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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

UNIVERSITY OF FLORIDA DIVISION OF AGRICULTURAL EXTENSION
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COOPERATING

P. H. Rolfs, Director

HOG CHOLERA

And

DISEASES RESEMBLING HOG CHOLERA

By JOHN SPENCER

GENERAL EXISTENCE

The earliest recognized outbreak of hog cholera occurred in Ohio in 1833 where presumably it had been imported from Europe. Its spread was at first slow, but later spread rapidly, and today is known thruout the entire United States.

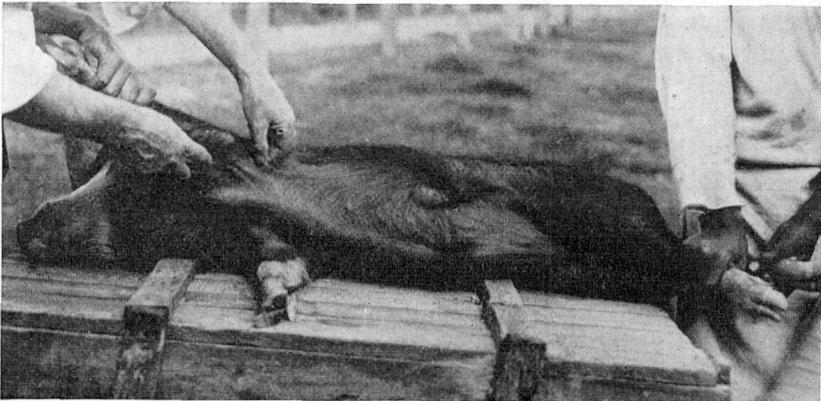


Fig. 1.—Proper Method Holding Small Hogs for Vaccination.
(Axillary Space) (Original)

AVAILABLE FACTS WITH REGARD TO LOSSES

Statistics from the Florida monthly crop report U. S. D. A. for the year ending March 31, 1918 show cholera losses were \$545,400. This loss exceeds the value of oranges in any county in the state with the exception of Brevard, DeSoto, Orange, Polk, and Volusia.

The hog losses in the United States, 70% of which should be charged to cholera, per 1000 head, were:

1914.....	118.8
1916.....	66.2
1917.....	48.6
1918.....	42.1

The hog losses in Florida during the past ten years have been reduced from 98 per thousand in 1917 to 90 per thousand for 1918. In the face of the increased prices, this 8% decreased loss is significant, and means the saving of many thousands of dollars.

CAUSE OF HOG CHOLERA

Hog cholera is due to one cause and one only—the *bacillus* of hog cholera, and without which the true disease cannot exist. There are, however, many contributing influences which may favor its spread and virulence.

ACCESSORY CAUSES

These are the conditions which favor the transmission of germs from animal to animal: Allowing hogs to run at large so that diseased and healthy mingle; freedom of animals to wander along lines of railways on which hogs are carried; scattering of infected litter from cars on such railways; use of same cars, boats, etc., without thoro disinfection; the purchase of stock from public markets; the introduction of fresh animals into a herd without ample quarantine; the return of swine from fairs without regard to the same precaution; allowing butchers, dealers, dogs, cats and birds, especially buzzards, to go into the pens and yards where the hogs are kept; feeding of uncooked garbage from boarding houses, hotels, etc., where infected scraps of raw bacon and such products find their way into swill barrels. This latter means has been responsible for outbreaks in the Dominion of Canada where they have occurred simultaneously at widely remote points, the same brand of bacon having found its way to such points. A few years ago the writer traced an

extensive outbreak in South Dakota to a source some five miles up stream following a deluge of rain which flooded the valley.

These and very similar instances figure largely in isolated and apparently obscure causes of serious loss from the disease.

PERIOD OF INCUBATION

Upon direct inoculation of diseased blood into healthy, susceptible animals, the disease usually asserts itself inside of a week. Where infection is taken into the system in feed and water the period is much longer in many cases and may extend over a period of ten days to two weeks or even longer, depending upon (1) the susceptibility of the animal, and (2) upon the degree of virulence of the virus; for it is known that in both a wide variation exists.

SYMPTOMS

Hog cholera is recognized in two forms—acute and chronic.

