

Lumpy Skin Disease

Importance

Lumpy skin disease is a viral pox disease of cattle that can cause mild to severe signs including fever, nodules in the skin, mucous membranes and internal organs, skin edema, lymphadenitis, and sometimes death. Economic concerns are decreased milk production, abortion, infertility, weight loss, poor growth, and damaged hides.

Etiology

Lumpy skin disease (LSD) is caused by a virus in the family Poxviridae, genus *Capripoxvirus*. It is closely related antigenically to sheep and goat pox virus. These viruses cannot be differentiated using routine serological testing.

Species affected

Lumpy skin disease is primarily a disease of cattle (*Bos taurus*, zebu, and domestic buffaloes), but the LSD virus can also infect oryx (*Oryx beisa*), giraffe (*Giraffe camelopardalis*), and impala (*Aepyceros melampus*), as well as sheep and goats experimentally.

Geographic distribution

Lumpy skin disease is generally confined to Africa. An outbreak occurred in Israel in 1989; the disease was eradicated by slaughter and vaccination.

Transmission

Transmission of the LSD virus is primarily by biting insects, particularly mosquitoes (e.g. *Culex mirificens* and *Aedes natrionus*) and flies (e.g. *Stomoxys calcitrans* and *Biomyia fasciata*). Epidemics occur in the rainy seasons. Direct contact is also a minor source of infections. Virus can be present in cutaneous lesions, saliva, nasal discharge, milk, semen, muscles, spleen, and lymph nodes. The virus can survive in desiccated crusts for up to 35 days. There is no carrier state.

Incubation period

The incubation period varies from 2 to 5 weeks.

Clinical signs

The clinical signs can range from inapparent to severe. Host susceptibility, dose, and route of virus inoculation affect the severity of disease. *Bos taurus* are more susceptible than *Bos indicus* and young calves often have more severe disease. The first sign is usually fever, which may be transitory or last up to 2-4 weeks. Skin nodules of 1-5 cm diameter generally occur within 2 days of the initial fever. These nodules may become painful and develop a characteristic inverted conical necrosis, which penetrates the entire dermis, the subcutaneous tissue, and sometimes the underlying muscle. These deep necrotic lesions often form scabs and are called 'sitfast.' Nodules may occur on the muzzle, nares, head, neck, back, legs, scrotum, perineum, udder, eyelids, lower ear, nasal mucosa, oral mucosa, and tail. Nodules can also develop in the gastrointestinal tract,

especially the abomasum, as well as the trachea and lungs, resulting in primary and secondary pneumonia. Additional related signs include depression, anorexia, excessive salivation, rhinitis and conjunctivitis with oculonasal discharge,agalactia, and emaciation. The lymph nodes may become enlarged up to 4-10 times normal size from draining the infected skin. Lameness may occur from inflammation and necrosis of the tendons, and severe edema of the brisket and legs. This lameness can be permanent with severe damage to tendons and joints from secondary bacterial infections. Permanent damage may occur to teats and mammary glands due to secondary bacterial infections and mastitis. Abortion, intrauterine infection, and temporary or permanent sterility in both bulls and cows may occur.

Post mortem lesions

The post mortem lesions can be extensive. The characteristic deep nodules are found in the skin; these nodules penetrate into the subcutaneous tissues and muscle with congestion, hemorrhage, edema, vasculitis, and necrosis. Lesions may also be found in the mucous membranes of the oral and nasal cavities, pharynx, epiglottis, and trachea as well as the gastrointestinal tract, lungs, testicles, and urinary bladder. Pleuritis, edema, and focal lobular atelectasis in the lungs may occur, with enlargement of the mediastinal lymph nodes in severe cases. Enlarged superficial lymph nodes draining affected areas are common with lymphoid proliferation, edema, congestion, and hemorrhage. Synovitis and tendosynovitis may be seen with fibrin in the synovial fluid.

Morbidity and Mortality

The morbidity rate can vary from 3 to 85%, depending on the presence of insect vectors and host susceptibility. Mortality is low in most cases (1-3%) but can be as high as 20-85%.

Diagnosis

Clinical

Lumpy skin disease can be suspected with clinical signs of a contagious disease with the characteristic skin nodules (sitfast), fever, emaciation, and low mortality.

