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Popular Article

Foot And Mouth Disease: Highly Contagious Viral Disease of Livestock

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Introduction

Foot and mouth disease (FMD) is a highly contagious viral disease that primarily affects cloven-hooved livestock and wildlife. Although adult animals generally recover, the morbidity rate is very high in naive populations, and significant pain and distress occur in some species. Sequelae may include decreased milk yield, permanent hoof damage and chronic mastitis. High mortality rates can sometimes occur in young animals or in some wildlife populations.

The foot and mouth disease virus (FMDV) are a member of the genus Aphtho virus in the family Picornaviridae. There are seven major viral serotypes: O, A, C, SAT 1, SAT 2, SAT 3 and Asia 1. Serotype O is the most common serotype worldwide. FMDV mainly affects members of the order Artiodactyla (cloven-hooved mammals). Most species in this order are thought to be susceptible to some degree. Important livestock hosts include cattle, pigs, sheep, goats, water buffalo and yaks. Cattle are important maintenance hosts in most areas, but a few viruses are adapted to pigs, and some isolates might circulate in water buffalo.

Transmission

The virus may be present in milk and semen for up to 4 days before the animal shows clinical signs of disease.

- Infected animals newly introduced into a herd (carrying virus in their saliva, milk, semen, etc.).

- Contaminated pens/buildings or contaminated animal transport vehicles.
- Contaminated materials such as hay, feed, water, milk or biologics. Contaminated clothing, footwear, or equipment.
- Virus-infected meat or other contaminated animal products (if fed to animals when raw or improperly cooked). Infected aerosols (spread of virus from an infected property via air currents).

Clinical Signs

FMD is typically an acute febrile illness with vesicles (blisters) localized on the feet, in and around the mouth, and on the mammary gland. Vesicles occur occasionally at other locations including the vulva, prepuce, or pressure points on the legs and other sites. The vesicles usually rupture rapidly, becoming erosions. Pain and discomfort from the lesions leads to clinical signs such as depression, anorexia, excessive salivation, lameness and reluctance to move or rise. Lesions on the coronary band may cause growth arrest lines on the hoof. In severe cases, the hooves or footpads may be sloughed.

Reproductive losses are possible, particularly in sheep and goats. Deaths are uncommon except in young animals, which may die from multifocal myocarditis or starvation. Most adults recover in 2 to 3 weeks, although secondary infections may slow recovery. Possible complications include temporary or permanent decreases in milk production, hoof malformations, chronic lameness or mastitis, weight loss and loss of condition.

Fig. 1: This photograph showing vesicles on limb of cattle

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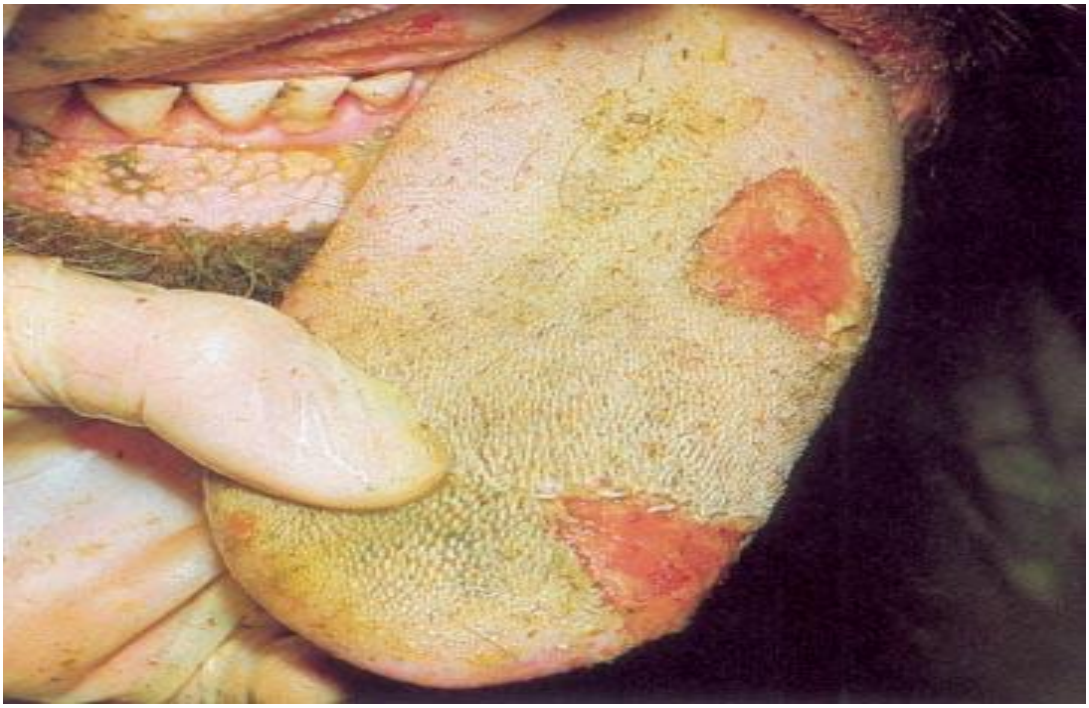

Fig. 2: This photograph showing vesicles on tongue and oral cavity of cattle

Post Mortem Lesions

The characteristic lesions of foot and mouth disease are single or multiple, fluid-filled vesicles or bullae. The earliest lesions can appear as small pale areas or vesicles, while ruptured vesicles become red, eroded areas or ulcers. Erosions may be covered with a gray fibrinous coating, and a demarcation line of newly developing epithelium.