Acute. Symptoms in the acute form vary according to susceptibility and virulence. While well marked cases usually

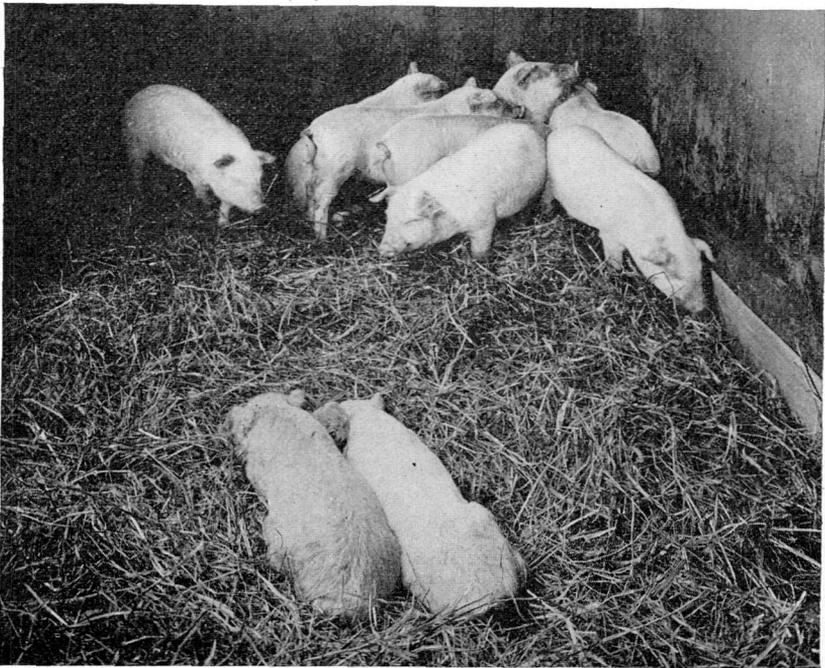


Fig. 2.—Early Evidence of Hog Cholera. Note Position of Two Sick Pigs in Foreground. (From Farmers' Bulletin 834, B. A. I.)

present a rather uniform type of symptoms and course, yet we find young pigs under six months are usually the first to exhibit signs of sickness and likewise are first to succumb. It is therefore not uncommon to find one or more young pigs dead as the first evidence of the disease in a herd. Where sickness is evident, one, two or more will be found separated from the herd (fig. 2) and if the weather is cold these will be huddled together and are disinclined to move; if compelled to rise they seem to be gaunt and listless. Many frequently cough. The temperature at this stage is usually high—105 to 107°F. The normal temperature is 102°F. The bowels are at first constipated and feces streaked with blood. On the second, third or fourth day constipation gives way to profuse and fetid diarrhea which lasts thruout the duration of the disease which is from two to eight days, the fetid odor being highly characteristic. Where death is delayed, a percentage of cases show marked discoloration of the skin on under surface of body, thighs, inside of fore legs, ears and snout. During the course of cholera hogs usually reject feed, but will frequently drink cold water freely. A few hours preceding death the internal temperature usually falls to normal or even lower. Older hogs withstand the acute attack somewhat longer than shoats. Eyes are usually gummed up with gluey discharge and breathing increased.

Chronic. Chronic cholera usually succeeds the acute type and shows itself in a modified continuance of the attack and may run a course lasting over weeks or even months, in which pigs do not regain their normal health and vigor but remain emaciated. The hair usually peels off and in some cases the skin dies in patches and sloughs, leaving open, raw sores. There is frequently a harsh cough, with increased breathing.

APPEARANCE AFTER DEATH FROM CHOLERA

The recognition of hog cholera with any degree of accuracy is frequently dependent upon post mortem evidences, and those are frequently similar to post mortem changes found in other diseases in a general way. In conducting post mortem examinations it is better to adopt a regular uniform system and examine each part in its natural position as nearly as possible, and immediately after death. The surface of the body should be carefully inspected for evidence of discoloration. These discolorations consist of highly colored markings on the under side of the belly, inside of thighs and fore legs, ears and snout, and

when present are very characteristic of cholera. They must not, however, be confused with reddening on the under side of the body from dead carcasses remaining on the ground several hours after death. The discolorations are those of reddening on the outer edges of discolored areas, becoming deeper in color toward the center and assuming a deep birth-mark color. The absence of these discolorations must not be regarded as proof that cholera does not exist; in fact noticeable symptoms are rather rare in cases which are so acute as to succumb the second to fourth day.

Upon opening the body, note the color of the lymphatic glands in the region of the throat. In cholera these are a deep red color. This condition of lymphatic gland congestion will be found thruout the body wherever encountered, especially the lymphatic glands attached to bowels.

Lungs.—If involved, the lungs usually present highly characteristic changes. These inflamed areas terminate very abruptly, the line of demarcation being sharply drawn. Several such inflamed areas may be present on one lobe of the lung. Again, the surface of the lungs is usually dotted with bright red spots varying in size from a pinhead to that of a small bean. The covering and the upper valves of the heart may also be similarly marked.

Stomach.—The lining of the stomach and the intestines is usually dotted with inflamed areas, and these are generally present thruout the lining of the intestines. The termination of the small bowel where it enters the large bowel presents typical button-shaped ulcers, especially in cases where death has been delayed a few days. These ulcers are highly evident of cholera, and are extremely rare in any other condition. Bowel lymphatic glands are of deep red color.

