few weeks is obtained, but the feeder buying his hogs about the country is almost sure to have some exposure to the germs in loading pens, in transit or in the unloading pens and those in the herd that have not been exposed over four days can be saved and thus made permanently immune, or if well hogs are vaccinated with serum alone and turned into cholera infected feed lots they are protected from the disease. Many persons have their hogs vaccinated after cholera attacks the herd. In these cases the vaccination must take place as soon as possible. Those in the herd that have not been exposed to the germ over four days can be saved by the serum alone treatment. In this method the process is identical with simultaneous injection excepting that cholera blood is not used. The serum is used in the same manner and proportions as described in the first method. Pregnant sows should be vaccinated by this method.

Remember that the injection of serum alone (simple method) produces temporary immunity, unless the hog

is exposed to cholera germs. Remember that the injection of serum and cholera blood at the same time (simultaneous method) produces life time immunity.

NOTE—When pregnant sows are to be inoculated they should not be thrown down, but confined in some way to avoid rough handling and are inoculated in the vertical furrow between the head and shoulder just back of the ears.

NOTICE.

If you have not a naturally immune hog or find any difficulty in obtaining hypodermic syringes and gauze, both serum and appliances may be obtained from Mason S. Peters, 809 Live Stock Exchange Bldg., Kansas City, Mo.

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