

# Gut Edema

*Dr. P. C. Bennett\**

THERE is little doubt but that the condition known as edema disease of pigs has been observed in Iowa since 1947. It may have been present even earlier. Records of the Iowa Veterinary Diagnostic Laboratory show that two pigs which were submitted for examination in June of that year were undoubtedly affected with edema disease. Since the condition was entirely unknown to the laboratory staff at that time, the recorded diagnosis of the case was anaphylaxis. The gross lesions which were noted and recorded at the time of autopsy, however, includes the finding of a severe edematous infiltration of the stomach wall. In view of the information concerning edema disease which has been accumulated since that time, it is significant that the 1947 case was submitted for examination with the suspicion that the pigs were affected with hog cholera. In order to obtain information on the possibility of a cholera infection, material from the submitted pigs was injected into two pigs secured by the laboratory, one of which was cholera immune, the other cholera susceptible. Observation of these test pigs failed to show the presence of any cholera infection.

Edema disease has also been known as gut edema and gastric edema and may be renamed when and if the cause is determined and the nature of the disease is better understood. It has been recog-

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nized in the swine raising areas of northern Ireland since 1932. It has also been recognized in England, Norway, Holland, Canada and the United States. It has apparently not been observed in Australia, Denmark or Sweden. According to Timoney<sup>1</sup> the disease was of only minor economic importance in Ireland less than 10 years ago, but during the years 1946 to 1949 it had become the most important cause of loss in young pigs. While it is still of minor economic importance in Iowa, the history of the disease in Ireland might be taken as a forecast of its importance here within the next few years.

At the present time the most significant feature of the disease here in Iowa is its confusion and coincidence with hog cholera. This is due to two commonly occurring features of edema disease. First, many pigs affected with edema disease show symptoms of a nervous nature such as staggering and incoordinated gait that are very similar to symptoms shown by pigs affected with cholera. Secondly, and probably of more importance, is the fact that edema disease has a marked tendency to affect pigs soon after weaning age. Since it is common practice to vaccinate weanling pigs for hog cholera, outbreaks of edema disease coincides with, or follows shortly after cholera vaccination. In these circumstances the question of diagnosis becomes of primary importance, and should be established as soon as possible.

While the majority of the cases of edema disease occur in pigs of the 8-14

weeks old group, it can and does occur in older pigs. Cases have been observed in the laboratory during every month of the year except, possibly, February.

One of the features of the disease is its sudden and abrupt appearance, followed by a comparatively short period of development of additional cases, and then its sudden disappearance. The history of many of the cases indicates that the pigs appeared perfectly normal during the evening, but that one or more were found dead the next morning. Quite commonly, additional cases may develop during the day on which the first cases were found dead, and for the next three to five days additional cases and losses may occur. Then, for no apparent reason, development of additional cases fails to occur.

### **Symptoms**

In addition to the staggering gait which was mentioned previously, other symptoms which may be observed includes swelling of the eyelids, due to the development of edema in these tissues, and in a few cases the development of edema in the throat area results in a slight swelling of this region. In some cases the nervous symptoms develop rapidly to a stage where the pig is found lying on its side with its feet and legs continually moving in running motions. Other symptoms may include all types of actions seen in convulsions. There is apparently no increase in body temperature or, if there is an increase, it must occur during the pre-clinical stages. Temperatures are usually found to be either approximately normal or slightly sub-normal. If the temperature is found to be significantly elevated, it is probably due to some secondary or concurrent condition. In experimental work Timoney reports the occurrence of only one individual which showed a rise in temperature.

### **Prognosis**

Timoney also reports that a 40 percent mortality rate in recently weaned litters is a common experience. In our contacts with cases in Iowa, such a mortality rate seems to be a little high. However, our

evaluation of the incidence of mortality is usually made on a herd basis rather than a litter basis. While no accurate figures are available, we do not recall any case in which more than one-third of the herd became affected. Even this high percentage has been very infrequent and the majority of Iowa outbreaks to date have averaged between 10 and 20 percent of the herd affected. A few of the visibly affected pigs may recover. However, the mortality rate usually runs rather high.