Liver.—There is little or no diseased alteration of the liver.

Spleen.—Upon the surface of the spleen bright red specks are frequently present. It is usually enlarged, softer in texture, contains an abnormal amount of blood, and is darkened in color. The normal spleen in the hog is about six inches long, one to two inches wide and half an inch thick in its thickest part, and is scarlet color in health.

Kidneys.—It is in the kidneys that we find perhaps the most typical evidence of hog cholera and the one above all others, in the writer's opinion, upon which positive conclusions are to be based. The kidneys should be carefully removed from the

body. With a sharp knife split the delicate capsule in which they are contained and peel it off; then carefully inspect the exposed outer surface of the gland for small bright red spots not larger than a pin point. The presence of even one, two or half a dozen such specks on a kidney affords the best evidence of cholera. In many cases where death has been delayed from six to ten days from the first noticeable symptom it is not unusual to find the kidney all spotted up (fig. 3), but the absence of such extensive markings must not be regarded as no evidence of cholera. While engaged in serum production the writer has rarely seen a typical cholera post mortem without kidney spots, and has found only one other condition (Anthrax) in which these are present.

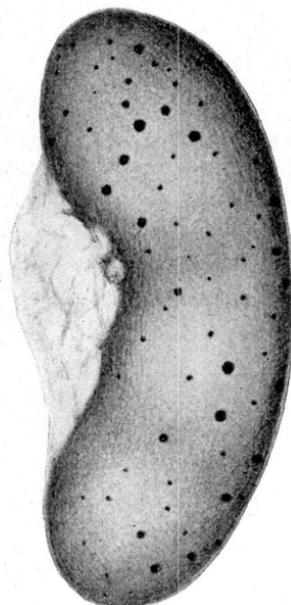


Fig. 3.—Kidney Spots Showing Evidence of Cholera. (From Farmers' Bulletin 834, B. A. I.)

MANAGEMENT OF HERD DURING OUTBREAK

Immediately upon the outbreak of hog cholera in a herd, healthy animals should be vaccinated and removed to non-infected quarters and proper quarantine established. They should be well supplied with good drinking water. The feed should be light in character and of exceptionally good quality, such as grain, milk, clean swill, and green fodder. All unnecessary excitement should be avoided. All dead animals should be burned and the premises which they have occupied thoroly cleansed and disinfected.

TREATMENT OF HEALTHY HERD

While it is desirable to treat healthy herds as a safeguard, the same general principles must be observed, viz., avoid excitement or overheating, and insist upon careful handling, and above all be liberal in the use of serum and virus. Better err on the side of safety by the extravagant use of serum than on the side of economy, which is usually expensive in failures from underdosage.

PREVENTION BY VACCINATION

Two methods of vaccination have been adopted—the single or serum alone treatment, and the serum simultaneous method. The former consists of injecting a dose of serum only, which affords only temporary protection extending over a period of a few weeks at most, while the latter consists of a dose of serum and also of virus at the same time but in different parts of the body. The simultaneous treatment properly handled affords permanent immunity and to animals so treated permanent protection against cholera.

Much judgment must be exercised in the selection of suitable sick animals for vaccination to avoid disappointing results. The writer concluded from personal observations that animals showing evidence of cholera rarely yield to serum treatment, but that a satisfactory saving could be made by the injection of large doses of potent serum even when the temperature was high, with no other evidence of cholera existing. We recall one special herd so treated, consisting of about 100 animals, in which several had died of cholera. Those animals which were visibly sick and had high temperatures all died; 60 percent of those showing high temperatures only were saved, and 100 percent of those showing no evidence of sickness with no rise of temperature lived, as did also two healthy, unexposed shoats which were vaccinated and turned in with the sick hogs.

PRE-VACCINATING PRECAUTIONS

Certain precautions must be observed in order to insure satisfactory results. Hogs to be vaccinated should be handled gently and above all avoid excitement or overheating, for experience has shown that recently treated hogs when immediately driven and become heated lose the desired immunity very quickly, and in fact a few die from the actual results of serum injection. Pregnant sows require careful handling, on general principles. Where large numbers of hogs are to be vaccinated the same day, it is best to separate in smaller lots of about 25 each, thereby lessening the period of close confinement and a corresponding lessening of excitement.

Site of injection should be thoroly cleansed with soap and water and bathed with tincture of iodine. Hands of operators



Fig. 4.—Proper Method Holding Small Hog for Flank Injection. (Original)

should also be thoroly scrubbed; instruments sterilized and not again allowed to come in contact with contaminated matter.

Syringes or needles should not be immersed in antiseptic solutions between injections of either serum or virus, but preferably returned to a normal salt solution between each operation. Such a solution is easily made by dissolving one ounce of coarse salt to a gallon of boiling water, and used cold.

