

LUMPY SKIN DISEASE

AETIOLOGY

Classification of the causative agent

Virus family *Poxviridae*, genus *Capripoxvirus* (also Sheep Pox and Goat Pox), 1 Serotype of Lumpy Skin Disease Virus (LSDV)

Resistance to physical and chemical action

Temperature:	Susceptible to 55°C/2 hours, 65°C/30 minutes. Can be recovered from skin nodules kept at –80°C for 10 years and infected tissue culture fluid stored at 4°C for 6 months.
pH:	Susceptible to highly alkaline or acid pH. No significant reduction in titre when held at pH 6.6–8.6 for 5 days at 37°C.
Chemicals/Disinfectants:	Susceptible to ether (20%), chloroform, formalin (1%), and some detergents, e.g. sodium dodecyl sulphate. Susceptible to phenol (2%/15 minutes), sodium hypochlorite (2–3%), iodine compounds (1:33 dilution), Virkon® (2%), quarternary ammonium compounds (0.5%).
Survival:	LSDV is remarkably stable, surviving for long periods at ambient temperature, especially in dried scabs. LSDV is very resistant to inactivation, surviving in necrotic skin nodules for up to 33 days or longer, desiccated crusts for up to 35 days, and at least 18 days in air-dried hides. It can remain viable for long periods in the environment. The virus is susceptible to sunlight and detergents containing lipid solvents, but in dark environmental conditions, such as contaminated animal sheds, it can persist for many months.

EPIDEMIOLOGY

- Morbidity rate varies between 5 and 45%
- Mortality rate up to 10%.

Hosts

- Cattle (*Bos taurus*, zebu, domestic Asian buffalo). *Bos taurus* is more susceptible to clinical disease than *Bos indicus*. Within *Bos taurus*, the fine-skinned Channel Island breeds develop more severe disease, with lactating cows appearing to be the most at risk.
- Role of wild fauna still has to be clarified. Giraffe (*Giraffe camelopardalis*) and impala (*Aepyceros melampus*) are highly susceptible to experimental infection. Suspected clinical disease has been described in an Arabian oryx (*Oryx leucoryx*) in Saudi Arabia, springbok (*Antidorcas marsupialis*) in Namibia, and oryx (*Oryx gazelle*) in South Africa. Antibodies have been found in 6 of 44 wildlife species in Africa: African buffalo (*Syncerus caffer*), greater kudu (*Tragelaphus strepsiceros*), waterbuck (*Kobus ellipsiprymnus*), reedbuck (*Redunca arundinum*), impala, springbok, and giraffe.
- LSDV will also replicate in sheep and goats following inoculation.

Transmission

- The principle 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 coetaneous 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.

DIAGNOSIS

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.

Clinical diagnosis

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. These nodules involve the dermis and epidermis and may initially exude serum. Over the following 2 weeks they may become necrotic plugs that penetrate the full thickness of the hide ("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.
- 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, and there are reports of aborted fetuses being covered in nodules.

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

The OIE will periodically update the OIE Technical Disease Cards. Please send relevant new references and proposed modifications to the OIE Scientific and Technical Department (scientific.dept@oie.int). Last updated October 2009.