



# pork industry handbook

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Michigan State University Extension

## Pseudorabies (Aujeszky's Disease)

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### Introduction and History

Pseudorabies is an acute, frequently fatal disease affecting most species of domestic and wild animals; however, man and certain apes are resistant to it. The disease is caused by a herpesvirus and is characterized by a variety of clinical signs; the most prominent involve the nervous and respiratory systems. Severe itching and self-mutilation are seen in most species, but rarely in swine.

Aujeszky first recognized pseudorabies as a disease of cattle and dogs in Hungary in 1902. It soon became evident, however, that swine were the natural hosts of the virus, and pigs could die as a result of the disease. For years in Europe, pseudorabies has been recognized as an important cause of death in swine of all ages and as a cause of abortion. Until the late 1960's and the early 1970's, the disease in the United States was considered important only as a cause of death in baby pigs and occasionally in cattle, sheep, dogs and cats. However, pseudorabies is more prevalent in the U.S. than was formerly believed, and the present viruses are capable of causing a variety of clinical manifestations, including death in newborn and adult swine and fetal death with abortion in pregnant swine. The disease is widespread and of considerable economic importance in several midwestern states. A slaughter serum survey conducted in 1983 revealed a nationwide prevalence of 18.8% in breeding swine with state rates ranging from 0% to 34.3%.

### Clinical Signs

**Pigs less than 3 weeks old.** In baby pigs, the disease may be characterized by sudden death with few, if any, clinical signs. Frequently death is preceded by fever which may exceed 105°F, dullness, loss of appetite, vomiting, weakness, incoordination and convulsions. If vomiting and diarrhea occur, the disease in baby pigs closely resembles transmissible gastroenteritis (TGE). In pigs less than 2 weeks old, death losses frequently approach 100%. Baby pigs may have become infected before birth and die within 2 days after birth, occasionally after showing violent shaking and shivering. Piglets infected immediately after birth may show clinical signs within the first 2 days of life and usually die before they are 5 days old.

**Pigs 3 weeks to 5 months old.** After 3 weeks of age, pigs usually develop a degree of resistance to the disease, and death losses may decrease from 50% in pigs exposed when 3 weeks old to less than 5% in pigs exposed when 5 months old. Death losses vary with different strains of the virus, and even in grown pigs severe death losses occasionally occur.

Fever is a prominent clinical sign in these growing pigs and is followed by loss of appetite, listlessness, labored breathing, excessive salivation, vomiting, trembling and eventually marked incoordination, especially of the hind legs. Normally death is preceded by convulsions. Involvement of the respiratory tract with sneezing, rubbing of the nose and coughing may occur. Clear to yellowish nasal discharges may be seen. Infected pigs that recover have lost condition and will be slow to reach market weight.

**Mature pigs.** The disease in adult pigs often is not severe, but with some strains of pseudorabies virus, deaths may occur. The disease in adult pigs is characterized by fever and respiratory signs which may include nasal discharges, sneezing, nose rubbing and coughing. Pseudorabies is often found in operations with other respiratory diseases such as Pasteurella and Actinobacillus (Hemophilus) pleuropneumonia. Nervous signs such as trembling, incoordination and itching occasionally occur, and blindness may follow pseudorabies infection. Vomiting and diarrhea or constipation may be seen. Since 1980, an acute, often fatal pneumonia caused by pseudorabies virus has increased in prevalence. This condition is most often seen in herds having a prolonged history of pseudorabies infection. Animals often die from a fatal secondary bacterial pneumonia.

Sows infected in the early stages of pregnancy may return to heat because of death and resorption of their fetuses. Sows infected in middle pregnancy may eventually abort mummified fetuses, whereas sows infected late in pregnancy often abort or give birth to weak, shaker or stillborn pigs.

### Postmortem Lesions

No gross lesions characteristic of pseudorabies are consistently found. Small greyish-white spots of focal necrosis may occur in the livers and spleens of pseudorabies-infected young pigs.



Congested pneumonic lungs are commonly seen. Virus isolation and fluorescent antibody examination of these and other tissues will reveal if the lesions are related to the disease.