LOCATION OF INJECTION

The locations most commonly selected for vaccinating are the loose tissue about the flanks (fig. 4), under the fore legs (fig. 1), and behind the ears. Heavy stock, especially pregnant sows in which it is undesirable to cast, may be snubbed up by a snubbing rope and injected in the loose tissue on sides of neck and behind the ears (fig. 5.). It is unwise to inject very large doses all at one spot or yet to inject cold serum. This may result in failure to absorb readily and cause an abscess or slough.

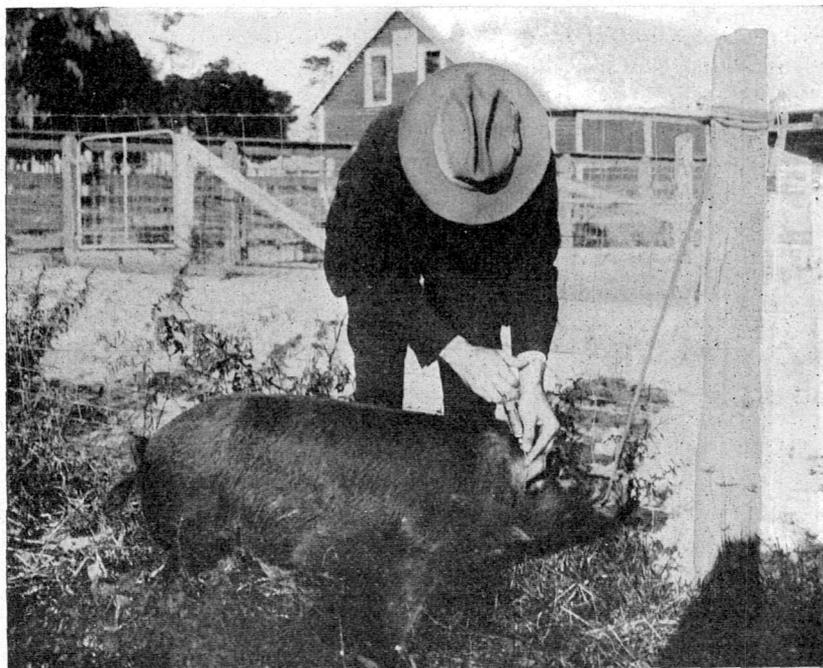


Fig. 5.—Proper Method of Snubbing Heavy Hogs for Vaccination.
(Original)

Virus also must never be injected in the same place as serum; the former would be neutralized and permanent immunity lost.

WHERE VACCINATION FAILS

From time to time reports become circulated of the evil or unfruitful results of vaccination, and these can easily be traced to the proper error. Where vaccinated pigs are subjected to excitement and overheating prior to and subsequent to treatment, desired results are not obtained. We have previously referred to the varying degrees of susceptibility existing in different animals both in the individuals and strains of virus. This can be accounted for largely by the past history. Undoubtedly a degree of immunity against disease is inherited. The progeny of immune sows certainly resist highly potent virus while they are sucking, and gradually lose that protection in later life, while those removed from infection for several generations are highly susceptible. Again, while serum is carefully standardized, the serum test pigs upon which the serum is tested against virus may be and usually are from sections where cholera has

existed for a long period and recurs annually, or are the progeny of immune sows. Consequently they are not so highly susceptible. Most of the serum-producing plants in this country are operating in strictly hog raising sections where cholera is most prevalent, and where wholly susceptible stock is practically unobtainable.

Again, virus varies greatly in its degree of virulence. We have personally handled strains of virus which would develop cholera with the greatest regularity on the third and fourth day, while others would fail to produce the same results in three times that period. Therefore, we recognize three conditions which cannot be foreseen in hog vaccination:

(1) Extreme susceptibility of pigs; (2) impotent serum or one not fully up to standard; (3) unduly virulent virus.

Any one of these conditions alone against an ordinary standard dose of serum would be hazardous. Any two of the above named conditions would induce a percentage of cases of cholera; while all three would certainly bring about the development of cholera in a previously healthy herd.

Having discovered these conditions in actual practice, we have heretofore advocated giving a dose of serum alone first, followed in ten days by full serum simultaneous treatment. We now believe this method can be greatly improved upon by largely increasing the dose of serum and at the same time give a liberal dose of virus instead of making two operations. We believe it is a mistake in field practice to curtail the dose of virulent blood with a view of lessening the risk of bad results, for by this practice we are liable to fall short of permanent immunity.

With regard to permanent immunity induced in very young pigs, we are in grave doubt, but have no data at hand to substantiate that belief. We do know, however, from actual test that young sucking pigs, the progeny of recently immuned sows, will withstand the injection of highly virulent blood alone, but question permanency of immunity conferred by that method. It is safe, however, to believe that serum simultaneously treated pigs of 80 to 100 pounds will resist infection thruout their lifetime.

