

# Information About Vesicular Stomatitis for the Dairy Producer

## Vesicular Stomatitis

Vesicular stomatitis is a sporadic, reemerging viral disease characterized by vesicular lesions on the tongue, oral mucosa, teats, or coronary bands of cattle, horses, and swine. The disease also affects sheep and goats. Many species of wild animals, including deer, bobcats, goats, raccoons, and monkeys, are also susceptible. People who handle infected animals also can become infected with vesicular stomatitis.

Vesicular stomatitis is most likely to occur during warm months in the Southwest, particularly along riverways and in valleys. The Southwestern United States experienced a vesicular stomatitis outbreak from May 1998 through January 1999.

Aside from its economic impact, vesicular stomatitis is significant because its outward signs are similar to (although generally less severe than) those of foot-and-mouth disease, a devastating foreign disease of cloven-hoofed animals that was eradicated from the United States in 1929. The only way to diagnose and differentiate these diseases is through laboratory tests.

The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) works to keep vesicular stomatitis from becoming established in the United States because of its similarity to other diseases of concern, its negative impact on livestock production, and its public health implications. Vesicular stomatitis is a disease that must be reported to the international animal health community when an outbreak is discovered. Individual countries may then take steps to restrict imports of U.S. livestock during outbreaks. Exports would be restricted to an even greater extent if vesicular stomatitis were allowed to spread in this country.

## Mode of Transmission

Vesicular stomatitis has been confirmed only in North, Central, and South America. The disease is endemic in the warmer regions of the Western Hemisphere, but sporadic outbreaks occur in temperate geographic areas.

How vesicular stomatitis spreads is not fully known; insect vectors, mechanical transmission, and movement of animals may be responsible. Once introduced into a herd, the disease moves from animal to animal by contact or exposure to saliva or fluid from ruptured blisters.

## Clinical Signs

The incubation period for vesicular stomatitis ranges from 2 to 8 days. Infected animals suffer from blisterlike lesions in the mouth and on the dental pad, tongue, lips, nostrils, hooves, and teats. Mouth lesions can be so painful that animals generally refuse to eat or drink. Infected animals usually experience severe weight loss. Fever can occur immediately before or at the same time lesions first appear but is of short duration and thus is detected rarely. The most common clinical sign in cattle is drooling or frothing at the mouth.

Fever and decreased feed intake commonly cause severe drops in milk production in dairy cows. About 25 percent of infected dairy cattle suffer teat lesions that can lead to mastitis. Foot lesions cause lameness in less than 5 percent of infected cattle. Vesicular stomatitis does not generally cause animals to die.

The number of infected cattle in a herd varies. Five to 10 percent of animals within an infected herd typically show clinical signs, and up to 80 percent of the animals in a herd may become infected. If there are no complications, such as secondary infections, infected animals recover in about 2 weeks. However, the ulcers may take up to 2 months to heal, and healing animals may still spread the disease.

## Human Health Risks

People who handle an infected animal can contract vesicular stomatitis if they fail to follow proper biosafety methods. In humans, vesicular stomatitis causes an acute influenzalike illness with symptoms such as fever, muscle aches, headaches, and malaise. Vesicular lesions are rare in humans. Prevalence in humans may be underreported because the disease often goes undetected or is misdiagnosed. People who handle potentially infected cattle should wear gloves to protect their hands and should not allow saliva and blister fluids to come in contact with open wounds or with their mucous membranes, such as the membranes in their eyes or mouth. Producers and other individuals who handle cattle and experience symptoms should contact their physician immediately.

## Economic Impacts

In an effort to assess the financial impact vesicular stomatitis can have on dairy herds, New Mexican dairy cattle owners were surveyed about the 1995 summer and fall outbreak in the Western United States. Two dairies were identified as harboring vesicular stomatitis. The impact on one dairy was minor, costing only \$1,150. The main cost was the extra feed needed for quarantined animals that could not be marketed. The second dairy had 25 cows infected with vesicular stomatitis. This dairy experienced drops in milk production and had to cull all 25 cows. The total loss to this dairy was \$24,664, two-thirds of which was due to the culling.

