
Sponsors

University of Minnesota

College of Veterinary Medicine

College of Food, Agricultural and Natural Resource Sciences

Extension Service

Swine Center

Thank you to **IDEXX Laboratories** for their financial support to reproduce conference proceedings

Production Assistants

Steven Claas

Michael Klatt

Layout and CD-ROM

David Brown

Logo Design

Ruth Cronje, and Jan Swanson;

based on the original design by Dr. Robert Dunlop

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, or sexual orientation.

Actinobacillus suis: a description of one integrated system's field challenges

Darin Madson, DVM
Iowa State University & Christensen Farms

Capitalizing on opportunity is usually the key to success for many businesses and it is no different in the swine industry. When we think about opportunity, excitement fills our mind about the possible economic returns that may be present in each situation. Swine production has many opportunities to increase revenue, whether that would be a marketing strategy, increased growth performance parameters, implementing biosecurity measures, or optimizing health. However, on the health aspect of swine production, many pathogens rely on our production blunders to provide an opportunity to thrive. One such bacterium that tops the list as being a prime opportunistic pathogen in the Christensen Farms system is *Actinobacillus suis*.

In the past, *A. suis* was primarily a neonatal pig problem, and on the rare occasion, a problem in the growing or adult animal. What has changed in swine production to bring *A. suis* to the forefront of the growing pig? Has *A. suis* been overshadowed by *Actinobacillus pleuropneumoniae* in the past? Is *A. suis* a healthy pig disease? Is the bacteria adapting to the host? Or, are we doing a better job of detecting the bacteria at the laboratory and field observations?

With any opportunistic organism, especially in the case of *A. suis*, it is extremely important to identify the risk factors that allow the bacteria to adapt to the situation at hand. Most opportunities are stressful events during the life of an animal or a group of animals. Each production phase of swine has stressing events, and some production systems have more than others, but in every case there are opportunities where *A. suis* can hurt production. Mitigating these stressful events can help reduce the opportunities for the bacteria to cause decreased performance and mortality.

If you do not have the organism within your production system, an important risk factor to consider is the risk of purchasing animals from an outside source to incorporate into your system. This includes multiplication animals or commercial animals. Also, if already present within your system, never underestimate its potential to adversely affect a group of pigs.

Clinical signs

The organism can be found in the tonsils and nostrils of healthy pigs, and transmission via aerosol and nose to nose contact seems to be the main routes of infection.¹ Thus, *A. suis* can present clinical signs in an animal or group of animals during any stage of production.

Christensen Farms rarely observes clinical signs of *A. suis* in the neonatal pig. However, it is reported that septicemia and sudden death can occur in this age of pig.² It is occasionally isolated within the CF system in this age of pig, but sudden death and septicemic lesions are not present. The isolation of the bacteria in tissue samples is made when the primary disease process is related to ill thrift animals at birth or there is an early diarrhea issue. Typically when the bacterium is isolated at this age, gross lesions are not present on necropsy. Another aspect to note is that early antibiotic treatment of the neonatal pig diminishes the regular isolation of *A. suis* in diagnostic submission within the CF system. Many systems use early antibiotic treatment as regular protocol and this may be a reason for few pigs with septicemia and sudden death. Other routine prophylactic treatment prior to weaning also has the potential of decreased clinical signs in the farrowing crate and in the early nursery stage.

In the nursery phase of production, there are many new stressors that pigs are presented with. The health status of the sow farm can play a role in determining if *A. suis* has the potential to cause disease. Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) seroconversion with corresponding maternal antibody decay provides an optimal opportunity for *A. suis* to present itself. Typically within the CF system these animals are usually noted as sudden deaths. A dry non-productive cough may accompany hyperemic extremities and pyrexia of pigs that survive an acute bacteremia. Rarely in the nursery phase of production do we see lameness associated with these affected animals and isolation of *A. suis* from synovial fluid has been unsuccessful. Upon necropsy, few gross lesions of septicemia are present in sudden death animals. However, if diagnostic samples are submitted, a diagnosis of *A. suis* is possible. One thing to note is that multiple submissions from consecutive days may be needed to identify the bacteria. From past experience, it is difficult to isolate *A. suis* on sudden death nursery pigs. If deaths

continue for multiple days, the latter sudden deaths are more likely to have gross lesions of septicemia. The most consistent gross lesion of *A. suis* infection within the CF system is raised necrotic lung lesion on the diaphragmatic lobes.

One factor that may limit isolation, and diminish clinical signs of *A. suis* in the nursery phase, is that antibiotics are routinely used in feed rations. If *A. suis* has been isolated from your herd and is sensitive to an antibiotic that is in a nursery ration, few occurrences of disease maybe present, even in stressful periods.

A key factor in making a presumptive diagnosis in a nursery facility is training of farm staff to conduct field necropsies on these animals. Training staff to recognize gross abnormalities by performing necropsies, especially daily necropsies in disease situations, allows for the collection of diagnostic samples. These processes along with laboratory confirmation help the herd veterinarian make an accurate diagnosis, and hence the opportunity to make specific recommendations to prevent additional disease outbreaks.

The finishing stage is where Christensen Farms sees the most clinical issues with *A. suis*. A couple of risk factors impact why we see more disease in this stage of production. One factor is the lack of feed antibiotic therapy for *A. suis*. Another is purely time spent in this production stage. Clinical signs are similar to the nursery stage but more evident and remarkable. Sudden death, respiratory signs, skin lesions, and lameness are the main clinical signs that are seen in this age group. Dry non-productive coughs with sudden deaths are the major clinical signs associated with *A. suis* in the CF system. A dermatitis, similar to *Erysipelas rhusiopathiae*, maybe present in the subacute to chronic phase of an outbreak. The dermatitis can be accompanied by lameness but this is not always apparent. Another clinical sign that is noted in this age of animal is hemorrhagic froth exuding from the nares after death.