EFFECT OF TREATMENT ON PREGNANT SOWS

The Bureau of Animal Industry has published carefully compiled statistics, and state that out of 3235 sows treated with serum alone in infected herds, 8 percent aborted, and that of

1357 given simultaneous injection 7.2 percent lost pigs, and of 126 serum alone treated sows in exposed herds 1.5 percent aborted and none of the 38 simultaneously injected animals lost their pigs. With regard to the effect produced on fertility, it has been found to have approximately no effect, as 95 percent of 2362 sows were successful producers after serum and virus treatment, while 94 percent of 1840 untreated sows also bred successfully. Immune sows produce immune pigs, and these retain their immunity until weaned.

MOST RECENT FINDINGS

The writer has just received the latest published information on investigations by the Bureau of Animal Industry concerning sources and channels of infection in hog cholera, and we take the liberty of reprinting verbatim the summary and conclusions of these findings.

“Altho the data obtained from these experiments is not sufficient to warrant sweeping conclusions, the results are nevertheless quite suggestive, and they serve to bring out some interesting points which may be summarized as follows:

“(1) The eye and nose secretions, the blood, the urine, and the feces of cholera-infected pigs were tested on the first, second, third, fifth, seventh, and ninth days after infection. When injected, the eye and nose secretions and fecal suspensions were found to be infectious on the third day; the urine was quite regularly infectious by the fourth or fifth day and the blood was infectious as early as the first day. When fed and when scattered in pens, the freshly collected secretions and excreta were noninfectious as a rule. Secretions and excreta which are held at room temperature (60° to 85°F.) for 24 hours remained infectious when injected. When the secretions and excreta were held at the same temperature for 48 hours the urine and feces remained infectious, but the eye and nose secretions were no longer so. It might appear, therefore, that outside the animal body the virus in the eye and nose secretions succumbs more quickly than the virus in the urine and feces, but such a conclusion is not justified by these experiments, as the virus from the eye and nose was allowed to dry on swabs. This point requires further study with the virus from the different sources held under identical conditions. Finally, it should be noted that the eye and nose secretions may be infectious before there is any visible discharge from the eyes or nose.

"(2) Susceptible pigs were exposed by association with cholera-infected pigs for 48-hour periods on the first, third, fifth, seventh, ninth, and eleventh days after infection. With the exception of those exposed on the first and second days—that is, during the first 48-hour interval—all of the exposed pigs contracted hog cholera. Other pigs which were exposed to cholera-infected pigs at 17 and 21 days contracted hog cholera. Cholera-infected pigs therefore may transmit the disease by contact at practically all stages of the disease, even in the period of incubation, before the appearance of visible symptoms and before the animal can be recognized as sick.

"(3) Susceptible pigs were exposed by being placed in pens with pigs which had suffered from typical attacks of hog cholera but had recovered. Other susceptible pigs were inoculated with blood drawn from the recovered pigs. Four recovered pigs were tested in this way to determine whether they harbored the virus of cholera within their bodies and might act as carriers of the disease. None of the pigs exposed to the recovered pigs, either by association or by blood injection, developed hog cholera. The exposed pigs were later proved to be susceptible by virus injection.

"(4) Susceptible pigs were exposed for long periods of time to pigeons, which passed daily from a heavily infected pen only 10 feet away and which contained sick and dying pigs, to a pen containing susceptible pigs. The exposure in these experiments was severe, as the pigeons were afforded every opportunity to carry the infection over a very short distance. Notwithstanding this, none of the exposed pigs developed cholera. All of the exposed pigs were later proved to be susceptible either by virus injection, by association directly with sick pigs, or by exposure in an infected pen. These experiments extended thru the fall and well into the winter. While the assumption would hardly be warranted that pigeons never convey hog cholera, it does not seem likely that they are often concerned in the spread of this disease.

"(5) Rats were fed on the meat of cholera hogs for periods of 5 to 21 days. The rats were then killed, their entire bodies chopped up, mixed with bran mash, and the mixture was fed to susceptible pigs. None of the pigs thus fed contracted cholera. The pigs were proved to be susceptible by subsequent virus injection."

DISEASES RESEMBLING HOG CHOLERA AND FOR WHICH IT MIGHT BE MISTAKEN

There are a number of diseases that affect the hog in very much the same way as does hog cholera. However, such troubles, which are non-infectious, do not extend beyond the herd or herds first attacked, or animals fed under same or similar conditions. As the loss from these causes is frequently large, any one of the following might easily be mistaken for hog cholera.

