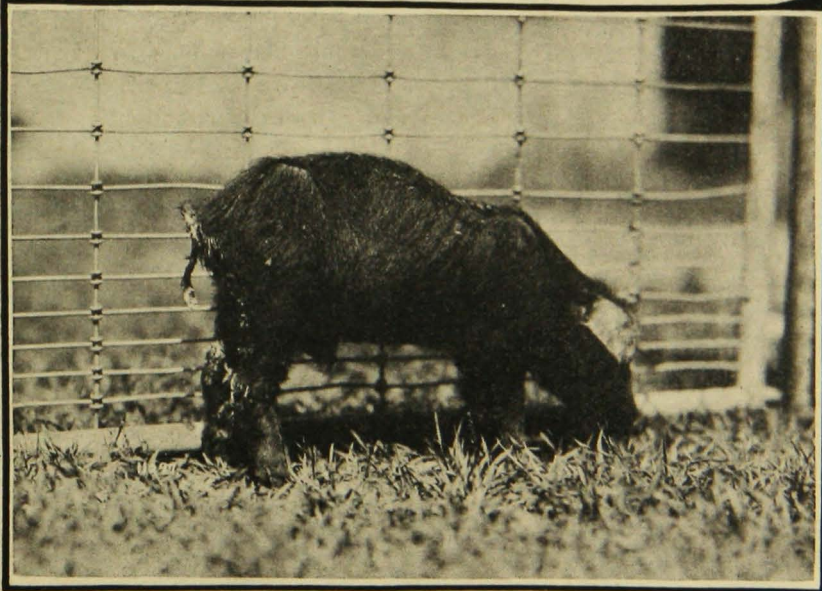


# "Necro" in Swine

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A CHRONIC CASE OF NECRO (INFECTIOUS NECROTIC ENTERITIS)

UNIVERSITY OF MINNESOTA  
AGRICULTURAL EXTENSION DIVISION

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**A**N analysis of the name used to designate this disease, infectious necrotic enteritis of swine, reveals in a general way some of the important characteristics of the disease. **Enteritis**, according to a standard dictionary, means an inflammation of the intestines. **Necrotic** is defined as pertaining to necrosis, and necrosis, we learn, means death of a tissue. Finally, **infectious** denotes that the disease is communicated by infection, and infection is understood to mean one or more species or varieties of micro-organisms, germs, or bacteria. Infectious necrotic enteritis of swine, therefore, is a disease of the intestines of swine, which is characterized by the death and destruction of some of the tissues of the intestine and is caused by a germ or germs.

While infectious necrotic enteritis is the scientific and correct name for the disease, the term "necro" is in more common usage. Necro is a slang short cut of the true name. An example of a parallel case is the use of "T. B." for tuberculosis. Necro, however, is also known and described under such names as intestinal necrobacillosis, infectious diarrhea, necrotic enteritis, diphtheritic enteritis, infectious colitis, pig typhoid, and gut rot.

Necro is becoming more prevalent and widespread in Minnesota from year to year. This is also true in the other states of the corn belt and of the United States in general. The number of farms on which this disease occurred ten or more years ago was less than the number affected now. In addition to a wider distribution of the infection, its virulence, or its power to produce disease, has apparently increased. It appears that necro is not influenced by any climatic differences. The disease, with all its characteristics, is found to occur in the colder as well as the warmer climates. Necro is just as severe in the northern sections of Minnesota as in the southern. In fact, more cases of necro are known to occur in the southern and central portions of Minnesota than in the northern, and it might seem that the disease is particularly adapted to these sections. However, this is not true. The chief reason for the greater number of cases in these areas is because the number of swine in the southern and central portions of Minnesota is much greater than in the northern sections.

Swine of all breeds are susceptible to necro. There is no evidence to support the contention that some breeds or strains of swine are less susceptible than others. Statements to the effect that one breed of swine is able to resist this infection more than some other breed are often made by persons eager to sell certain animals. Such statements are made when they are known to be untrue.