Additional data on vesicular stomatitis economic impacts were published in the Journal of the American Veterinary Medical Association (Goodger, W.J., Thurmond, M., and et al., volume 186: page 370-373; 1985). The study lists estimated losses per cow due to vesicular stomatitis outbreaks in dairies in various States. For instance, California Dairy A, \$97; Dairy B, \$202; Idaho \$123; Washington \$194; and Colorado \$253. For the two California dairies (1,569 cows milked), per-cow losses translated into a total loss of \$225,000 in a 2-month period.

Also outlined in the study were six categories of losses due to a 1982 vesicular stomatitis outbreak in the San Joaquin Valley, CA. The following table shows the categories and percentages of overall economic losses.

Overall Loss Category	(percent)
Increased culling	40-50
Reduced milk production	20-30
Increased mortality	10
Indirect losses from calf mortality and quarantine	7-8
Early dry-off	3-4
Increased labor, medicine, and veterinary costs	3-4

**Increased Culling**—Losses from an increase in culling were based on the cost of replacing an infected animal with one of similar genetic potential less the salvage value (beef value) of the infected animal. Involuntary culling in large numbers took place because of the number, severity, and rapid development of clinical cases. Infected animals were debilitated and suffered severe weight loss, up to 400 pounds. Fewer cattle may have been culled if milking was discontinued early to reduce stress.

**Reduced Milk Production**—Revenue lost from the decrease in milk production was based on the difference between an average herd's milk production before and during the outbreak. Milk production in dairy cows with vesicular stomatitis varies depending on where lesions are located on the animals.

Therefore, dairies that have a higher proportion of animals with teat lesions experience greater losses.

**Increased Mortality**—Economic losses from higher mortality rates were based on any mortality rate above normal for a particular dairy. The cost included both replacing and rendering infected animals.

**Calf Mortality**—Because dairies are more concerned with reducing adult herd losses than caring for quarantined calves, the increase in calf mortality rates was not due to the disease. The maintenance of quarantined calves and their feed were additional costs.

**Increased Labor, Medicine, and Veterinary Costs**—In addition to costs for medicine and veterinary services, more personnel were hired to handle increased management responsibilities during the outbreak.

## Reducing Economic Losses

When a dairy herd becomes infected with vesicular stomatitis, producers can reduce economic losses by implementing management practices that will minimize the spread of the disease to susceptible herd mates and effectively treat infected animals. Producers also should take precautions to prevent human infection.

**Facilities and Equipment**—Vesicular stomatitis can spread rapidly within a herd through direct contact between animals, common feed and water troughs, insects, and inanimate objects that can harbor the virus, including feeding equipment and bedding. To maintain facilities and equipment hygienically, managers should

- Clean and sanitize feed bunks, water sources, and milking facilities daily.
- Rinse, disinfect, and rerinse calf buckets, nipples, and other utensils after each feeding.
- Use different boots or disinfectant footbaths when moving between clean and infected areas. Phenolic- and halogen-based disinfectants work best (see the tabulation under "Effective Disinfectants"). Sunlight and heat also destroy the virus quickly.
- Clean and sanitize feeding and cleaning equipment before using with healthy animals.
- Implement an animal and facility vector-control program.
- Maintain ground surface conditions that minimize the risk of foot injury. Foot skin integrity can be enhanced by routine bathing in antiseptic solutions.
- Maintain safe milking equipment to prevent teat abrasions and trauma: use soft liners; check and adjust the pulsation rate, teat-end vacuum, airflow, and vacuum reserve; adjust automatic takeoffs to prevent over- or undermilking; carefully and gently remove units by cutting vacuum; adjust squeaky liners.

- Flush, wash, and/or scrape alleyways after each milking.

**Feed**—Feed cattle high-quality forage and soft grains to reduce mouth injuries. Place concentrates in a clean bunk on top of hay or silage. Do not feed calves or other livestock colostrum from infected animals. Compost, ferment, or burn leftover feed daily.

**Treatment**—Producers should implement treatments to reduce secondary bacterial infection and promote healing. Supportive care, such as adding high-energy liquid gruel feed and electrolytes to the water supply, is the single most important treatment. Older, higher milk-producing cows in the early phase of lactation are at highest risk of vesicular stomatitis infection. Monitor these animals carefully. Consult a veterinarian about which lesions to treat.