NECROBACILLOSIS IN PIGS

This rather common and largely overlooked infectious disease of pigs assumes various forms according to just what part of the body is attacked. The form most prevalent among the hogs in Florida is confined to the intestinal tract and known as necrotic enteritis, and is often mistaken for cholera. This condition is observed only in pigs from about six weeks to seven months of age. The organism *Bacillus necrophorus*, which produces this condition, inhabits the intestinal canal, and being expelled in the fecal discharge, develops and flourishes in damp unsanitary places. When introduced into a wound either on the body or in the digestive tract, it produces its characteristic necrotic (dead) lesions.

Symptoms.—To the casual observer the disease resembles cholera, but a close study and an accurate diagnosis, together with post mortem evidence, will distinguish the difference. The animals are depressed, appetite is in abeyance or wholly wanting, the pigs become unthrifty, emaciated and weak. Diarrhea may be present early in this form, but lacks the characteristic odor peculiar to that of cholera. The temperature is generally normal or subnormal, mortality exceedingly high. Post mortem evidences are chiefly confined to the lining of the bowels, which show characteristic grey raised patches which can be readily scraped off, exposing a collection of cheesy substance. When these areas are extensive, absorption of the food for the sustenance of the body is interfered with and the animal dies from lack of nutrition.

Differential Diagnosis.—Absence of uniformly high temperatures, skin discoloration, button-shaped ulcers confined to the ileocecal region and characteristic kidney specks serve to distinguish the disease from cholera.

Prevention.—Prevention consists of better sanitation and the destruction or removal of infected surroundings. Nearby mud puddles should be filled, old wooden floors and troughs removed, or preferably new quarters provided. There should be a rigid separation of the healthy from the diseased animals, and reliable disinfectants used freely. Lime freely applied to pens, lots, etc., will be found effective.

CAUSTIC POISONING

A condition that is by no means uncommon among swine which are fed town-collected garbage is caustic poisoning. This poisoning comes from the too free use of caustic soaps in dish-washing, where it finds its way into the garbage cans.

Symptoms.—The symptoms produced by caustic poisoning are very similar to those of hog cholera. Animals, regardless of age, are taken suddenly ill, refuse feed, have unquenchable thirst and exhibit high fever. Early in the attack diarrhea asserts itself, and it is frequently blood-stained. Mucous membranes of mouth and anus are frequently highly inflamed; vomiting frequently present; death taking place on second, third or fourth day, depending upon the amount of poison taken in and its concentration. When confronted with this condition in a herd of swine, the source of feed should be carefully considered and examined.

The writer has witnessed rather widespread loss from this cause where hogs have been held in quarantine as cholera suspects, and where an examination of their feed has revealed portions of cans of undissolved caustic in the swill.

Post Mortem.—Examination after death due to caustic poisoning is usually confined to those portions of the mucous membranes of the mouth, throat, oesophagus, stomach and bowels which have been inflamed by the caustic action of the poison. There is an intense inflammation extending from mouth to anus.

Treatment.—First remove the cause. As the offending caustics are highly concentrated alkaline substances, dilute acids should be administered in a drench to animals so affected. Vinegar is good for this purpose and should be given in half ounce doses highly diluted. This should be followed by a dose of castor oil, and for a 100 pound hog, 1 to 3 ounces is a dose, after which give 20-grain doses subnitrate of bismuth with five to ten grains

powdered opium every eight hours until relief is secured. Abundance of cool drinking water will also materially assist. The feed should be of a light, easily digested nature. Milk, oatmeal and green material are good feeds for animals so affected.

INDIGESTION

This condition in hogs is usually associated with faulty feeding and can be traced to errors in diet, such as allowing musty grain, rotten fruits and vegetables, or over-stimulating concentrated feeds to be devoured in large quantities.

Symptoms.—Vomiting is far from uncommon; bowels are irregular in their action—at times constipated and again loose; condition falls off rapidly.

Treatment.—In the management of this form of indigestion strict attention must be given to the character of the feed. It should be given at regular intervals and in moderate quantities, which, together with sanitary surroundings, is usually all that is called for.

Twenty-drop doses dilute hydrochloric acid (not concentrated) to each 100 pound hog assists digestion in such cases. Constipation is assisted by injection of warm water and proper diet rather than by purgatives. Buttermilk is good for hogs bothered with indigestion.

ACUTE YELLOW ATROPHY OF THE LIVER

This is a very acute and fatal malady affecting hogs, especially under southern conditions, and is due to constant feeding on over-rich and concentrated feeds. This is especially true when such feeds have been grown under conditions favoring vegetable bacterial development which possess poisonous substances either in toxines or alkaloids. The functions of the liver are important and well understood, and among these none are more important than its ability to attract and arrest poisons, which when in excessive quantities, overcome its function.

Causes.—Highly concentrated and fungus contaminated feeds given for long periods, and stagnant drinking water containing animal and vegetable decomposition, are the usual causes of this disease.

