

VESICULAR STOMATITIS

- [Definition](#)
- [Etiology](#)
- [Host Range](#)
- [Geographic Distribution](#)
- [Transmission](#)
- [Epidemiology](#)
- [Incubation Period](#)
- [Clinical Signs](#)
- [Gross Lesions](#)
- [Morbidity and Mortality](#)
- [Differences Between VS and FMD](#)
- [Diagnosis](#)
- [Field Diagnosis](#)
- [Control and Eradication](#)
- [Public Health](#)
- [References](#)
- [FAD Table of Contents](#)

Definition [top](#)

Vesicular stomatitis (VS) is a viral disease characterized by fever, vesicles, and subsequent erosions in the mouth and epithelium on the teats and feet. Horses, cattle, and pigs are naturally susceptible; sheep and goats are rarely affected.

Etiology [top](#)

The vesicular stomatitis virus is a *Vesiculovirus* in the family *Rhabdoviridae*. The virion is a large bullet-shaped (65-185 nm) RNA virus. There are two serotypes of VSV: New Jersey and Indiana 1. In the serotype Indiana 1, there are two subtypes: Indiana 2 (Cocal) and Indiana 3 (Alagoas). In addition to these two serotypes of VSV, there are other viruses within the genus *Vesiculovirus* that can experimentally cause vesicular lesions in domestic animals and infect humans; these are as follows:

Piry — first isolated from an opossum in Brazil.

Chandipura — first isolated from a person in India.

Isfahan — isolated from sandflies and humans in Iran.

Effective disinfectants are 2 percent, sodium carbonate - 4 percent, sodium hydroxide - 2 percent, iodophore disinfectants and chlorine dioxide disinfectants.

Host Range [top](#)

The host range in decreasing order of severity of infection are horses, donkeys, mules, cattle, swine, and man.

South American camelids develop clinical infection.

Sheep and goats are quite resistant and rarely become affected.

Vesicular stomatitis virus has also been shown experimentally to infect a wide host range, including deer, raccoons, bobcats, and monkeys.

Geographic Distribution [top](#)

Classical VS occurs only in North and Central America and the northern part of South America. Serotypes New Jersey and Indiana I occur in the United States and Central America. Serotypes New Jersey and Indiana 1, 2, and 3 occur in South America.

Transmission [top](#)

The vesicular stomatitis virus has been shown to be transmitted by the sand fly (*Lutzomyia shannoni*) and the black fly (*Simuliidae*). Transovarial transmission has been shown to occur in both flies. The VS-NJ serotype was isolated from a variety of field-collected hematophagous insects such as *Culicoides* (biting midges), *Simuliidae* (black flies), *Aedes* (mosquitoes) and nonbiting insects such as *Chloropidae* (eye gnats), *Anthomyiidae*, and *Musca* (house flies) during the 1982 epizootic in the southwestern United States (1). Except for *Lutzomyia* and *Simulidae*, the role of these other insects in the transmission of VSV is unknown. Before the 1982 outbreak in the United States, people, on the basis of past experience, expected an outbreak to stop about 2 weeks after a killing frost. In the 1982 outbreak, cases and spread occurred through the winter. The winter spread of the disease is believed to have resulted from movement of infected animals and the resulting exposure of uninfected animals to contaminated waterers and feed bunks as well as contact with infected animals. It is known that VSV can be spread by a contaminated milking machine. Overwintering did not occur in the 1995 outbreak in the United States.

Humans may be infected by contact and by aerosol.

Epidemiology [top](#)

The disease occurs throughout the year in subtropical and tropical areas of the Americas. The disease occurs sporadically during the warm months in southern and western United States. Epidemics have occurred irregularly at 10 to 15 year intervals. The virus is spread by insect vectors, movement of infected animals, and contaminated objects. Researchers have shown transovarial transmission in the sand fly and black fly; this may be a way the virus can overwinter.

Incubation Period [top](#)

A vesicle appears in about 24 hours after intradermal lingual inoculation of VSV. This similar to the incubation period for foot-and-mouth disease.

In humans, the incubation period is 24 to 48 hours.

Clinical Signs [top](#)

Animals develop a fever ranging to 104-106° F (40-41° C).