Stressing events

As stated previously, an opportunistic pathogen is waiting for it's time to cause a problem. Identifying the stressful events and risk factors predisposing to *A. suis* outbreaks will help you diagnose and prevent *A. suis* within your system.

In the nursery phase of production, commingling sources seem to be a big factor whether or not *A. suis* will present as a disease challenge. It may not be evident in the earlier stages of the nursery, but certain sow farms may have a low prevalence of *A. suis* and therefore are naïve to the bacteria. Once commingled with animals of high *A. suis* prevalence, more opportunities exist for disease challenges. This is similar to any other disease. Some

factors that may exist at the sow farms to increase *A. suis* prevalence that are seen in the CF system are low parity farms, start-up farms, PRRS instability, or Swine Influenza Virus (SIV).

Vaccination and maternal antibody decay of PRRS can contribute to the incidence of *A. suis* within a nursery. Space allocation in the late nursery stage adds stress and the capability of enhanced transmission.

The finishing stage is very similar to the nursery phase of production for stressing events. The use of conventional style nursery adds additional stress in the finishing stage due to a necessary additional movement, new pen mates and a different environment. Other factors to consider are diet changes and the feed system. If there is a delay in feed ordering, low storage capacity of the feeder itself or a feed system that doesn't allow multiple animals to feed, more stress will be added. The same can be said for water availability.

Ventilation in finishing seems to be a risk factor depending on the time of year and the barn style. During the transitional seasons of the year, barns are difficult to ventilate properly. Wind direction and speed can fluctuate and cause barns to have high variances of temperature swings. An astute caretaker can minimize risk in these times of the year.

Another aspect of production that may influence your incidence of *A. suis* in the finishing phase is marketing strategy. How heavy you raise the animals, how many cuts are taken from the barn, and space allocation are factors that may affect incidence of disease and mortality from *A. suis*.

In the CF system, a key factor associate with clinical *A. suis* is a SIV outbreak within the finishing phase. If the SIV clinical signs have subsided after one week, *A. suis* is usually not a problematic factor. However, if a dry non-productive cough and sudden death occurs after 7-10 days, it is almost always *A. suis* playing the part of opportunity. SIV seems to be the catalyst in the CF system that really sets off *A. suis*. As stated earlier, you may not see the classical lung lesions and septicemia lesions unless multiple necropsies are performed for multiple days.

Treatment and prevention

The key to success in any treatment and prevention strategy is to isolate the pathogen and identify the items that are the greatest risk factors within your system. Culture and sensitivity will allow you to choose the correct antibiotic treatment and placement. Risk analysis will also allow you to experiment with different strategies to mitigate stressful events. Performing field necropsies and submitting tissue will help you determine causes of death for future prevention.

Darin Madson

Treatment of *A. suis* has become more complex within the CF production system. In the past, tetracycline water administration and oxytetracycline injectible administration were sufficient in curbing clinical signs of disease. Along with the production of high health animals has come the adaptation of *A. suis* and therefore new treatment protocols. Chlortetracycline water administration with a third generation beta lactam injectible are now needed to combat the disease process. Another important change has been the recurrence of clinical signs after a short reprieve from antibiotics. Strategic planning and placement is now needed to battle initial outbreaks and a second wave of clinical signs. If treatment is insufficient in length, a lingering affect of sudden deaths can occur.

A key success of taking preventative measures has been the addition of an antibiotic that is sensitive to *A. suis* in the late stage nursery feed ration because of maternal antibody decline. In addition, higher health pigs with clinical respiratory issues in the finishing phase of production have benefited from antibiotic treatment that is sensitive to *A. suis*, even though *A. suis* may not be the inciting bacterial issue.

CF has trialed an autogenous *A. suis* vaccine within the system. However no significant results were found because of the inability to produce repeatable results across vaccinated groups.

Discussion

It is of the authors opinion that the increase of clinical *A. suis* is partly do to more complex respiratory diseases. Respiratory viruses of swine are becoming more complex as they evolve in the pig as well as the environment. These changes allow the bacteria to cause clinical issues within a herd. Genetic predisposition in certain breeds is also a factor to evaluate for possible reasons of increased clinical signs of the bacteria. Lastly, with more integration and larger swine facilities being built, economics play a role in adding more stressful events to swine and increasing the potential for *A. suis* to cause problems.

Conclusion

A. suis is no longer a baby pig disease or a healthy pig disease. Animals of multiple ages can be infected and diseased if the bacterium is given the opportunity. The swine industry may be promoting more *A. suis* infection based on the way production systems operate today and the stressful events that we place on the animals. Do not discount *A. suis* as potential pathogen in your system when clinical signs are present. Training personnel to recognize clinical signs, obtaining a thorough history, and submitting tissues to a diagnostic lab will aid in the diagnosis of *A. suis* and ultimately allow the implementation of treatment and control strategies.

References

1. Knoll MJ, *A. suis*: A diagnostic dilemma. *Proceedings American Association of Swine Veterinarians*. 2001; 487-489
2. Taylor DJ, *A. suis Diseases of Swine 8th edition*. Ames, IA: Iowa State University Press 1999; 624-627