Symptoms.—In the lower animals the accurate diagnosis of liver diseases is difficult and poorly understood, consequently frequently overlooked sufficiently early to be of use. The earliest indications of liver congestion leading to atrophy is a general dullness with loss of appetite. In hogs the ears are drooping and the head depressed, the eyes are dull and sunken, with frequent collection of mucus. The visible mucous membranes are yellowish (jaundiced), the bowels are constipated and the urine highly colored (brown or yellow). As the stomach and upper intestinal tract is irritated, there is a tendency to swallow such foreign substances as earth and sand in large quantities, which leads to vomiting and diarrhea. The latter usually hastens death. Death usually takes place in from three to ten days from first noticeable symptoms. The mortality is very high.

Post mortem evidence of atrophy of the liver is usually confined to the liver and its surrounding. The gland is shrunken in size, solid to the feel, and is heavy in weight, and of a deep yellow color. There is frequently patches of congestion of the bowels. The spleen is frequently three or four times larger than normal, and in cases we have personally opened, the stomach contained large quantities of sand. Its mucous coat is pale in color; peritoneal fluid is over abundant, and of a yellowish bloody color.

Treatment is limited to preventive measures. When such conditions are revealed by clinical evidence or post mortem findings, no time should be lost in examining the character of the feed and water. A mixed diet rather than one highly concentrated must be substituted. Green feed, velvet beans, potatoes, etc., should be selected. Drinking water should be provided from unquestionable sources, preferably from deep wells or running streams.

Differential Diagnosis.—Atrophy of the liver may be distinguished from hog cholera by the absence of uniformly high temperature at the offset of the former, by the uniform persistent diarrhea of the latter, together with its characteristic odor; by the jaundiced colored mucous membranes of liver atrophy, and general post mortem findings, which are chiefly confined to the liver in atrophy; and absence of kidney spots and bowel ulcers, which always go with cholera.

INTERNAL PARASITES

Of all domestic animals, the hog suffers most from ravages of worms, which in a southern climate is a severe handicap in successful hog raising.

ROUND WORMS
(*Ascaris suilla*)

This round worm which inhabits the intestinal canal is probably the most common found in the hog, and except they are present in large numbers, rarely give rise to symptoms which would lead to a suspicion of their existence. The adult worm is round, about six to ten inches in length, is a pinkish or yellowish white, and tapers at both ends. (Fig. 6.) They are not blood suckers but feed upon the intestinal contents.

Symptoms.—When in large numbers this parasite gives rise to a chain of symptoms suggestive of its presence, such as unthriftiness, loss of appetite, diarrhea, and the passage of worms in the feces. Colicky pains with occasional nervous disturbances may in extreme cases be exhibited.

Treatment.—In order to successfully combat the ravages of worms, as with all parasites, it is necessary to cut off the source of supply. See that no stagnant water is used for drinking purposes. Fresh water should be available, with clean quarters. Several remedies can be used, but the writer has found excellent results from the use of the following mixture:

Fresh powdered areca nut.....	2 parts
Fresh powdered worm seed.....	2 parts
Fresh powdered kamala.....	1 part

Dose for a 100 pound hog is a heaping teaspoonful once daily in sloppy feed until four to six doses have been given. All fecal matter should be collected and burned during and immediately following treatment. Good results can also be obtained from 5 grain doses each of calomel and santonine per 100 pound weight daily or every second day for three or four doses. This

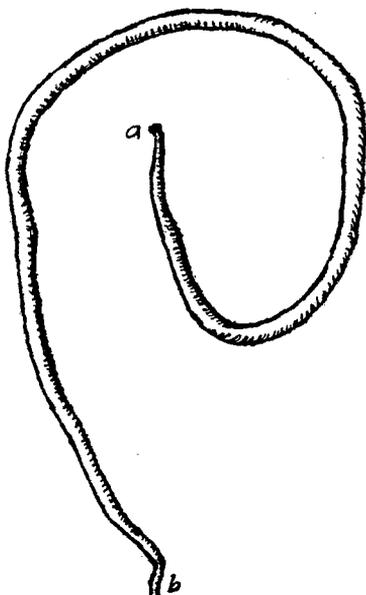
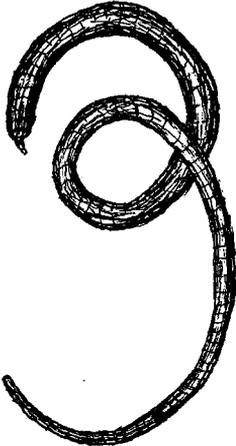


Fig. 6.—Round Worms (*Ascaris suilla*) (From Lynch's Diseases of Swine.)

should be mixed in meal and each animal dosed separately. Spirits of turpentine is also an active destroyer of worms and should be given in half ounce doses for hogs of 100 pound weight. Its use must not be long continued on account of its toxic effect upon the kidneys. Whatever treatment is pursued, success will only follow in protecting hogs against renewed infection by placing them in non-infected quarters and supplying good sound feed and clear uncontaminated drinking water.