While it is reasonable to assume that swine which are receiving a wholesome, nutritious and well-balanced diet are better able to resist or withstand necro than swine which are receiving a poor and inade-

quate diet, it is not uncommon for swine that were receiving a very good diet to become sick and die of necro. The other extreme is also true. For example, cases have come to our attention where only a few of the pigs in a drove were sick with necro, and the diet which they were receiving was inadequate and unsatisfactory. Whereas these conditions have been pointed out to show that food as food is not primarily responsible for infectious necrotic enteritis in swine, it should nevertheless be kept in mind that foodstuffs are a large factor in connection with the health, vigor and vitality of an animal.

Necro occurs in pigs of from 30 to 90 pounds in weight more often than in smaller or larger swine. Pigs of this size and age seem to be more susceptible to the disease. This, however, is not always the case. Pigs that are but a few weeks old sometimes become affected. Necro occurs frequently in the more fully grown and mature hog. This is especially true of those weighing from 100 to 140 pounds. Our experience indicates that the disease occurs more often in pigs more than 90 pounds in weight than in pigs of less than 30 pounds.

### CAUSE OF NECRO

The principal causative agent of necro in swine is a germ. This germ is known to bacteriologists, veterinarians, and others as *Samonella suispestifer*. Like many other germs it is a very small, rod-shaped organism which is visible only under the microscope. Strangely enough, it was this organism that for many years was believed to be the definite cause of hog cholera. It has been proved, however, that *S. suispestifer* is not the cause of hog cholera. While this germ is the primary cause of necro, the disease is very frequently associated with another germ which produces much injury to the tissues, especially those lining the large intestines. The latter is the germ known as *Actinomyces necrophorus*. For a long time this organism was thought to be the chief causative factor of infectious necrotic enteritis in swine.

Altho the organisms just referred to are generally considered the principal causes of necro, there are certain contributory causes of more or less importance. The part which foodstuffs may have as contributory causes has already been mentioned. Pens in which the manure and litter are permitted to accumulate are insanitary, and as such have an influence as contributing factors. In like manner, yards and enclosures where filthy and dirty wallows and muddy pools exist are accessory factors. Manure piles, left in the yard where the swine have opportunity of trampling and rooting, must be viewed as an important secondary cause. Intestinal parasites or worms, such as those which inhabit the small intestines, cecum, and large intestines, play a part

in many cases. Similarly, protozoan organisms (microscopic animals) of certain kinds, may, when present in large numbers, produce conditions in the intestines which permit a greater opportunity for the necro infection to develop. Simple digestive disorders of unknown origin, which of themselves cause only temporary discomfort, may be the forerunner of a case of necro, providing the causative germs of necro are present in the intestinal tract at the time of the intestinal disorder. In other words, a simple indigestion may pave the way for the much more serious disease.

### SYMPTOMS OF THE DISEASE

The symptoms of the disease, necro, depend somewhat upon its course. In some cases the course of the disease is of short duration, whereas in others it extends over a rather long period of time. Cases of short duration represent the acute type of the disease, and those of long duration, the chronic type. In acute cases, pigs may show evidence of being sick for only three or four days before death, altho it is not unusual for the chronic cases to linger for two or three weeks. Some of the chronic cases live longer and not infrequently some recover. The recovery in some instances is complete so that the pig grows and increases in weight and eventually becomes marketable, tho in many cases the recovery is never complete and the pigs remain stunted or "runty."

The course of the disease in the greater number of cases is intermediate between the acute and the chronic types. The affected pig becomes drowsy and dull. The hair coat becomes lusterless and is harsh and dry. The skin appears dry and rough. A bluish discoloration of the skin is quite often observed. Evidence of weakness is noted as the disease progresses. This is manifested by a wabby and unsteady gait. In many cases there is a marked diarrhea, and the fecal matter may be streaked with blood or appear almost black. It has a very strong and offensive odor. In other cases evidence of constipation is observed and the feces are firm and sometimes have small pieces of yellowish tissue clinging to them. The temperature in the acute case rises to 106 degrees Fahrenheit and higher. This is also observed in the sub-acute cases during the stage when the disease seems to be most active. Towards the termination of the disease the temperature often drops below normal. The normal temperature varies from about 100 to 102 degrees. Affected pigs seldom stop eating entirely, altho the quantity of food consumed is greatly reduced.

