Transmission of Senecavirus A by artificial insemination and the impact on the production of piglets

Fabio Vannucci DVM, MSc, PhD

Justification

Senecavirus A (SVA), formerly known as Seneca Valley Virus, is the only species in the genus Senecavirus of the Picornaviridae family. The virus has been identified and isolated from pigs showing vesicular lesions, acute lameness and sudden neonatal death. In this respect, clinical signs of SVA mimic other vesicular disease differentials in the porcine host including vesicular stomatitis, vesicular exanthema, swine vesicular disease and foot-and-mouth disease. Although SVA has been identified in swine since 1988, recently 87 outbreaks in US were reported between July and October 2015. This scenario has activated the discussions regarding the pathogenic role of SVA in swine, since Koch postulate has not been published. Experimental studies are underway and preliminary data has demonstrated that the virus is able cause vesicular disease in 9 weeks-old pigs and gilts. In addition, the virus has been detected by PCR in several tissues, including serum, brain and one case in semen. The single detection in the semen showed low amount of virus RNA by PCR. But, SVA has been able to cause viremia and cross the blood-brain barrier. These observations bring questions regarding the ability of the virus being transmitted by artificial insemination and transplacentally.

This proposal will evaluate the shedding pattern of SVA in the semen of experimentally-infected boars followed by transmission of infected semen to susceptible gilts. Most modern boar studs supply in the range of 30,000 to 80,000 sows. Understanding the risks of SVA shedding in the semen is critical to evaluate strategies to monitor the infection in boar stud in order to avoid potential introduction of the virus in commercial sow farms.

The objectives 2 will investigate the impact of the SVA on the reproductive performance of gilts inseminated with SVA-infected semen. The effect of infected semen will be evaluated during the early stages of gestation (first month). Parameters that impact on production of piglets, such as embryonic deaths and return to estrous will be evaluated.

The objective 3 will directly address the potential impact of SVA in pregnant gilts and their farrowed neonates. The rationale is based on recent reports of SVA outbreaks characterized by acute transient neonatal mortality. High virus titers have been
identified in affected litters, but no gross or histological features has been specifically described. In order to investigate the role of SVA in neonatal piglets, gilts will be experimentally-infected one week before farrowing and clinical and pathological evaluations will be performed throughout the course of the infection in the gilts and in their farrowed neonates. The knowledge generated on the achievement of this objective will be important to monitor the disease in sow herds, especially at the late stages of gestation to avoid neonatal losses.

Objectives

The overall goal of the proposed research is to understand the shedding patterns of Senecavirus A (SVA) in the semen of experimentally-infected boars linked with the transmission by artificial insemination to sows and the subsequent impact on the production of piglets.

Specific aims:

1. Evaluate the clinical signs and shedding pattern of SVA in the semen of experimentally-infected boars

2. Evaluate the transmission of SVA by artificial insemination and the impact on early stage of gestation

3. Evaluate the effect of SVA infection in pregnant gilts and their farrowed neonates.