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Swine Vesicular Disease

Porcine Enterovirus Infection




Swine vesicular disease (SVD) is also known as porcine enterovirus infection. It is typically a transient disease of pigs in which vesicular lesions appear in the mouth and on the feet.

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Overview

- Organism
- Economic Impact
- Epidemiology
- Transmission
- Clinical Signs
- Diagnosis and Treatment
- Prevention and Control
- Actions to take




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In today's presentation we will cover information regarding the organism that causes swine vesicular disease and its epidemiology. We will also talk about the economic impact the disease has had in the past and could have in the future. Additionally, we will talk about how it is transmitted, the species it affects, clinical signs and necropsy findings, and diagnosis and treatment of the disease. Finally, we will address prevention and control measures for the disease as well as actions to take if swine vesicular disease is suspected.

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The Organism



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Swine Vesicular Disease

- Virus
 - Family Picornaviridae
 - Genus Enterovirus
 - Related to human enterovirus
 - Unrelated to other porcine enteroviruses
 - Survives for long periods in environment and in meat products
 - Resistant to
 - Temperatures up to 157 °F
 - pH ranging from 2.5-12

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The swine vesicular disease virus (SVDV) is a single-stranded RNA genome enclosed in a capsid of icosohedral symmetry, and is a porcine enterovirus in the Picornaviridae family. While it is antigenically related to the human enterovirus Coxsackie B5, but is unrelated to other known porcine enteroviruses. SVDV can survive for long periods of time in the environment. This virus is resistant to heat up to 157°F (69°C) and pH ranging from 2.5-12. It can also survive up to 2 years in dried, salted, or smoked meat.

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Importance



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History

- 1966: First identified in Italy
 - Confirmed in
 - Hong Kong
 - Japan
 - Western Europe
- Eradication successful in most countries
- Outbreaks
 - 1990s: Italy, Spain, Portugal

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SVDV was first identified in Italy in 1966 and was subsequently confirmed in Hong Kong, Japan, and various countries in Western Europe. Since the 1970s, this disease appears to have been eradicated from most countries. In the 1990s, Italy, Spain and Portugal had outbreaks of SVD.

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Economic Impact

- Does not cause severe production losses
- Major economic importance
 - Difficult to distinguish from foot-and-mouth disease
 - Control measures, eradication costly
 - Trade restrictions

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While it does not cause severe production losses, it is of major economic importance because it is difficult to distinguish from foot-and-mouth disease. Control measures and eradication of SVD are costly, and nations which are known to have SVD often face embargoes on the export of pigs and pork products.

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Epidemiology



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Geographic Distribution

- Has occurred in
 - Italy, Hong Kong, England, Wales, Japan, Germany, Poland, Switzerland, Greece and Spain
- Has not occurred in North America or Australia
- Eradicated from most countries
 - Low in adult pigs
 - Up to 10% in piglets
- As of 2003, only found in Italy and Portugal

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Swine vesicular disease has been seen in Italy, Hong Kong, England, Wales, Japan, Malta, Austria, Belgium, France, the Netherlands, Germany Poland, Switzerland, Greece, and Spain. Since the 1970s, this disease appears to have been eradicated from most countries. In the 1990s, Italy, Spain, and Portugal had outbreaks of swine vesicular disease. According to the OIE, swine vesicular disease is only found in Italy and Portugal as of 2003.

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Morbidity/Mortality

- Moderately contagious
- Compared to foot-and-mouth
 - Lower morbidity, less severe lesions
- Mortality not generally a concern
 - Low in adult pigs
 - Up to 10% in piglets
- No persistent infection
- Protective antibody developed

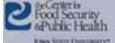
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SVDV is considered to be moderately contagious. Compared to foot-and-mouth disease, morbidity is lower and the lesions are less severe. Mortality is not generally a concern with this disease, although it may reach 10% in piglets. No persistent infections have been reported, and all infected pigs have developed protective antibody for SVDV upon recovery.

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Transmission

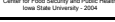


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Animal Transmission

- Contact
 - Infected animals or feces
- Ingestion
 - Contaminated meat scraps
- Excretion of virus
 - Nose, mouth, feces
 - Up to 48 hrs. before clinical signs seen
 - Shed in feces for >3 months after infection



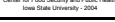
The virus can enter the body of a pig by a number of different routes. Pigs are most easily infected through damaged skin or an ulcerated mucous membrane; the incubation period for this route of exposure is 2-7 days. Infection by ingestion (of contaminated meat scraps, e.g.) requires a larger amount of the virus; the incubation period is 2-3 days. Pigs can secrete the virus from the nose or mouth, and excrete the virus in feces up to 48 hours before clinical signs are seen. Virus can also be shed in the feces for up to three months following infection.

