http://www.MSCNews.net/news/index.cfm?nk=66547

Kansas State University researcher publishes study

As an African swine fever outbreak has moved rapidly throughout China and threatens to spread to new countries in Europe, a Kansas State University researcher continues to understand the possible routes for disease introduction and transmission.

Megan Niederwerder, Kansas State University assistant professor of diagnostic medicine and pathobiology in the College of Veterinary Medicine, is leading a team that is exploring how the currently circulating strain of African swine fever, or ASF, could spread in feed and feed ingredients. A new publication details the dose necessary to transmit the disease when pigs ingest virus-contaminated feed or liquid.

"Although feed and feed ingredients are a less recognized transmission route for African swine fever, the global distribution of feed ingredients makes this pathway important to consider for transboundary introduction of the virus," Niederwerder said. "This study is the first to demonstrate that African swine fever can be easily transmitted through the natural consumption of contaminated feed and liquid."

The study, "Infectious dose of African swine fever virus when consumed naturally in liquid or feed," was published in Emerging Infectious Diseases. Niederwerder and collaborators found that the level of virus required to cause infection in liquid was extremely low, demonstrating the high infectivity of African swine fever through the oral route. Although greater concentrations of virus were required to cause infection through feed, the high frequency of exposure may make contaminated feed a more significant risk factor.

"Working with statistician Trevor Hefley, we were able to model the probability of African swine fever infection when pigs consumed a contaminated batch of feed over time," Niederwerder said. "The likelihood of infection increased dramatically after even 10 exposures, or consumption of 1 kilogram of contaminated feed. Modeling multiple exposures increases the applicability of our experimental data to what would occur at the farm."

Agricultural processing methods for feed ingredients can put them at risk for contamination in countries with African swine fever. One common practice in China, for instance, is to dry crops on roadways. Those roadways could be contaminated by traffic from trucks containing infected pigs. Processing ingredients on contaminated equipment is another possible source of transmitting

virus particles to feed.

"Millions of kilograms of feed ingredients are imported from countries where African swine fever virus is currently circulating," Niederwerder said. "Our previous work demonstrated that a wide range of feed ingredients promote survival of the virus after exposure to environmental conditions simulating transboundary shipment."

Introduction of African swine fever virus would be devastating to U.S. swine production because it is a trade-limiting disease that causes severe clinical signs and high mortality in pigs. Another costly swine disease, porcine epidemic diarrhea virus, was introduced into the U.S. in 2013 and caused the death of an estimated 7 million pigs within the first year. Subsequent investigations unveiled the risk of feed for introduction and transmission of swine viruses. Niederwerder's goal is to prevent another catastrophic disease outbreak.

Peter Dorhout, Kansas State University vice president for research, said protecting U.S. producers and consumers against disease outbreaks is an area in which the university excels.

"K-State has world-renowned research strengths in providing biodefense for global threats to agriculture," Dorhout said. "We are proud to have some of the best, highly specialized facilities in which we can safely conduct this research, and Dr. Niederwerder's team is making great strides."

Niederwerder and her group conduct their work in the Biosecurity Research Institute, a biosafety level-3 facility that has helped them perform large studies. Their first study found that the African swine fever virus could survive in a simulated overseas feed shipment. Now that the group has confirmed African swine fever transmission through feed and has identified the oral dose necessary for infection, the next step will be to identify ways to reduce or eliminate this risk, including chemical additives, storage time, heat treatments or other steps.

"African swine fever is arguably the most significant threat to worldwide swine production," Niederwerder said. "With no effective vaccine or treatment, preventing introduction of the virus is the primary goal of countries free of the disease. Our hope is that this research will further define possible routes of disease spread and develop mitigation strategies to prevent introduction into the U.S. swine herd."

The National Pork Checkoff and the State of Kansas National Bio and Agro-defense Facility Fund provided funding for the study. Kansas State University co-authors on the publication include Ana Stoian, doctoral student in pathobiology; Raymond "Bob" Rowland, professor of diagnostic medicine and pathobiology; Steve Dritz, professor of diagnostic medicine and pathobiology;

Vlad Petrovan, doctoral student in pathobiology; Laura Constance, concurrent Doctor of Veterinary Medicine and doctoral student in pathobiology; Jordan Gebhardt, concurrent Doctor of Veterinary Medicine and doctoral student in animal science; Matthew Olcha, concurrent Doctor of Veterinary Medicine and doctoral student in pathobiology; Cassandra Jones, associate professor of animal science; Jason Woodworth, research associate professor of animal science; Ying Fang, professor of diagnostic medicine and pathobiology; Jia Liang, doctoral student in statistics; and Trevor Hefley, assistant professor of statistics.