### **Post Mortem Findings**

Post-mortem findings are seldom as prominent as the sudden and dramatic appearance of the disease, or the violent nervous symptoms, might suggest. The usual findings include a small amount of fluid in the body cavities and pericardial sac, moderate edema of most of the body lymph glands, especially those of the inguinal region, and a tendency toward constipation, with the contents of the stomach and large intestine being slightly, to very much, dryer than usual.

Perhaps the most common lesion is the presence of an edematous area in the stomach wall. When cut, such an area has the appearance of a clear or serum colored gelatinous layer between the stomach mucosa and the outer wall. This gelatinous layer may vary in thickness from approximately one inch down to a layer which may be barely visible. It is commonly found along the greater curvature of the stomach in the cardiac portion, but may extend into the neighboring fundic and oesophageal areas. In some cases this gelatinous material is also prominent between the coils of the large intestine. Sometimes the wall of the rectum is found to be slightly edematous. The presence of this gelatinous infiltration of the stomach wall and the coils of the large intestine is considered diagnostic at the present time.

No test or diagnostic aid of any other kind has yet been developed for positive identification of the disease. Investigators in Ireland report the presence of sugar in the urine of a large percentage of cases; however, this does not appear in all cases and has not yet been used as a means

of identifying the disease. Also, their observations on the serum protein level of affected pigs indicates some degree of hypoproteinemia. However, like the urine sugar findings, the significance of the hypoproteinemia appears to need further study.

Other lesions, which may or may not be present, consist of varying degrees of hyperemia of the stomach mucosa and the intestinal mucosa, or perhaps a few cardiac hemorrhages. The liver, spleen and kidneys do not appear to be affected by the disease.

### Etiology (?)

The cause of edema disease is unknown. The observations and studies which have been made to date have resulted in the accumulation of information which is incomplete and somewhat confusing as regards possible cause and nature of the condition. The rapid increase in incidence of the disease together with its apparent spread from one locality to another suggests that it is of an infectious nature. The irregular scattered pattern of its spread, both in affected herds and in the locations of new outbreaks, and the sudden termination of an outbreak appears to contradict the infectious theory. So far only negative results have been secured in attempts to correlate bacteria, viruses, or known poisonous materials with the disease. It does not appear to affect any species other than the pig. Timoney has reported the successful reproduction of the disease by using the supernate from centrifuged contents of the small intestines of infected pigs and injecting it intravenously into susceptible pigs. So far other investigators have had only poor success in attempts to reproduce the disease by this method. However, Timoney's success indicates the possibility that the condition may be caused in a manner similar to enterotoxemia of sheep. Timoney demonstrated, however, that it is not the same as enterotoxemia since the use of enterotoxemia antiserum failed to protect pigs against edema disease.

Likewise, there appears to be no definite correlation between edema disease and the feeding program or the housing

and management practices. Many outbreaks do occur at the time of, or soon after, some change in the feeding program. However, there have been so many variations in such feeding changes that there appears to be no factor common to all of them and so far no one has been able to show a positive correlation between such changes and the occurrence of the disease. It is even very uncertain that the feeding and management changes have any contributory effect on the disease. Until the cause and nature of the disease has been determined, it is unlikely that a satisfactory method of treatment or prevention can be developed.

It is safe to assume that a long list of drugs, antibiotics and antihistamines have been tried on affected pigs with little or no results. Shanks<sup>2</sup> reports that he has his best results in the way of treatment by the use of magnesium sulfate. Since it is so often the best and fastest growing pigs which become affected, perhaps a sharp decrease in the amount of feed or some other change which would tend to slow down the rate of gain might be of value in preventing the development of additional cases. In addition, symptomatic and supportive treatment of various kinds might have the appearance of being of value and, in the absence of more complete information, they may have more actual value than is suspected at the present time.

1. Timoney, J. F., *Vet. Record* 62, (Dec. 9, 1950) 748-755.
2. Shanks, P. L., *Vet. Record* 62, (Dec. 9, 1950) 743-747.

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Vitamin-B<sub>12</sub> will not take the place of animal protein concentrates but will fit into our over-all supplies of essential supplements to balance rations.

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It has been found that intramedullary pins inserted into a canine femur will loosen in about four weeks and be capable of easy manual withdrawal before complete healing has occurred. The only solution seems to be the use of a wedge shaped intramedullary pin in place of the present round one.