FOOD ANIMAL MEDICINE VCM 501 LECTURE NOTE ON: LUMPY SKIN DISEASE

IMPORTANCE

Lumpy skin disease is a pox-viral disease with significant morbidity in cattle. Although the mortality rate is generally low, losses occur from decreased milk production, abortion, infertility, loss of condition and damaged hides. Lumpy skin disease is endemic in parts of Africa, where outbreaks may be widespread. This disease has the potential to become established in other parts of the world.

AETIOLOGY

LSD is caused by a virus in the genus *Capripoxvirus* of the family *Poxviridae*. Lumpy Skin Disease Virus (LSDV) IS closely related antigenically to sheep and goat poxviruses. Although these three viruses are distinct, they cannot be differentiated with routine serological tests.

EPIDEMIOLOGY

• Morbidity rate varies between 5 and 45%

• Mortality rate up to 10%.

Hosts

• LSD is primarily a disease of cattle. *Bos Taurus* breeds, particularly Jersey, are more susceptible to clinical disease than zebus cattle (*Bos indicus)*.

Transmission

• The principal method of transmission is mechanical by arthropod vector. Though no specific vector has been identified to date, mosquitoes (e.g. *Culex mirificens* and *Aedes natrionus*) and flies (e.g. *Stomoxys calcitrans* and *Biomyia fasciata*) could play a major role.

• Direct contact could be a minor source of infection.

• Transmission may also occur by ingestion of feed and water contaminated with infected saliva.

• Animals can be infected experimentally by inoculation with material from cutaneous nodules or blood.

Sources of virus

• Skin; cutaneous lesions and crusts. Virus can be isolated for up to 35 days and viral nucleic acid can be demonstrated by PCR for up to 3 months.
• Saliva, ocular and nasal discharge, milk, and semen. All secretions contain LSD virus when nodules on the mucous membranes of the eyes, nose, mouth, rectum, udder and genitalia ulcerate. Shedding in semen may be prolonged; viral DNA has been found in the semen of some bulls for at least 5 months after infection. In experimentally infected cattle LSD virus was demonstrated in saliva for 11 days, semen for 22 days and in skin nodules for 33 days, but not in urine or faeces. Viraemia lasts approximately 1–2 weeks.
• Lung tissue
• Spleen
• Lymph nodes
• No carrier state

Occurrence

In the past LSD was restricted to sub-Saharan Africa but currently it occurs in most African countries. The most recent outbreaks outside Africa occurred in the Middle East 2006 and 2007 and in Mauritius 2008.

CLINICAL SIGNS

The incubation period under field conditions has not been reported. Following inoculation the onset of fever is in 6–9 days, and first skin lesions appear at the inoculation site in 4–20 days. LSD signs range from inapparent to severe disease.
• Pyrexia which may exceed 41°C and persist for 1 week.
• Rhinitis, conjunctivitis and excessive salivation.
• Marked reduction in milk yield in lactating cattle.
• Painful nodules of 2–5 cm in diameter develop over the entire body, particularly on the head, neck, udder and perineum between 7 and 19 days after virus inoculation.
Although the nodules may exude serum initially, they develop a characteristic inverted conical zone of necrosis, which penetrates the epidermis and dermis, subcutaneous tissue, and sometimes the underlying muscle. Over the following 2 weeks they may become necrotic plugs that penetrate the full thickness of the hide/skin and are called “sit-fasts”.

• Pox lesions may develop in the mucous membranes of the mouth and alimentary tract and, in trachea and lungs, resulting in primary and secondary pneumonia.
• Depression, anorexia, agalactia and emaciation.
• All the superficial lymph nodes are enlarged and edematous
• Limbs may be oedematous and the animal is reluctant to move.
• Nodules on the mucous membranes of the eyes, nose, mouth, rectum, udder and genitalia quickly ulcerate, and all secretions contain LSD virus.
• Discharge from the eyes and nose becomes mucopurulent, and keratitis may develop.
• Pregnant cattle may abort.
• Bulls may become permanently or temporarily infertile from orchitis and testicular atrophy, and the virus can be excreted in the semen for prolonged periods.
Temporary sterility in cows may also occur.
• Recovery from severe infection is slow due to emaciation, pneumonia, mastitis, and necrotic skin plugs, which are subject to fly strike and shed leaving deep holes in the hide.

Lesions

• Nodules involving all layers of skin, subcutaneous tissue, and often adjacent musculature, with congestion, haemorrhage, oedema, vasculitis and necrosis
• Enlargement of lymph nodes draining affected areas with lymphoid proliferation, oedema, congestion and haemorrhage
• Pox lesions of mucous membrane of the mouth, the pharynx, epiglottis, tongue and throughout the digestive tract
• Pox lesions of the mucous membranes of the nasal cavity, trachea and lungs
• Oedema and areas of focal lobular atelectasis in lungs
• Pleuritis with enlargement of the mediastinal lymph nodes in severe cases
• Synovitis and tendosynovitis with fibrin in the synovial fluid
• Pox lesions may be present in the testicles and urinary bladder.

Differential diagnosis

• Severe LSD is highly characteristic, but milder forms can be confused with those below.

• Pseudo lumpy skin disease/ Bovine herpes mammillitis (Bovine Herpesvirus 2)

• Bovine papular stomatitis (Parapoxvirus)

• Pseudocowpox (Parapoxvirus)

• Vaccinia virus and Cowpox virus (Orthopoxviruses) – uncommon and not generalized infections

• Dermatophilosis

• Insect or tick bites

• Besnoitiosis

• Demodicosis

• *Hypoderma bovis* infection

• Photosensitisation

• Urticaria

• Cutaneous tuberculosis

Laboratory diagnosis

Virus isolation and identification (using samples of lesions, including tissues from surrounding areas) can be carried out by

- ELISA
- PCR assays
- Histopathology

Serological tests (using frozen sera from both acute and convalescent animals) can also be carried out:

• Virus neutralisation

• Indirect fluorescent antibody test

• Capripox antibody ELISA.

• Western blot: highly sensitive and specific but expensive and difficult to perform.

TREATMENT

No specific treatment. Strong antibiotic therapy may avoid secondary infection.

PREVENTION AND CONTROL

In free countries: import restrictions on livestock, carcasses, hides, skins and semen.

In infected countries:

- strict quarantine to avoid introduction of infected animals into safe herds
- in cases of outbreaks, isolation and prohibition of animal movements
- slaughtering of all sick and infected animals (as far as possible)
- proper disposal of dead animals (e.g. incineration)
- cleaning and disinfection of premises and implements
- vector control in premises and on animals
- vaccination:

1. Homologous live attenuated virus vaccine:

Neethling strain: immunity conferred lasts up to 3 years

2. Heterologous live attenuated virus vaccine:

Sheep or goat pox vaccine, but may cause local, sometimes severe, reactions

Note: not advised in countries free from sheep and goat pox.

With the exception of vaccination, control measures are usually not effective.

Vector control in ships and aircraft is highly recommended.

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