

FOOD ANIMAL MEDICINE (VCM 501) LECTURE NOTES ON:

SHEEP POX AND GOAT POX

Definition

Sheep and goat pox are contagious viral diseases of small ruminants. These diseases may be mild in indigenous breeds living in endemic areas, but are often fatal in newly introduced animals.

Importance

Economic losses result from decreased milk production, damage to the quality of hides and wool, and other production losses. Sheep and goat pox can limit trade and prevent the development of intensive livestock production. They may also prevent new breeds of sheep or goats from being imported into endemic regions.

Etiology

Sheep pox and goat pox result from infection by sheep-pox virus (SPV) or goat-pox virus (GPV), closely related members of the *Capripox* genus in the family Pox-viridae. Most isolates are host specific, with SPV mainly causing disease in sheep and GPV predominantly affecting goats. However, some isolates can cause serious disease in both species. SPV and GPV are closely related to the virus that causes lumpy skin disease in cattle (LSDV).

Species Affected

Sheep and goat capripox viruses cause disease only in these two species. Many SPV isolates are specific for sheep, and many GPV strains are specific for goats, but some strains of these viruses readily affect both species. Infections have not been reported in wild ungulates.

Geographic Distribution

Sheep pox and goat pox are found in parts of Africa and Asia, the Middle East, and most of the Indian subcontinent.

Transmission

SPV and GPV are often transmitted by aerosol route, close contact and flies. These viruses can remain infectious for up to six months in shaded sheep pens. They may also be found on the wool or hair for as long as three months after infection, and possibly longer in scabs.

Clinical Signs

The incubation period varies from four to 21 days, but it is usually 1 to 2 weeks. Clinical signs generally appear sooner when the virus is inoculated by insects than when it is transmitted in aerosols. The clinical signs vary from mild to severe, depending on the animal's age, breed, immunity and other factors. Inapparent infections also occur. Clinical signs in sheep and goats are similar but generally less severe in goats. Fever, swollen eyelids, mucopurulent nasal discharges, widespread skin lesions especially on the muzzle, ears, areas free of wool or long hair. Lesions start as erythematous areas on the skin and progress rapidly to raised, circular plaques with congested borders caused by local inflammation, edema and epithelial hyperplasia. When scabs are removed, a star shaped scar, free of hair or wool remains. In severe cases, lesions can develop in the lungs.

All superficial lymph nodes usually become enlarged within a day of the appearance of generalized papules; the prescapular lymph nodes are particularly noticeable.

Nodules in the intestines can cause diarrhea. Depression and emaciation may be seen in some animals. Abortions can occur but are not common.

Capripox lesions can take several weeks to heal, and may leave permanent scars on the skin. During healing, they are susceptible to fly strike. Secondary bacterial infections, including pneumonia, are common, and death can occur at any stage of the disease. Recovery can be slow if the animal was severely affected.

Infection results in solid and enduring immunity.

Capripox lesions have a predilection for areas of sparsely woolled/ haired skin such as the axillae, muzzle, eyelids, ears, mammary gland and inguinal area, but in more severe cases, they may cover the body. In animals with heavy wool, the lesions can be easier to find by palpation than

Morbidity and Mortality

Morbidity and mortality vary with the breed of the animal, its immunity to capripox viruses, and the strain of the virus. Mild infections are common among indigenous breeds in endemic areas, but more severe disease can be seen in young or stressed animals, animals with concurrent infections, or animals from areas where pox has not occurred for some time. Reported morbidity rates in indigenous breeds range from 1% to 75% or higher. Although the mortality rate is often less than 10%, case fatality rates of nearly 100% have been reported in some young animals.

Imported breeds of sheep and goats usually develop severe disease when they are moved into an endemic area. The morbidity and mortality rates can approach 100% in newly imported, highly susceptible flocks.

Diagnosis

➤ **Clinical**

Sheep or goat pox should be suspected in febrile animals with the characteristic full-thickness skin lesions and enlarged lymph nodes. Dyspnea, conjunctivitis, nasal discharges and other signs may also be seen. The mortality rate is usually high in naïve animals. Although sheep pox and goat pox are usually distinctive in fully susceptible animals, these diseases can be subtler and more difficult to diagnose in indigenous animals.

➤ **Laboratory tests**

- Electron microscopy: because the morphology of the virus particle is characteristic, capripox viruses can be differentiated from most poxviruses that cause lesions in small ruminants.
- Histopathology can also be helpful.
- Serological tests include virus neutralization, AGID, the indirect fluorescent antibody test (IFA), ELISAs and immunoblotting (Western blotting).
- Polymerase chain reaction (PCR) assays: this can detect capripox-virus genomes in tissue samples or cultures, but cannot identify whether the virus is SPV or GPV.

Differential diagnosis

The differential diagnoses include contagious ecthyma (contagious pustular dermatitis), dermatophilosis/ streptothricosis, mange (e.g., psoroptic mange/sheep scab), photosensitization or urticaria, peste des petits ruminants, parasitic pneumonia, multiple insect bites and caseous lymphadenitis.

Samples to collect

In live animals, biopsies of skin lesions should be taken for virus isolation and antigen detection. SPV and GPV can also be found in vesicular fluid, scabs and scrapings of skin lesions, as well as lymph node aspirates and blood (collected into heparin or EDTA). At necropsy, samples should

be collected from skin lesions, lymph nodes and lung lesions. An additional set of samples should be taken for histology; these samples should include a wide range of lesions from the skin, as well as spleen, rumen, trachea, lungs and other affected tissues. PCR can detect capripox-viruses in blood, nasal or oral swabs, scabs, skin lesions and tissue samples. Neutralizing antibodies can interfere with virus isolation and some antigen-detection tests; samples for these tests must be collected during the first week of illness. Samples for PCR can be taken after neutralizing antibodies have developed. Paired serum samples should be collected for serology. Samples for virus isolation must be sent to the laboratory as soon as possible. They should be kept cold and shipped on wet ice or gel packs. If these samples must be shipped long distances without refrigeration, glycerol (10%) can be added; the tissue samples must be large enough that the medium does not penetrate into the center of the tissue and destroy the viruses there.

Treatment

No specific treatment is advised, but palliative treatment may be necessary in severely affected animals.

Control

- Prohibition of importation from infected areas (for countries that are free)
- In outbreaks, control is by quarantines, movement restriction, and depopulation of infected and exposed animals, followed by stringent cleaning and disinfection of farms and equipment. Proper disposal of infected carcasses is important; burning or burial is often used.
- Live, attenuated virus vaccine and live, attenuated Lumpy skin disease virus can be used.

Public Health

SPV and GPV do not infect humans.

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