Uncomplicated, untreated oral ulcers usually heal in 2 weeks, and cows are back on feed within 7 days of showing clinical signs. To hasten healing of infected animals, implement the following treatments:

- Swab oral ulcers with a 1 to 2 percent solution of Lugol's iodine and with oral and injectable antibiotics, and observe appropriate antibiotic withdrawal periods.
- Spray foot ulcers twice daily with a saturated solution of copper sulfate.
- Treat teat ulcers with a spray solution of an antibiotic and antiinflammatory drug.
- Treat mastitic quarters by using an aseptic technique; predip teat, wipe with alcohol, and redip teat after infusion.
- Treat uncommon conditions such as ketosis and neurologic complications, which are possible consequences of a vesicular stomatitis infection.
- Consider infected animals for early dry-off to reduce stress and further debilitation and to prevent culling.

## Prevention

**Adding Cattle to a Herd**—Cattle that are already infected with vesicular stomatitis or that have been in contact with infected animals can introduce it into healthy dairy herds. Producers should ascertain that new cattle come from sources that have not had animals with clinical signs of vesicular stomatitis in the past 3 months. Producers should isolate newly arrived cattle and calves from the rest of the herd for at least 21 days. The isolation area is ideally offsite and as far away from the main herd as feasible.

Producers should exercise similar precautions to avoid reintroducing vesicular stomatitis into a herd that has just recovered from the disease. Cattle can become reinfected with the virus after only a few weeks.

**Animal Movement**—Intermingling infected and healthy animals may contribute to the spread of vesicular stomatitis. Producers should take the following precautions in limiting animal movement:

- Isolate infected animals and maintain them in an area physically removed from other cattle as soon as signs appear.
- Minimize interpen movement of all animals.
- Remove calves from infected dams immediately, and keep these calves separated from others.
- Isolate dead animals for pickup by a salvage truck.
- Spray carcasses around the mouth, teats, and feet with disinfectant, and treat with insecticide.
- Avoid putting cattle into contact with livestock and other animals, such as dogs, cats, rodents, birds, and insects. The same rules apply here as for isolating new herd additions from the main herd. The goal is to minimize or prevent the entrance of any potential biological or mechanical vector of vesicular stomatitis into dairy units.

**Controlling Insects**—Preventive activities should incorporate insect controls because insects are thought to be vectors. Consult your veterinarian for advice on selecting an insecticide approved for use with lactating animals. In addition to animal and premises treatment, eliminate habitats favorable to insect survival. For example, screen the windows of all buildings where animals are housed, and eliminate standing water and objects that attract insects.

**Mechanical Transmission**—Scientists suspect that the vesicular stomatitis virus is transmitted also by people or inanimate objects such as feeding or cleaning utensils and health-care equipment (needles, nose tongs, etc.). Producers should take precautions to avoid transferring equipment and personnel between isolates and the main herd. Use separate sets of equipment for each group wherever possible. If equipment is shared, clean and disinfect it thoroughly between uses at different dairy facilities. Also, clean and disinfect feed bunks and water sources daily. Personnel should shower and change clothing and boots when moving between isolates and the main herd. If production logistics permit, care for isolated animals after the main herd to avoid cross-contamination.

Keep service personnel and other visitors entering the dairy unit to an absolute minimum. Again, require showers and clothes changes for these personnel. If possible, prevent feed, delivery, supplies, and other trucks from directly entering the dairy unit. Ask drivers if they have visited other dairy facilities and if they have taken appropriate cleaning and disinfecting precautions. Service personnel often visit multiple

dairy operations on any given day, and they and their vehicles, shoes, clothing, and equipment represent a potential source of disease transmission.

Farm vehicles that are used for transporting cattle to slaughter or that are driven to places where other cattle-hauling trucks and producers congregate should be cleaned and disinfected. Drivers of these vehicles should change contaminated clothing before returning to their home base.

For footbaths and disinfection of facilities and equipment, phenolic- and halogen-based disinfectants work best. Sunlight and heat also destroy the virus quickly.

**Effective Disinfectants**—The following table shows disinfectants found to be effective in inactivating the vesicular stomatitis virus when used for 10 minutes.

