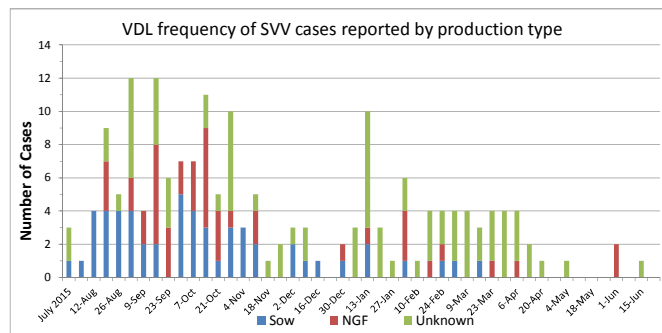
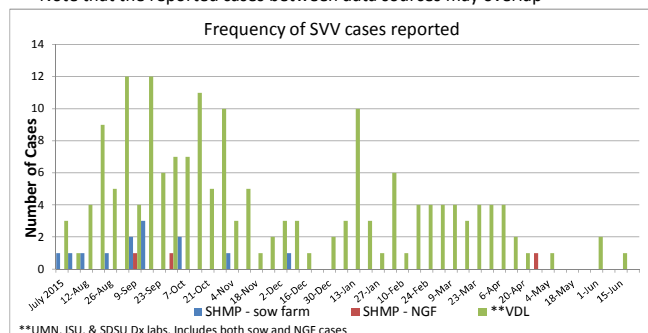


Seneca Valley Virus Update

We requested SHMP participants and UMN, ISU, and SDSU diagnostic labs to report frequency of Seneca Valley virus cases each week.

- 1 VDL case reported for week of 06/12/16
- Note that the reported cases between data sources may overlap



Are these viruses becoming more common?

Paul Sundberg DVM, PhD
Executive Director of Swine Health Information Center

Key Points:

- We've become aware of growing pig sites presenting with unusual CNS signs.
- Porcine teschovirus, porcine sapelovirus and atypical porcine pestivirus are among the possible causes.
- These 3 viruses have historically been reported infrequently in United States but should be considered when other more likely causes of CNS disease are ruled out.
- If you have any confirmed cases, please report it to Dr. Morrison (BobM@UMN.Edu) or Dr. Sundberg with the Swine Health Information Center (psundberg@swinehealth.org).

There have been recent communications about growing pigs presenting with neurologic signs ranging from mild muscle tremors to ataxia and paresis with most extreme cases progressing to paralysis and death. Affected pigs range from mentally alert to ataxic and extremely lethargic with decreased response to environmental stimuli. Reported morbidity has been as low as 5% and as high as 20%. Case fatality rate has ranged from 30% to 100%. Possible infectious causes include porcine teschovirus, porcine sapelovirus and atypical porcine pestivirus. These viruses are not new to United States and confirmed cases have historically been reported infrequently.

Porcine teschovirus (PTV)

Porcine teschovirus (PTV) is a non-enveloped, positive-sense single-stranded RNA virus in the genus Teschovirus of the family Picornaviridae. There are 13 known serotypes of PTV. Pigs can be co-infected with more than one serotype and PTV is commonly isolated in healthy swine. Highly virulent strains of PTV-1 can cause teschovirus encephalomyelitis. Less virulent strains of PTV-1, in addition to PTV-2, PTV-3, and PTV-5, are associated with Talfan disease (also known as benign enzootic paresis), a milder presentation of polioencephalomyelitis than teschovirus encephalomyelitis.

In teschovirus encephalomyelitis, fever, anorexia, listlessness, and locomotor ataxia can be seen prior to paralysis/paresis. Caudal ataxia leading to paresis or paralysis can be seen as early as two to three days post infection. Commonly, death occurs three to four days after the onset of clinical signs¹ but recent suspected cases progressed to death within 24 hours.

Abortion and SMEDI syndrome (stillbirth [S], mummified fetus [M], embryonic death [ED], infertility[I]) have been linked to the variety of reproductive disorders that can be caused by PTV serotypes. SMEDI syndrome is also seen with parvovirus infections, which more frequently cause reproductive disorders in conventional herds than PTV.

Porcine sapelovirus (PSV)

Porcine sapelovirus (PSV) is a non-enveloped, positive-sense single-stranded RNA virus belonging to the genus Sapelovirus in the family Picornaviridae. PSV is closely related to the genus Enterovirus and was previously classified as porcine enterovirus 8 (PEV-8). There are three species within the Sapelovirus genus: porcine, simian and avian. Pigs, monkeys and ducks are the only known hosts for each species.