## POST-MORTEM FINDINGS

Tissue changes which characterize necro are for the most part found in the large intestines. When the cecum and the colon are laid open with a knife, the lining membrane is covered with a yellowish-brownish-reddish exudate. Frequently this exudate is more or less evenly distributed over the bowel lining and again it is scattered over the surface in ulcer-like formation. The ulcerations vary in size from that of a ten-cent piece to larger than that of a silver dollar. The necrotic tissues are often very thick and almost completely occlude the bowel. In fact, it is sometimes so thick that if the bowel is cut crosswise it will not collapse. The lesions will at times involve the small intestine. The tissue changes occurring in the small intestine are similar to those just mentioned. The lining of the stomach is less frequently affected. The necrotic tissue changes are not present in the intestines in all cases. Cases are found in which the membrane lining the bowel is very red and a marked hemorrhagic inflammatory condition is observed. In some of these cases a considerable amount of blood may be found on the inside of the bowel. In addition to the changes in the bowels, the lymph nodes, especially those in the mesentery, are swollen, congested, and hemorrhagic. The centers of the lymph nodes frequently show evidence of degeneration and necrosis, which is characterized by a yellowish pus-like substance. The spleen is often very much enlarged and filled with blood. Tissue changes frequently occur in some of the other organs, but are not as a rule characteristic and typical of necro.

## TREATMENT AND CONTROL

The treatment for necro is unsatisfactory. In fact, there is no known treatment that will give uniformly satisfactory results in even a small percentage of unselected cases. By treatment reference is made to the cure of an animal already sick with the disease. Prevention and control of the disease give the most satisfactory results. What can be done with a drove of swine that are affected with necro?

One of the first things to be considered is isolation. It is quite improbable that the entire number of pigs in a drove are affected at one time. This, of course, depends somewhat upon the number of pigs in the drove or in the pen or lot where the disease exists. It further depends to some extent on the size of the pen, lot, or pasture in which the pigs have been kept. For example, if the number of pigs is small and the pen or pasture is large, then the probability that all are infected is not so great as when the number of pigs is small and the lot or pasture is small. Again, if a large number of swine are kept

in a comparatively small area, the chances for the spread of the infection are greatly increased.

There is, however, another point which must be considered. This is the matter of feeding and watering all the pigs at some particular concentration point. In other words, the pigs may have a large pasture in which to forage, but must come to one or two definite places for their food and water. Because the bowel discharges (feces) of affected pigs contain the infective matter and through this medium may contaminate the food of others, the opportunity of spreading the infection at such concentration points is great.



Fig. 1. A Portion of the Large Intestine from a Case of Necro (Infectious Necrotic Enteritis)  
The intestine has been opened lengthwise so as to show the inner surface or mucous membrane. This shows a great amount of necrotic tissue, spread more or less over the mucous membrane.

It is for the foregoing reason that infected pigs should be isolated or separated from the rest. Much of the success in the matter of control hinges on this. The isolation or separation means that there should be no physical contact between affected and unaffected swine. The sick and the healthy pigs should be separated and placed in separate pens, yards, or pastures. The importance of this is greatest when only one or two pigs of a drove are affected. It should be kept in mind that one pig sick with necro is a potential source of infection for other pigs of a drove. If the disease has progressed so that a large number of pigs in a drove are affected before the condition has been recognized, the problem of separation and isolation becomes more difficult. Under these circumstances it is advisable to leave the sick pigs in the lot where they are and remove those not affected to clean quarters.