Loss of vesicular fluid through the epidermis can lead to the development of "dry" lesions, which appear necrotic rather than vesicular. Among domestic animals, dry lesions are particularly common in the oral cavity of pigs.

Common sites for lesions include the oral cavity and snout/ muzzle, the heel, coronary band and feet; the teats or udder; pressure points of the legs; the ruminal pillars (in ruminants); and the prepuce or vulva.

Coronitis may be seen on the hooves, and the hooves or claws may be sloughed in severe cases. Involvement of the pancreas, as well as heart failure and emaciation.

In young animals, cardiac degeneration and necrosis can result in irregular gray or yellow lesions, including streaking, in the myocardium, these lesions are sometimes called "tiger heart" apperance. Piglets can have histological evidence of myocarditis without gross lesions in the heart.

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Signs of septicemia, abomasitis and enteritis, as well as myocarditis, have been reported in lambs.

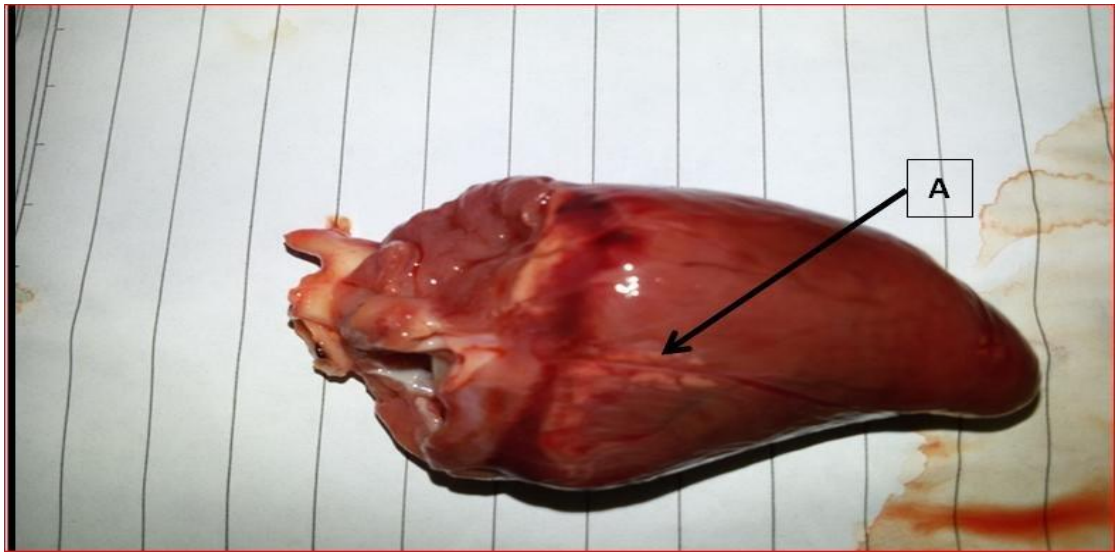

Fig. 3: Gross photograph showing "tiger- heart" appearance in calf's heart (Pathognomic lesion)

Laboratory diagnosis

Samples

- 1 g of tissue from an unruptured or recently ruptured vesicle
- Epithelial samples should be placed in a transport medium which maintains a pH of 7.2–7.6 and kept cool.
- Oesophageal-pharyngeal fluid collected by means of a probang cup. Probang samples should be refrigerated or frozen immediately after collection.
- Antigen ELISA – detects FMD viral antigen and identifies serotype, preferred over CF test.
- Complement fixation test – less specific and sensitive than ELISA.

Virus isolation:

Inoculation of primary bovine (calf) thyroid cells or primary pig, calf and lamb kidney cells; inoculation of BHK-21 and IB-RS-2 cell lines; inoculation of 2-7 day old unweaned mice.

Once cytopathic effect is complete, culture fluids (or musculo-skeletal tissues from dying mice) can be used in CF, ELISA or PCR tests.

Treatment

No specific treatment for FMD, other than supportive care. Treatment is likely to be allowed only in countries or regions where FMD is endemic.

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Prevention

Measures that are recommended at the farm level include:

- Control over people's access to livestock, equipment and introduction of new animals into existing herds.
- Regular cleaning and disinfection of livestock pens, buildings, vehicles and equipment.
- Monitoring and reporting of illness. Appropriate disposal of manure and dead carcasses.

Contingency planning for potential outbreaks will identify the elements included in a response effort to eradicate the disease, such as:

- Humane destruction of all infected, recovered and FMD-susceptible contact animals.
- Appropriate disposal of carcasses and all animal products.
- Surveillance and tracing of potentially infected or exposed livestock.
- Strict quarantine and controls on movement of livestock, equipment, vehicles.
- Thorough disinfection of premises and all infected materials (implements, cars, clothes, etc.).

Use of vaccination

Ring vaccination is Control of foot-and-mouth disease by ring vaccination may be carried out in a country with a completely susceptible livestock population. It involves the vaccination of all susceptible animals in a prescribed area around an outbreak.

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