Horse

Vesicles in the mouth may cause the animal to chomp its jaws, drool, and rub its mouth on the manger or other objects. Lesions on the coronary band can cause lameness.

Cattle and pigs

See the clinical signs section in the FMD chapter. The signs are very similar.

Humans

In humans, VSV causes an influenza-like illness; there is fever, headache, muscular aches, and blisters in the mouth similar to those caused by herpesvirus. The disease course is 4 to 7 days.

Morbidity and Mortality [top](#)

Interesting data on the economic effect of VS in cattle were collected by Alderink

during the 1982 outbreak of VS in Colorado. In 13 of the dairy herds studied, there were 2,404 cows and 378 cases of VS. Lesion distribution in these 378 was as follows:

Oral lesions only	263 animals (69.3%)
Teat lesions only	87 animals (23%)
Oral and teat lesions	22 animals (5.8%)
Foot lesions only	7 animals (1.9%)

Herds experiencing primarily oral lesions had an attack rate of 19.8 percent. The attack rate in two of four herds with teat lesions was 55.8 percent and in the other two herds 1.6 percent. The clinical course in cases with oral lesions was 23.8 days. Mastitis complicated 72% of the cases with teat lesions.

The total cost to the 13 dairymen was \$95,752, which came to an average cost of \$253 per case. The approximate cost of a case with only oral lesions was \$174 in contrast to an average cost of \$568 for cases with teat lesions. Of the total \$95,752 loss, 46 percent was for cows culled; 30 percent was for decreased production; 11 percent for deaths; and 11 percent for drugs, labor, weight loss, and veterinary charges.

Differences Between VS and FMD [top](#)

The characteristics of VS are as follows:

Horses affected.

Sporadic incidence in the herd (see preceding).

Distribution of lesions in an animal (small percentage of animals have lesions at more than one site of predilection; see preceding).

No rumen lesions observed at necropsy.

No heart lesions observed at necropsy.

Vesicular stomatitis is less severe in young animals.

Stabled animals usually not affected.

In spite of these differences, do not attempt to make a final differential diagnosis in the field; get laboratory confirmation of the diagnosis.

Diagnosis [top](#)

[See FMD chapter.](#)

Field Diagnosis [top](#)

Differential diagnosis for VS in cattle should include foot-and-mouth disease, foot rot, and chemical and thermal burns. In cattle, oral lesions caused by rinderpest, infectious bovine rhinopneumonitis, bovine virus diarrhea, malignant catarrhal fever, and bluetongue can be similar to the later lesions in FMD. In pigs, the differential diagnosis for VS should include foot-and-mouth disease, swine vesicular disease, vesicular exanthema of swine, foot rot, and chemical and thermal burns. In sheep, the differential diagnosis for VS lesions should include bluetongue, contagious ecthyma, lip and leg ulceration, and footrot.

Control and Eradication [top](#)

Control movement of animals — no movement from an infected premise, except for slaughter, for 30 days after last lesion has healed.

Separate infected and healthy animals.

Stable animals if possible.

Disinfect milking machines between cows.

Milk infected cows last.

Control insects.

Commercial vaccines are available, but efficacy has not been field tested.

Public Health [top](#)

Vesicular stomatitis (New Jersey and Indiana) infection frequently occurs in man and causes influenza-like symptoms but rarely results in vesicles. Other vesicular stomatitis viruses (Piry, Isfahan, and Chandipura) are much more infectious for man.

GUIDE TO THE LITERATURE [top](#)

1. FRANCEY, D.B., MOORE, G.C., JACOB, W.L., TAYLOR, S.A., and CALISHER, C.H. 1988. Epizootic vesicular stomatitis in Colorado, 1982. Isolation of virus collected from insects from along the northern Colorado Rocky Mountain Front Range. J. Med. Entomol., 25:342-347.
2. KRAMER, W.L., JONES, F.R., HOLBROOK, F.R., WALTON, T.E., and CALISHER, C. H. 1990. Isolation of abroviruses from *Culicoides* midges (*Diptera: Ceratopogonidae*) in Colorado during an epizootic of vesicular stomatitis New Jersey. J. Med. Entomol., 27:487-493.

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