The diet of pigs affected with necro should preferably be a wet or slop feed. Ground oats or barley fed as a slop has been suggested. It is further advised that the slop be made very thin for the first few days and then gradually be made thicker. The use of a milk diet, consisting almost entirely of skimmilk or buttermilk has given very satisfactory results, improving the physical condition of affected swine. This applies particularly to pigs that are in the early stages of the disease. Pigs that are receiving a milk diet should not be given any water, but should be allowed to consume all of the milk they will take. Nothing but milk is given them for several days, after which they are supplied with ground oats or barley mixed into a slop with milk.

Amounts of milk sufficient for this method are not always available, and it becomes necessary to use something else. The use of lye and copper sulphate has met with favor in certain sections of the country. There is always a certain amount of danger when giving such strong, irritating substances to animals with their feed. However, if one is

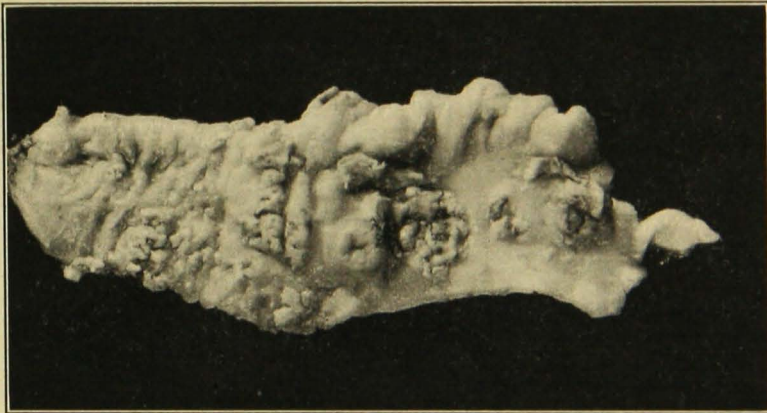


Fig. 2. A Portion of the Cecum and Colon from a Case of Necro (Infectious Necrotic Enteritis)

The intestine has been opened lengthwise so as to show the inner surface or mucous membrane. The necrotic tissue is in more or less isolated patches or areas.

careful about how they are used, the danger or harm becomes almost negligible. If these substances are used, the following directions should be followed carefully. One pound of lye and 1 pound of copper sulphate and  $\frac{1}{4}$  pound of common salt are dissolved in 1 gallon of water and boiled 5 minutes. Add 1 pint of this mixture to 15 gallons of water and stir thoroly. Then mix about 3 bushels of whole oats or barley with the 15-gallon mixture and allow this to soak for twenty-four hours before using. This feed can be continued for several days or two weeks, and even longer, when necessary. It should not be understood that these are specific cures for necro. In fact, as has

been stated, we know of no specific treatment for the disease. Cases are known in which the milk diet was used without beneficial results and other cases in which the lye and copper sulphate treatment was of no benefit. Still other cases are known in which both have been used at alternate times—the milk for several days and then the alkalinized food—and no improvement was evident. However, we have knowledge of cases that did not show any signs of improvement with the use of the milk diet, but that when this was discontinued and the alkalinized diet substituted, showed very satisfactory results. On the other hand, the lye and copper sulphate treatment was used in a number of cases without showing any appreciable beneficial results, and then when the milk diet was substituted, great improvement resulted. The point to emphasize is that if one method seems to fail, it should be discontinued and the second method tried. Both may fail, however, especially if the disease has progressed to a point where much injury to the tissues has already occurred.

Many necro treatments, remedies, and “sure cures” are advertised. The claims made for some are beyond reasonable comprehension. Because of the nature of the disease, the way in which the disease affects the tissues of the pig, it can not be expected that any treatment will produce satisfactory results in all cases. The swine grower is cautioned against the unscrupulous salesman who boasts, guarantees, and offers positive assurances for this or that remedy as a sure cure for necro.