Disinfectant	Concentration
Chlorine bleach	0.645 percent
Wescodyne™	4 percent
Cresylic acids	1 percent
Roccal™	1:200
Septisol™	1:50

**Vaccination**—Vesicular stomatitis vaccines for cattle have been available intermittently during outbreak years. However, little information is known about their efficacy in preventing infection, reducing clinical signs associated with infection, or lessening the economic impact of infection. Check with your State Veterinarian's office for information on availability of vaccines and permits that may be required.

## Recommended Practices for Milking Cattle

To enter and infect an animal, the vesicular stomatitis virus requires a break in the skin. Therefore, dry, chapped, or cracked teats predispose cattle to infection. Producers should take measures to maintain or restore healthy teat condition. Producers should not use teat balm preparations on healthy teats because the transmission of the virus may be enhanced and secondary bacterial mastitis can develop. Infected animals that develop mastitis are often culled. Milkers should wear rubber gloves and eye protection. Milk healthy cows before infected ones.

## Infected and Healthy Animals

- Prewash teats, if necessary, with diluted acid detergent and emollient to soften and remove soil.
- Clean and examine teats carefully.
- Daub teats dry with a soft paper towel.
- After milking, use iodine-based teat dip with a high concentration of emollient. Latex-based teat dips may provide a shield against virus entry.

- Use separate dip dispensers for infected and healthy animals.
- Dip milkers' gloves in tamed 4 percent iodine and rinse with water before milking the next animal.
- Dip liners in all units between every 2 or 3 animals in tamed 4 percent iodine and rinse well with water. Dip liners also if a newly infected animal is inadvertently milked with the regular milking string.
- Empty, wash, and spray feed bunks and floors with disinfectant and rinse with water between strings.

## Infected Animals

- Do not milk with the same milking string animals that are drooling, foaming at the mouth, or have new teat blisters. Place these animals with other infected animals and milk them last.
- Dip teats with new blisters in tamed 4 percent iodine and rinse with water before milking. Do not let the iodine dip enter the milk line.
- Spray painful ulcers with topical anesthetic 3 to 5 minutes prior to attaching the milking equipment. Blisters can develop into painful ulcers, resulting in poor milk letdown and difficulty in keeping the milking equipment attached. The administration of 100 mg of oxytocin may be necessary to induce milk letdown.
- Perform a California mastitis test (CMT) on foremilk from quarters with teat lesions; if results are greater than a trace, treat with an extramammary antibiotic preparation used for lactating cows and observe appropriate withdrawal periods.

## Impact on Reproduction

Vesicular stomatitis seems to have no direct impact on reproduction. The virus is not known to cause abortion or fetal resorption. In past outbreaks, heat-detection efficiency suffered, but this appears to be due to lack of management capacity rather than a direct result of the disease. The number of cows observed in heat may drop below 60 percent. The impact of missed heats may persist over many months as the average number of days in milk increases, as does the average days open. If infected cows become debilitated, they may experience delayed uterine involution and subsequent delays in the resumption of normal estrous cycles after calving.

Producers do not need to alter reproduction management practices during an outbreak, except to make sure that the artificial insemination technician does not spread the disease through mechanical transmission. There is no evidence to suggest that the virus can spread by artificial insemination or rectal palpation other than by use of the contaminated equipment.

## Minimizing the Risk of Spread

Producers should take measures to minimize the risk of spreading vesicular stomatitis through infected cattle and calves' saliva and blister fluids. Temporarily eliminating procedures involving the head and feet, such as dehorning and foot trimming, should be considered. Delaying practices such as tattooing, vaccination (especially intranasal), removal of dewclaws or extra teats, administration of magnets, and ear tagging may decrease the spread of the virus to herd mates.

## Report Suspicious Cases

Vesicular stomatitis infection in a dairy herd can cause significant financial losses. Implementing appropriate, recommended management practices and working closely with your veterinarian can reduce the losses. Veterinarians and livestock owners who suspect an animal may have vesicular stomatitis or any other vesicular disease should immediately contact State or Federal animal health authorities.

## Additional Information

For more information, contact  
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or visit our Web site at [www.aphis.usda.gov/vs](http://www.aphis.usda.gov/vs).

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