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Human Transmission

- Laboratory workers
 - Contact with SVD pigs or SVDV
 - Variety of illnesses developed
 - Traceable to SVDV infection
 - Seroconversion
 - Mild clinical disease
 - One case of meningitis

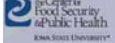


Pigs are the only species that are naturally infected, although the virus may be present in sheep or cattle. Infection in humans has also occurred in two circumstances: in workers who had contact with SVDV-infected pigs on the farm or with SVDV itself in the laboratory. The workers developed a variety of illnesses traceable to infection with SVDV, with seroconversion and mild clinical disease. There was one case of aseptic meningitis.

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Animals and Swine Vesicular Disease



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Clinical Signs

- Incubation period: 2-7 days
- Very similar to foot-and-mouth disease
- Vesicles and erosions
 - Snout, mammary glands, coronary band, interdigital areas
- Neurological signs rare
- Abortion not typically seen
- Recovery within 2-3 weeks
 - Little permanent damage



The incubation period for SVD varies with the route of transmission. It can be as short as 2-5 days if the virus is ingested in contaminated meat or 2-7 days if it is acquired through contact with infected animals or fecal material. Clinical signs are very similar to foot-and-mouth disease, and include fever, salivation, and lameness. Vesicles and erosions can be seen on the snout, mammary glands, coronary band, and interdigital areas, but vesicles in the oral cavity are relatively rare. The infection may be subclinical, mild, or severe depending on the virulence of the strain. Severe signs are generally seen only in pigs housed on damp concrete, with younger animals more severely affected.

Neurological signs (including shivering, unsteady gait, and chorea [rhythmic jerking] of the legs) due to encephalitis are rare, and abortion is not typically seen. Recovery will usually occur within 2-3 weeks with little permanent damage.

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	Foot & Mouth Disease	Vesicular Stomatitis	Swine Vesicular Disease	Vesicular Exanthema of Swine
Clinical Signs by Species	All vesicular diseases produce a fever with vesicles that progress to erosions in the mouth, nares, muzzle, teats, and feet			
Cattle	Oral & hoof lesions, salivation, drooling, lameness, abortions, death in young animals, "spitters"; Disease Indicators	Vesicles in oral cavity, mammary glands, coronary bands, interdigital space	Not affected	Not affected
Pigs	Severe hoof lesions, hoof sloughing, snout vesicles, less severe oral lesions; Amplifying Hosts	Same as cattle	Severe signs in animals housed on concrete; lameness, salivation, neurological signs, younger more severe	Deeper lesions with granulation tissue formation on the feet
Sheep & Goats	Mild signs if any; Maintenance Hosts	Rarely show signs	Not affected	Not affected
Horses, Donkeys, Horses	Not affected	Most severe with oral and coronary band vesicles, drooling, rub mouths on objects, lameness	Not affected	Not affected

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Clinically, all vesicular diseases produce a fever with vesicles that progress to erosions in the mouth, nares, muzzle, teats and feet. Vesicular diseases are clinically indistinguishable from one-another, especially in swine as this chart shows, and diagnosis can only be made through virus isolation initially. Any disease with vesicles and fever should be reported to a state or federal veterinarian.

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Clinical Signs

- Vesicles
 - Feet
 - Snout
 - Tongue
 - Teat



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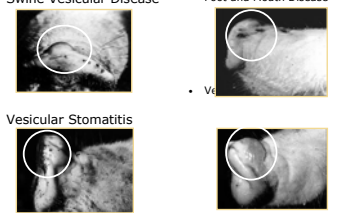
Vesicles on the mouth and hooves are common clinical findings in hogs infected with SVD, and are clinically indistinguishable from lesions of foot-and-mouth disease. The vesicles may be ruptured or unruptured; shown above are ruptured vesicles found on the feet. These photographs show typical lesions on pigs infected with SVD: the vesicles may be ruptured or unruptured, and may be present on the snout, tongue or teat, as shown above. Photos from www.aphis.gov.

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Clinical Comparisons: Snouts

- Swine Vesicular Disease
- Foot and Mouth Disease
- Vesicular Stomatitis



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These photographs show vesicular lesions on the snouts of swine infected with the four viral vesicular diseases which infect swine. They are clinically indistinguishable from each other. Photos from www.aphis.usda.gov.

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Clinical Comparisons: Feet

- Swine Vesicular Disease
- Foot-and-mouth
- Vesicular Exanthema



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These photographs show lesions on the feet of pigs infected with swine vesicular disease, foot-and-mouth, and vesicular exanthema. These diseases are clinically indistinguishable.

