



FOOT-AND-MOUTH DISEASE

Susceptible Species

Cattle
Small ruminants
Swine
Water buffalo
Wildlife
Not Horses

**ALERT
CALL TAHC
800 550-8242**

**OR
USDA
512-916-5551**



Clinical Manifestations

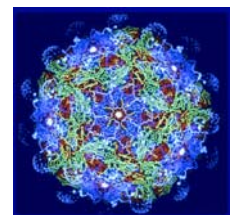
- Initially see general decline, loss of appetite, and fever
- Vesicles and erosions in the mucosa of the mouth, and skin-hoof junction
- Excessive salivation
- Lifting feet alternately and lameness
- Clear nasal discharge progressing to mucopurulent
- Lesions on entire dorsal surface of tongue coalesce before rupture, huge lesions
- Erosions have serrated edges
- Signs develop rapidly in cattle and are more severe than lesions in pigs, sheep or goats.
- If all species are exposed together, cattle will show signs first.



Incubation

- Incubation period depends on which strain of FMD virus (7 serotypes), dosage, and the route of entry.
- As short as **2-3 days**
- As long as **10-14 days**
- Experimentally shown to be as short as 18-24 hours

- 24 hrs after infection, virus begins replicating in nasopharynx and lungs
- Subsequent viremia with spread to lymph nodes and body fluids
- Fever, appearance of vesicles
- Rupture of vesicles increases severity of signs



Excretion of FMD virus can begin up to 14 days BEFORE clinical disease becomes apparent.



FOOT-AND-MOUTH DISEASE

Transmission

Ingestion or inhalation of infective particles of FMD virus

Direct or indirect contact-droplets

Vectors (vehicles, equipment, or humans)

Aerosols/Airborne

- Spread by aerosols from infected animals, given the right temperature and humidity, can cover many miles.
- Aerosols from bulk milk spread FMD in England.
- A person in contact with infected animals may retain and exhale virus for up to 36 hours and serve as an “airborne” source of infection.



Foot and mouth disease virus can be transmitted via:

- *Exhaled air*
- *Milk*
- *Saliva*
- *Feces*
- *Urine*
- *Semen*
- *Fluid from ruptured vesicles*

Carrier State

- Up to 50% of recovered ruminants continue to shed the virus sporadically, 6-24 months post-infection, may extend to 36 months.
- Carrier state in water buffalo, cattle, sheep and goats; Water buffalo can be carriers for 5 years
- Virus is excreted in HIGH quantities in expired air, in all secretions including milk, and from ruptured vesicles
- Swine may aerosolize up to 400,000,000 infective particles per day, even before evidence of clinical signs.



- It only takes 10-40 infective virus particles to infect one cow via inhalation



FOOT-AND-MOUTH DISEASE

Clinical Signs in Cattle

- Fever (up to 103°-106°)
- Depression
- Anorexia
- Milk production ceases
- Blisters start to form in the mouth
- Excessive salivation follows
- Blisters rupture within 24 hrs leaving raw, painful ulcers
- Mouth lesions may heal in 10 days



Blisters form on the

mouth
tongue,
dental pad,
gums,
soft palate
muzzle,
nostrils
teats
feet at the inter-digital space and coronary band



- Body tremors from pain
- Lameness from developing lesions on feet
- Permanently unthrifty due to lesions in GI tract
- Smacking of the lips and sucking of the sore tongue is characteristic
- Secondary bacterial infections
- Mastitis –permanent damage to udder
- Pregnant cows may abort

Animals may recover in 2 weeks.

High morbidity

Morbidity approaches 100% in a susceptible herd.

Low mortality

Only 1-5% of infected adult cattle die from FMD

Rarely fatal except in young animals; 50-80% exposed young animals die

Extra-epithelial replication limited to myocardium; occurs in immature animals only.

Young calves may die without showing any clinical signs. There will be focal necrosis of cardiac muscle. “Tiger heart”



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Clinical Signs in Swine

- Fever
- No appetite
- Reluctant to move
- Worst blistering is on the feet
- May slough the hoof
- Abortion
- Suckling piglets die suddenly – even before blisters develop
- Not known to be carriers naturally
- Shed virus in extremely high quantities while infected



Courtesy of Bill White and Tom McKenna





FOOT-AND-MOUTH DISEASE

Clinical Signs in Sheep

- Vesicles on dental pad and between toes
- May appear similar to Orf
- Prone to develop secondary foot-rot
- Lamb death, 50-90%
- Sheep can be carriers for up to 9 months



When sheep become infected with FMD, the disease may not be diagnosed for a considerable time because the clinical signs may be very mild.

Sheep may appear healthy but will be producing infectious aerosols or spreading the virus via urine, feces or direct contact.

Goats respond similarly to sheep.

Clinical Signs in Wild Species



Images courtesy of Suzanne Burnham, Linda Logan, Kathy Appicelli, Corrie Brown, Moritz Van Vuuren, and USDA