THORNHEAD WORM
(*Echinorhynchus Gigas*)

Another important intestinal worm found in southern hogs is the thornhead worm, which is a parasite of hogs only. This is a large, round worm, the female measuring from 8 to 12 inches; males 3 to 4 inches. (Fig. 7.) This round worm differs from others in that it fastens itself securely into the lining of the bowel.

Fig. 7.—Thornhead Worm (*Echinorhynchus gigas*). (From Newman's Animal Parasites)

Life History.—Adult female lays its eggs in the bowels of the hog, and from here passes out to the ground. These eggs are eaten by the white grub worm, and here the eggs hatch and pass thru their larva and pupation stage. The grub worm is eaten by the hog, liberating the young worm which again becomes the adult parasite.

Symptoms.—As with the round worms, the presence of considerable numbers of thornhead worms are necessary to produce symptoms of digestive disturbances. The pig loses flesh; is usually nervous; has variable appetite; constipation is alternated with diarrhea. Nervous symptoms may be marked by extreme irritability, twitching of the muscles of the neck, convulsions resembling epilepsy, which if severe may result in death.

Post Mortem.—Post mortem reveals numerous ulcers of the bowels, which should not be confused with those of the ulcers of hog cholera. Those of the thornhead worm are found along the course of the small intestines, while those of cholera are most severe at or near the ileocecal valve.

Treatment.—Prevention here plays an important part. Keep the animals away from old lots and manure piles where the grub worm is common; rather feed hogs on plank floors or new pastures.

Turpentine has been found to be very destructive to this parasite, but is open to the objection of irritating the kidneys if used too long. A good practice is to give from a teaspoonful to a tablespoonful spirits of turpentine once daily for three doses and follow with a brisk purge of castor oil. As these agents mix readily with milk their administration should not be difficult to hungry hogs.

When it is desired or necessary to drench hogs, great care must be exercised to avoid choking. The writer has found that by snubbing hogs up by a rope attached to the upper jaw, holding the head moderately low, and passing the fluids gently back on the tongue from a small metal dose syringe equipped with a five inch pipe, the operation can usually be performed with a fair degree of safety.

SUMMARY

Hog cholera is a highly communicable disease of swine and is due to one cause only, the introduction of an unknown filterable virus into susceptible subjects. This is materially aided by such influences as lack of good sanitation, overcrowding, undue exposure to sick and other immediate surroundings. The disease runs a definite and usually fatal course. Immunity to the disease by either natural or artificial influences is permanent in all but the very young. The success with which it is handled depends wholly upon an early and accurate diagnosis which must be based largely upon the history of the invasion, coupled with a chain of specific symptoms and post mortems heretofore outlined. These briefly summed up are high temperatures, constipation, subsequented by persistent fetid diarrhea, discharge from eyes, cough, etc., with uniform congestion of the lymph glands of the body, characteristic button-shaped bowel ulcers in the ileocecal region, and kidney specks.

Hog cholera is to be distinguished from a variety of dietetic disorders and poisoning from alkalies and possibly other chemicals which may find access to the feed. Powdered soap has been found to produce a series of symptoms closely resembling those of hog cholera.

As between chronic cholera and a severe infestation of intestinal worms, one must be guarded in a too positive diagnosis. The general outlook is closely associated as regards symptoms. The presence of large numbers of worms in the bowels justifies active measures against those in any case. The past history of

the herd will assist in a diagnosis, for all cholera outbreaks are marked by considerable loss, especially at the offset, with many or all the post mortem evidences, especially ileocecal ulcers and kidney spots.

IMPORTANT SUGGESTIONS

Locating the hog lots and pens away from public highways and running streams.

Avoid visiting farms where sick hogs exist, and restrict traffic as much as possible to your own pens and yards.

Do not expose healthy herds to freshly purchased stock until a long period of quarantine has been made, say thirty days.

In case of an outbreak in your herd, vaccinate promptly, and under best possible conditions.

Be liberal with the dose of serum.

Burn dead animals and make free use of disinfectants, 2% to 3% cresol.

One of three things is accomplished by vaccination—nothing, immunity, or hog cholera.

CAUTION

Hog raisers are earnestly cautioned against the adoption of much advertised so-called guaranteed cures and preventive measures against cholera other than officially tested hog cholera serum. These remedies have been fully tested as they have appeared on the American market, none of which have proven the claims made for them by their makers. There is no known remedy which will protect or immunize hogs against cholera except the anti-hog cholera serum.