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Post Mortem Lesions

- Vesicles are the only post mortem lesions



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The only post-mortem lesions are the vesicles that can be seen in live pigs. These lesions are similar to those of other vesicular diseases, including foot-and-mouth disease. Shown above are vesicles that are common on the snout and hooves of animals infected with SVDV. Photos from www.aphis.usda.gov.

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Differential Diagnosis

- Foot-and-mouth disease
- Vesicular stomatitis
- Vesicular exanthema of swine
- Chemical or thermal burns

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The differentials for swine vesicular diseases include foot-and-mouth disease, vesicular stomatitis, vesicular exanthema of swine, and chemical or thermal burns.

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Sampling

- Before collecting or sending any samples, the proper authorities should be contacted
- Samples should only be sent under secure conditions and to authorized laboratories to prevent the spread of the disease

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Contact authorities if you are suspicious of a vesicular disease. Samples must be properly obtained, securely packaged, and sent to authorized laboratories for diagnosis. Call before sampling as a USDA trained Foreign Animal Disease Diagnostician (FADD) will need to collect and ship the samples.

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Diagnosis

- Clinical
 - Vesicles and erosions on mouth and feet
- Laboratory testing
 - Essential to rule out other vesicular diseases
- Available tests
 - ELISA, direct complement fixation
 - Virus isolation
 - Serology: Virus neutralization, ELISA

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Swine vesicular disease or other vesicular diseases should be suspected when vesicles or erosions are found on the mouth and/or feet of pigs. In swine vesicular disease outbreaks, pigs will be the only species affected, the lesions will be mild, and there will be no mortality. Other vesicular diseases must be ruled out with laboratory tests. Laboratory diagnosis is essential due to clinical similarities to other vesicular diseases, especially foot-and-mouth. SVDV can be identified using enzyme-linked immunosorbent assay (ELISA), the direct complement fixation test, and virus isolation in pig-derived cell cultures. Virus neutralization and ELISA can be used for serological diagnosis.

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SVD in Humans



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SVD in Humans

- Incubation period: 1-2 weeks
- Clinical signs
 - Mild influenza-like symptoms
 - Generalized abdominal and muscle pain
 - Aseptic meningitis (one case)
 - No vesicular lesions
- Diagnosis: seroconversion
- Treatment: supportive care

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As in pigs, this virus is not fatal to humans. Only a small number of human cases have been documented in laboratory workers with contact with SVDV and SVD-infected pigs. The incubation period in humans varies from 1-2 weeks to up to 5 weeks. Aerosolization of the virus is thought to be the major route of transmission but entry into cuts or abrasions is also suspected. Clinical signs include mild influenza-like symptoms (fever, malaise) with generalized abdominal and muscle pain and weakness. Vesicular lesions are not seen. One case developed into aseptic meningitis. All human cases recovered without sequelae. Diagnosis is by seroconversion, and treatment includes supportive care.

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Prevention and Control

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Recommended Actions

- Notification of Authorities
 - Federal:
 - Area Veterinarian in Charge (AVIC)
 - www.aphis.usda.gov/vs/area_offices.htm
 - State veterinarian
 - www.aphis.usda.gov/vs/sregs/official.htm
- Quarantine

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State or federal authorities should be notified immediately if there is suspicion of SVD. Strict quarantine should be imposed in farms or areas that are even suspected of having SVD.

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Control

- Slaughter
 - Infected pigs
 - Pigs in contact with SVD pigs
 - Disposal
- Disinfection
 - 1% sodium hydroxide + detergent
 - Oxidizing agents
 - Iodophors + detergent

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Pigs infected with SVDV and those in contact with them should be slaughtered and disposed of. The premises should be thoroughly cleaned and disinfected. In the presence of organic matter, sodium hydroxide (1% combined with detergent) can be used. Oxidizing agents and iodophors used with detergents work well for personal disinfection in the absence of gross organic matter.

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Vaccination

- Never been done
- Inactivated vaccines
 - Not commercially available
- We all need to do our part
 - Keep our pigs healthy and free of disease



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Although there are inactivated vaccines against SVDV, none are commercially available, and vaccination of pigs has never been undertaken in the field. We all need to do our part in keeping our pigs healthy and free of foreign animals diseases such as SVDV.

Additional Resources

- World Organization for Animal Health (OIE)
– www.oie.int
- USAHA FAD – “The Gray Book”
– www.vet.uga.edu/vpp/gray_book
- Food and Agriculture Organization of the United Nations
– www.fao.org
- USDA-APHIS website
– www.aphis.usda.gov

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