### Immunity

Recovery by swine from pseudorabies confers some resistance for at least 12 months. Re-exposure may result in reinfection, but it is usually asymptomatic. The passive immunity passed on from an immune sow to her offspring through the colostrum may protect the piglets for 5 to 10 weeks, after which they gradually become fully susceptible. However, the passive immunity may be too low to protect the piglets so the offspring of immune sows also may die of pseudorabies.

Vaccines have been used in Europe for years, and in the United States since 1977. The research consensus is that vaccines reduce swine losses and spread of the disease but do not totally prevent infection and the establishment of a carrier state in recovered swine. Vaccines have been reported to enhance the control and eradication of pseudorabies. Newer "differentiable" vaccines combined with their appropriate serological tests permit vaccinated animals to be distinguished from those infected with "field" strains of virus. Differentiable vaccines permit the monitoring of herd infection status in vaccinated herds.

### Spread of Infection

Pseudorabies is spread mainly by direct contact between swine; the nose and mouth are the main entry points for the virus. Nasal discharges and saliva contain the virus; therefore, drinking water, bedding and other objects such as clothing and instruments may become contaminated. The virus can be spread without movement of pigs. When entering swine premises, clean clothes should be worn, and boots should be disinfected upon entering and leaving the premises. Virus also may spread by the movement of air within buildings and for short distances outside depending upon climatic conditions. Air spread in late winter and early spring is suspected to be over greater distances than previously thought.

Recovered pigs may remain carriers of the virus and later can infect susceptible pigs or cattle with which they come into contact. Severe cattle losses from pseudorabies have occurred as a result of contact infection from apparently normal carrier swine. The disease also has been introduced to swine farms by introduction of carrier pigs.

Dogs and cats are very susceptible to pseudorabies and usually become infected through contact with infected pigs. Wild animals such as raccoons, skunks and mice are also susceptible to the disease. Dogs, cats and wild animals are potential spreaders of the disease within an endemic area, but are not considered a factor in the spread outside the area.

### Diagnosis

The clinical signs of pseudorabies are variable so clinical diagnosis should always be confirmed by laboratory tests. Several tests—the Serum-Virus Neutralization Test (SN), Virus Isolation (VI), Fluorescent Antibody Tissue Section Test (FATS), the Enzyme Linked Immuno-Sorbent Assay (ELISA) and the Latex Agglutination Test (LAT)—have been approved for the diagnosis of pseudorabies. Other tests are being developed.

The SN, LAT and ELISA tests detect pseudorabies antibodies in serum of pigs that have been infected with the virus. These antibodies appear in the serum about day seven of infection and may persist for years. The presence of pseudorabies antibodies is evidence that the pig has been infected with the virus in the past or has been vaccinated. Absence of antibodies indicates that the animal has probably not been infected or that it may be in the early stages of the disease. Diagnosis of a pseudorabies outbreak can be made by conducting SN tests on paired serum samples, one taken from the pig early in the disease, and the second 3 to 4 weeks later. A significant rise in antibodies between the first and second bleeding indicates active pseudorabies infection has been present.

The SN, LAT and ELISA are extremely reliable tests. While these tests accurately detect antibodies to pseudorabies, they do not differentiate between antibodies resulting from natural disease and those resulting from vaccination. Only the differential tests will permit such a distinction.

Serum submitted for SN examination must be collected in clean, sterile tubes (not Brucellosis tubes) and submitted packed in ice. If serum is badly hemolyzed or contaminated with bacteria, the SN test is unreliable.

### Control of Infection

The chances for introduction of the disease can be minimized if the owner strictly controls movement of people, animals and objects into swine premises. Clean clothes and boots should be decontaminated with a good disinfectant before introduction. Cats, dogs and other animals should be kept away from pigs. Add breeding stock from a herd known to be pseudorabies-free, and all additions should be tested and found free, isolated for at least 30 days, and then retested. Untested feeder pigs should never be brought onto premises where farrowing operations exist.

When pseudorabies occurs on a farm, quarantine the premises; all movement of people and animals should be strictly controlled. If possible, separate healthy pigs from the sick. Control movement between them. Dispose of dead pigs by deep burial or incineration. Recovered pigs should be sold only for slaughter to prevent spreading the infection to other farms by carrier swine.

