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pork industry handbook

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Actinobacillus (Haemophilus) pleuropneumoniae

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Actinobacillus pleuropneumonia (APP) is a severe, often fatal disease of growing-finishing swine. It is caused by bacterium now officially known as *Actinobacillus pleuropneumoniae*. This bacterium was previously named *Haemophilus pleuropneumoniae*, and the disease it caused was called Haemophilus pleuropneumonia (HPP). The new name, *Actinobacillus* will be used in this article, but the disease remains the same potentially devastating problem for pork producers.

APP is worldwide in distribution causing significant economic losses to swine industries of many countries, including Switzerland, Canada, Venezuela, Mexico, Denmark, Brazil, Germany, Japan and the United States.

APP was first recognized in the United States about 25 years ago, but has not gained prominence until recent years. The occurrence of APP in the swine-producing areas of the United States has steadily increased in the last decade. For example, the Iowa State University Veterinary Diagnostic Laboratory reported only two cases of APP in 1976, but had 100 confirmed cases in 1980 and over 500 cases in 1987. Diagnostic laboratories from other swine-producing states have also reported significant increases in numbers of APP cases diagnosed during this time.

The identification of *Actinobacillus pleuropneumoniae* serotypes occurring in a given geographic region is important because the protection provided by *Actinobacillus pleuropneumoniae* bacterin is serotype specific. Twelve distinctive serotypes of *Actinobacillus pleuropneumoniae* have been identified in the world and it is likely that more serotypes will be identified in the near future. Seven of those 12 serotypes (1, 3, 4, 5, 7, 8 and 9) have been identified in the United States. Serotypes 1, 3, 5 and 7 have been reported in the midwestern states with serotypes 1 and 5 being the most frequent isolates.

Clinical Signs

Sudden death of apparently healthy pigs is frequently the first sign. This sudden death generally follows a stressful period (i.e. moving, mixing, rapid weather changes, poor ventilation). Death can occur in as short a time period as 8-12 hours after the pig is exposed to *Actinobacillus pleuropneumoniae*. There are reports that uninfected pigs held overnight at a slaughter plant with infected pigs can develop lesions before slaughter the next morning. Pigs of all ages are susceptible, but most commonly affected are those from 40 lb. to market weight. Apparently healthy pigs may develop labored breathing and die within minutes following as small a stress as movement to a new pen within the building. Bleeding from the nose at death may be seen in some pigs but is not a consistent sign. In less severe cases, infected pigs may have abdominal breathing (thumping), high fever (104-107F), depression, and reluctance to move. Coughing may appear but is not a major clinical sign in most cases. Pigs with these milder signs may die although many will survive. These survivors may have severely damaged lungs and be poor-doing pigs. Because the organisms are spread through the air by aerosol droplets, the number affected in a group can reach 100% with death loss approaching 20-40% or more if immediate and effective treatment is not instituted.

Diagnosis

A tentative diagnosis can be made based on a history of sudden death and respiratory distress, and typical gross lesions. However, a definitive diagnosis may require culture of *Actinobacillus pleuropneumoniae* from a typical lesion. Culture results are particularly helpful in classifying mixed pneumonia infections.

Lung samples should be cultured immediately after death for *Actinobacillus pleuropneumoniae*, but if that is not possible, samples of lung collected soon after death may be kept at refrigerator temperature for at least 2 or 3 days before being cultured at a local laboratory or before being mailed (packed with ice packs) to a distant laboratory for diagnostic tests.

Diagnostic efforts will be enhanced if growing-finishing pigs that die are necropsied by a veterinarian to develop a disease profile for the herd. This practice can detect potential problems before they become major losses. Based on necropsy findings and bacterial culture results, successful therapeutic programs can be developed.

Lesions

Pasteurella, Mycoplasma and other airborne organisms generally cause lesions in the lower anterior part of the lungs. *Actinobacillus pleuropneumoniae* infections can occur in the same regions but commonly cause lesions in the posterior lobes of the lungs near the diaphragm. The type of lesion observed will depend on the length of time the pig was infected before necropsy examination. Lesion development progresses from hemorrhage and edema that can involve all of the lung within hours after infection (peracute stage) to circumscribed, dark red, almost black hemorrhagic areas that are covered with a layer of fibrin (acute stage). These acute lesions will begin to develop approximately 12 hours after the lung is infected. Adhesions will develop between the surface of the lung lesions and the body wall in pigs that survive *Actinobacillus pleuropneumoniae* infections for longer than a few days (chronic stage). These chronic lesions will no longer have the hemorrhagic, red color of acute lesions and encapsulated abscesses will form in the lung as the body defenses attempt to wall off the infection. These chronic encapsulated lesions still contain viable *Actinobacillus pleuropneumoniae* organisms. Studies have shown that such chronically infected pigs can serve as Actinobacillus pleuropneumoniae carriers for at least four months. Because of the poor blood supply to these abscesses, limited amounts of antibiotic can reach the bacteria through the blood stream. This makes successful treatment of chronically infected pigs difficult.