Differential diagnosis

Differentials include pseudo-lumpy skin disease (a much milder disease caused by a herpesvirus), bovine herpes mammillitis (a disease with lesions generally confined to the teats and udder), dermatophilosis, ringworm, insect or tick bites, besnoitiosis, rinderpest, demodicosis, *Hypoderma bovis* infection, photosensitization, bovine papular stomatitis, urticaria, cutaneous tuberculosis, and onchocercosis. Most of these diseases can be distinguished by the clinical signs, resolution of disease, histopathology, and other laboratory tests.

Laboratory tests

Confirmation of lumpy skin disease in a new area requires virus isolation and identification. Lamb testicle or fetal bovine lung cell cultures are best for the growth of LSD virus. Microscopic examination of cell cultures will indicate a characteristic cytopathic effect and intracytoplasmic inclusion bodies. Pseudo lumpy skin disease,

caused by a herpesvirus, produces syncytia and intranuclear inclusion bodies in cell culture. Antigen testing can be done using direct immunofluorescent staining, virus neutralization, or ELISA.

Typical capripox virions can be seen using transmission electron microscopy of biopsy samples or desiccated crusts. This finding, in combination with a history of generalized nodular skin lesions and lymph node enlargement in cattle, can be diagnostic. The capripoxvirus can be distinguished from the parapoxvirus that causes bovine papular stomatitis and pseudocowpox. Cowpox and vaccinia virus cannot be distinguished morphologically from capripoxvirus, but do not cause generalized infection and are not commonly seen in cattle.

Serological tests include an indirect fluorescent antibody test, virus neutralization, and enzyme-linked immunosorbent assay (ELISA). Cross-reactions may occur with other poxviruses.

Samples to collect

Before collecting or sending any samples from animals with a suspected foreign animal disease, contact the AVIC. These samples should only be sent under secure conditions, by authorized personnel, and to authorized laboratories to prevent the spread of disease.

Skin biopsies taken of early lesions without necrosis from at least three animals can be used for virus isolation or histopathology. Lung lesions, lymph nodes, or lymph node aspirates are also good samples for virus isolation. Tissue samples should be sent on ice for virus isolation as well as preserved in 10% buffered formalin for histopathology. These samples should not be frozen. Lesions (even dry crusts) removed from the skin, subcutis, or oropharynx of dead animals may be used. Blood samples in anticoagulant (heparin or EDTA) collected early in the disease during the viremic stage can be used for virus isolation. Serum samples from acute and chronic cases with follow-up samples 2-3 weeks after the first skin lesions appear should be sent for antigen detection and can be frozen.

Recommended actions if lumpy skin disease is suspected

Notification of authorities

State and federal veterinarians should be immediately informed of any suspected cases of lumpy skin disease. Federal: Area Veterinarians in Charge (AVICS)

http://www.aphis.usda.gov/vs/area_offices.htm

State vets: <http://www.aphis.usda.gov/vs/sregs/official.html>

Quarantine and Disinfection

Quarantine, slaughter and burning of carcasses, disinfection of the premises, and insect control are important in controlling an outbreak of lumpy skin disease. A vaccine is available for use in infected countries. LSD virus is susceptible to ether (20%), chloroform, formalin (1%), and some detergents, as well as phenol (2%/15 min). It can survive for long periods in the environment - up to 35 days in desiccated scabs.

Public health

The lumpy skin disease virus does not infect humans.

For More Information

World Organization for Animal Health (OIE)

<http://www.oie.int>

OIE Manual of Standards

http://www.oie.int/eng/normes/mmanual/a_summry.htm

OIE International Animal Health Code

http://www.oie.int/eng/normes/mcode/A_summry.htm

USAHA Foreign Animal Diseases book

http://www.vet.uga.edu/vpp/gray_book/FAD/

References

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“Lumpy Skin Disease.” In *The Merck Veterinary Manual*, 8th ed. Edited by S.E. Aiello and A. Mays. Whitehouse Station, NJ: Merck and Co., 1998, pp. 621-622.

House, James A. “Lumpy Skin Disease.” In *Foreign Animal Diseases*. Richmond, VA: United States Animal Health Association, 1998, pp. 303-310.

“Lumpy Skin Disease.” 30 Aug. 2000 *World Organization for Animal Health* 16 Oct. 2001 <http://www.oie.int/eng/maladies/fiches/a_A070.htm >