### SANITATION IMPORTANT

The importance of sanitation in connection with the control of necro can not be emphasized too strongly. We believe it essential to call attention again to the fact that the bowel discharges of affected pigs carry great quantities of the infective and causative material. The necessity for draining and fencing off filthy or muddy wallows in the hog lot becomes more apparent when it is realized that they are a source of infection. Manure and other litter which is allowed to accumulate in piles in the lots and yards are another potential source of infection. It seems to be the delight of many pigs to step into, walk, or lie down in the water or feed trough, and frequently they will deposit manure there. When it is an affected pig that does this sort of thing, the opportunities of spreading the infection are many. It is for this reason that fountain waterers and feed troughs covered with slats or bars, which prevent the pigs from getting into the trough, are to be preferred. Utensils of this kind should be washed frequently and cleaned carefully.

The advisability of thoroly cleaning the pens and smaller lots or manure or litter should be removed and hauled to some part of the farm where swine and other animals will not come in contact with it. Scraping or skinning the surface soil to a depth of two inches is highly desirable. This can not always be done, but it should be done when feasible. If it is possible, after having removed the manure and top soil from the pen, to exclude all pigs from the particular area for at least two or three weeks, much will have been accomplished. One can not disinfect the soil satisfactorily, especially if the area is quite large. Sunlight is one of nature's most powerful disinfectants, and if the surface of the ground is cleared of all extraneous litter so that the sun's rays can reach it, much good will be done.

Pens and lots inside of a building require the application of a suitable disinfectant after they have been thoroly cleaned. It is important to get all of the dirt and filth from the corners and cracks and also the dried accumulations from the walls, gates, troughs, etc. Hot lye water is an effective washing compound to insure thoro cleaning of material of this kind. The mixture may be prepared by dissolving 1 pound of lye in 30 gallons of water. After a thoro cleaning with hot lye water, all surfaces should be washed or rinsed with clear water and then treated with a disinfectant. Compound solution of cresol is an efficient disinfectant when used in a 3 to 4 per cent solution. The mixture is made by taking 3 or 4 parts of the cresol and 97 or 96 parts of water. The compound solution of cresol mixes readily in water. It is non-poisonous to livestock in the strength suggested. A substitute for the compound solution of cresol, known as saponified cresol solution, has been prepared by many manufacturers. This product should contain approximately 50 per cent cresylic acid to meet the requirements as a disinfectant for use as outlined above. A liberal application of the disinfectant is recommended. One gallon of the saponified cresol solution to 30 gallons of water should be sufficient to disinfect about 500 square feet of floor space. Many other disinfectants suitable for stable disinfection are manufactured.

The disposal of all dead pigs is of great importance. The carcasses should be removed from the yards and burned or buried. Burning is the most satisfactory method of disposal. Swine carcasses will burn readily. The proper way to burn a carcass is to place it on top of the wood before igniting. Many make the mistake of piling the wood on the carcass. Much more wood is required to burn a carcass in this manner. The burial of a carcass is equally effective if it is properly done. The trench or pit in which the carcasses are to be placed should be so deep that the bodies will be at least three feet below the surface

of the ground when covered. However, before closing the pit with dirt, it is advisable to cover the carcasses with quicklime.

A question often asked by the owner of a drove of swine in which necro is prevalent is, "How was the disease introduced into the drove?" A concrete answer can not always be made. However, there are certain agencies which are looked upon as sources of the disease. As has been said, the infected pig is a dangerous spreader, and it is the pig harboring the causative agent of this disease that must be considered the principal source of the infection. The beginning of the disease in many outbreaks has been traced to the introduction of affected pigs. Because of this fact it is advisable when introducing swine from an unknown origin to keep them separated from the native pigs for at least three weeks. This is usually a sufficient time in which to observe whether or not any evidence of disease will make its appearance.

In conclusion, attention is again called to the fact that necro, or infectious necrotic enteritis, is a serious disease of swine. It is a disease for which there is no known remedy that will give satisfactory results in a majority of cases, and, therefore, it must be prevented and controlled, in so far as this can be done, by sanitation.