The lesions described above are primarily APP lesions. In many pneumonia problems, multiple causes are found. APP may be active as a triggering agent to other respiratory problems and vice versa. In these cases, the typical lesions described above may be obscured or modified by the presence of other pneumonic lesions.

Therapy

In an acute outbreak of APP, high levels of antibiotic in the blood are the most effective treatment. Dosages must be at the high end of their respective recommended treatment ranges for success. Variation in antibiotic sensitivity patterns of *Actinobacillus pleuropneumoniae* isolates makes antibiotic sensitivity testing important in selecting the most effective drug. In vitro studies have shown that of the most commonly used injectable antibiotics, penicillin and tetracycline encounter the least number of resistant *Actinobacillus pleuropneumoniae* isolates. Therefore, these two antibiotics probably would have the greatest likelihood of being effective in an acute outbreak until a specific antibiotic sensitivity test can be completed. It is recommended that both normal and sick pigs sharing the same air space be treated by antibiotic injection since lung damage can be severe even before clinical signs are evident. Antibiotic injection of both healthy and sick swine will usually result in a reduction of death losses.

Antibiotics that are added to feed or to water do not reach the necessary blood levels to effectively stop an acute outbreak. However, drugs in water have been used as a preventive measure following the initial injectable treatment. In addition to helping control *Actinobacillus pleuropneumoniae*, they aid in controlling other potential respiratory pathogens that are possibly present in the swine lung. Tiamulin, a drug recently approved by the FDA for water treatment, can provide beneficial results in a swine herd with an APP problem. Treatment with tetracycline in the water has been reported to be a significant benefit in some swine herds with *Actinobacillus pleuropneumoniae* infection.

Control and Prevention

The carrier pig that has recovered from APP is the major source of infection. The bacteria are fragile and do not live outside the pig for extended periods. They also appear to be specific to swine. Therefore, reservoirs of infection in other species are not thought to be important in the spread of this disease. The entry of infected animals into an uninfected herd poses the greatest danger of spread. The infected pigs pass *Actinobacillus pleuropneumoniae* to the uninfected pigs by aerosol transmission.

Groups of swine held in overcrowded, poorly ventilated buildings are more likely to experience APP problems. Sudden weather changes and drafts can also increase the chances for an APP outbreak. Once the bacteria are introduced into the herd, environmental quality must be held at optimum levels. Failure to provide a quality environment may precipitate renewed APP outbreaks in groups of pigs which have apparently recovered following treatment. Inadequate environmental control also greatly increases the probability that new additions to the environmental space will develop a clinical outbreak of APP. Therefore, efforts to reduce overcrowding and to maintain good ventilation are very important. Reducing pig density, increasing ventilation rates, or taking pigs out of an enclosed building, help lower the death losses and make other treatment and preventive measures more successful.

The spread of *Actinobacillus pleuropneumoniae* to uninfected herds from infected pigs can be reduced by testing the serum of new pigs for APP antibodies before they are allowed to mix with an APP-free herd. A new group of pigs that is to be added to the APP-free herd should be isolated and serum tested upon arrival and then retested again in 30 days before they are allowed to enter the herd.

Vaccination is another weapon available for use against APP. Autogenous *Actinobacillus pleuropneumoniae* vaccines and numerous commercial vaccines containing one or more serotypes of *Actinobacillus pleuropneumoniae* are available in the United States. *Actinobacillus pleuropneumoniae* is apparently not a powerful antibody stimulant and available vaccines do not completely block infection, death loss, lung lesions or the development of carrier pigs. Vaccines are a useful tool to reduce death losses and lesion development in some herds. Timing of vaccination, selection of proper vaccine strain, concentration of bacteria per dose, and use of an effective adjuvant to stimulate immune response, are all very important in determining the degree of benefit obtained by vaccinating for APP.

The increased occurrence, the severity of clinical signs and the losses experienced make APP an important problem. Additional research is needed to understand this disease so it may be better controlled and/or prevented to reduce economic losses to pork producers.

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