Polioencephalomyelitis syndrome, characterized by ataxia and limb paralysis, with or without other clinical symptoms (diarrhea or pneumonia) is suggestive of PSV infection.² A recent case resulted in case mortality within 24 – 48 hours. Like PTV, SMEDI syndrome has also been linked to the virus. Litters with few to several stillborn or mummified fetuses may be suggestive of PSV-induced reproductive disorder³ when no other more common cause is identified.

Atypical porcine pestivirus (APPV)

A study by Arruda et al. published in 2016 identified an atypical porcine pestivirus from piglets with congenital tremors.⁴ This virus was closely related to a novel pestivirus reported in serum samples from pigs involved in a PRRS metagenomics sequencing study. Phylogenetic analysis showed the greatest similarity to a newly described pestivirus in bats in China.

Samples from growing pigs submitted to the Iowa State University Veterinary Diagnostic Laboratory for routine testing were screened for APPV RNA via RT-PCR; 6% (22/362) of the pigs tested positive.⁴ In this study, pregnant sows were also inoculated with APPV (intravenous, intranasal, and inoculation of fetal amniotic vesicles) in an attempt to cause disease. Inoculated sows farrowed pigs affected with congenital tremors while controls did not; APPV was also consistently detected in tissues from affected piglets via RT-PCR.⁴

Just recently, an APPV was isolated from a pig with uncontrollable shaking. Approximately 700 affected pigs in the herd died. Notably, this outbreak occurred in pigs 5 – 14 weeks-of-age which is significantly older than piglets in which congenital tremors occur.⁵

CONTINUED ON NEXT PAGE

There are significant knowledge gaps about the pathogenicity and epidemiology of these viruses. And data from the veterinary diagnostic labs are yet to be analyzed to see if the recent communications are part of an increasing trend or part of the historic, sporadic incidence. However, one of the charges and responsibilities of the Swine Health Information Center is to monitor disease trends in the U.S. herd and to help identify emerging diseases. Individual outbreaks may seem like individual, sporadic incidents but if everyone experiencing an outbreak communicates it and that information is aggregated an emerging disease picture might become apparent.

If you encounter any cases with clinical signs that could be attributed to any of these three viruses, keep them in mind as potential differential diagnoses. And, should the veterinary diagnostic lab find that any of these three are the etiology, please report it to Dr. Morrison with the Swine Health Monitoring Project or Dr. Sundberg with the Swine Health Information Center. This will be a great help to determine if any of them are an emerging pathogen in the U.S.

More information about these viruses can be found in Fact Sheets posted under the Emerging Diseases tab of the Swine Health Information Center's website, www.swinehealth.org.

References

1. Deng MY, Millien M, Jacques-Simon R, Flanagan JK, Bracht AJ, Carrillo C, Barrette RW, Fabian A, Mohamed F, Moran K, Rowland J, Swenson SL, Jenkins-Moore M, Koster L, Thomsen BV, Mayr G, Pyburn D, Morales P, Shaw J, Burrage T, White W, McIntosh MT, Metwally S. Diagnosis of Porcine teschovirus encephalomyelitis in the Republic of Haiti. *J Vet Diagn Invest.* 2012;24(4):671-678.
2. Lan DL, Ji WH, Yang SX, Cui L, Yang Z, Yuan C, Hua X. Isolation and characterization of the first Chinese porcine sapelovirus strain. *Arch Virol.* 2011;156(9):1567-1574.
3. Huang J, Gentry RF, Zarkower A. Experimental infection of pregnant sows with porcine enteroviruses. *Am J Vet Res.* 1980;41(4):469-473.
4. Arruda BL, Arruda PH, Magstadt DR, et al. Identification of a Divergent Lineage Porcine Pestivirus in Nursing Piglets with Congenital Tremors and Reproduction of Disease following Experimental Inoculation. *PLoS One.* 2016;11(2):e0150104.
5. National Hog Farmer. KSU Research Team Discovers Novel Pestivirus Affecting Swine. 2015; <http://nationalhogfarmer.com/animal-well-being/ksu-research-team-discovers-novel-pestivirus-affecting-swine?page=1>. Accessed March 30, 2016.