Many herds which are infected may be freed of infection by using either "test and removal" procedures or offspring segregation. Vaccinate exposed or offspring segregated gilts in the first generation with differentiable vaccines if random sample testing is used to determine herd status. Monitor until the second generation turnover. Results using these procedures are very encouraging except in herds undergoing an acute infection. In highly concentrated herds, the virus appears to cycle continuously. In these herds vaccination with a differentiable vaccine may stop spread and permit effective removal of pseudorabies virus (PRV) from the herd. In less concentrated operations, the virus appears to cycle intermittently, and many offspring are pseudorabies-free. In these herds, a testing program with isolation and removal of infected animals appears to be an effective herd clean-up strategy, and vaccines may also be used to advantage.

State regulations and requirements on PRV control vary among states. Consult the state veterinarian about individual state requirements/regulations on PRV testing, control and eradication procedures. More information on eradication can be found in the publication "Plans for Elimination of PRV from a Swine Herd" available from Livestock Conservation Institute, 6414 Copps Avenue, Suite 204, Madison, Wisconsin 53716.

### U.S. Eradication Plan

A national eradication program (with a starting date of January 1) was approved by the National Pork Producers Council in 1989. This decision was made after many discussions, meetings and debates that had been going on for about 15 years since the disease first began to cause problems in swine herds. The plan, endorsed by several other livestock groups, was written by a task force created by Livestock Conservation Institute (LCI) made up of representatives of all segments of the pork industry.

A series of pilot eradication projects in five states over a three-year period were conducted to answer two questions: Are tools available to eradicate the disease? What would eradication cost and would it be cost effective? The technical advisory committee to the pilot projects concluded that pseudorabies area control is feasible and can be accomplished by methods which are acceptable to pork producers and to the program coordinators.

The eradication plan developed and supported by the industry is flexible. It calls for establishment of state committees made up of producers and other segments of the industry to determine program activities and advancement from stage to stage in individual states. The first stage of the program is preparation, during which state committees are formed, prevalence of the disease is meas-



ured and plans are made for future activities, and whatever changes in state laws and regulations and/or legislative authorities needed are determined.

The second stage is the control stage, during which states will implement surveillance programs to find infected herds; quarantine such herds and if they choose, begin a voluntary program of eliminating the virus from infected herds.

The third stage is the start of mandatory herd clean-up, during which owners of infected herds will be required to develop and implement individual plans to eliminate the virus from their herds.

The fourth stage is for states which have completed the herd clean-up phase and have no known infected herds but continue to look for infection. The fifth and final stage is pseudorabies-free status.

### Summary

1. Pseudorabies is a disease of economic significance in the United States.
2. Severe death losses, abortions and reproductive failure may occur in pseudorabies-infected swine herds.
3. Cattle, sheep, dogs, cats and wild animals also die from the disease.
4. Pseudorabies does not cause disease in humans and is not related to rabies.
5. Recovered animals may be carriers of the virus but rarely become ill upon re-exposure.
6. Many vaccines, both modified and killed, have been approved for use in the United States subject to the control of the State Animal Health Official. Vaccines reduce the severity of the disease, but do not totally prevent natural infection or the establishment of the carrier state. When

PRV occurs on a farm, vaccination should be encouraged immediately— subject, however, to individual state laws and regulations.

7. Diagnostic methods are reliable if adequate specimens are submitted.
8. Spread of the disease can be reduced by quarantine, proper disposal of dead pigs, and strict application of hygienic measures.
9. Additions to breeding herds should be PRV negative and from PRV negative herds. They should be isolated for at least 30 days and retested prior to release into the herd.
10. Untested feeder pigs should not be introduced onto premises where farrowing operations exist.
11. Infected herds often can be freed of infection by testing and animal selection procedures.
12. "Differentiable" vaccines may be used effectively in most herd "clean-up" programs.
13. The National PRV Eradication Program began January 1, 1989.

### References

The Epidemiology of Pseudorabies. 1990. Livestock Conservation Institute, 6414 Copps Avenue, Suite 204, Madison, WI 53716

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