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An Awareness Notes on Lumpy Skin Disease (LSD) For Dairy Farming Community

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ARTICLE ID: 005

Lumpy skin disease (LSD) is an emerging viral disease affecting cattle and buffaloes in India. Arthropods (mosquitoes, biting flies, Culicoides midges, and three blood sucking hard ticks) are the primary mechanical vectors of the disease. Skin nodules all over the body, fever, lacrimal discharge, nasal discharge, anorexia, decreased milk yield, emaciation, depression, and reluctance to move are all major clinical signs. Since the first report of lumpy skin disease in India, it has spread rapidly across the country, posing a potential productivity and mortality threat to the cattle and buffalo populations. Strict quarantine, vector control, prophylactic vaccine and effective surveillance may be the preferred remedy for preventing the spread of the disease. On available on e-resources, the use of medicinal plants to manage clinical conditions can reduce loss due to decreased productivity, allopathic medicine expenses, and other allopathic medicine side effects.

Introduction

Lumpy skin disease (LSD) is a re-emerging trans boundary viral illness of cattle and buffaloes that has a significant economic impact. The World Organization for Animal Health has classified LSD as a notifiable disease (OIE) due to its capacity for fast trans-boundary spread. The disease is characterized by pyrexia, enlarged superficial lymph nodes, nasal discharge, watery eyes and generalized firm flat topped papules and nodules of 0.5–5.0 cm size all over the body especially on head, neck, udder, scrotum, perineum and buccalmucosa. The disease is host-specific; means affects only cattle and water buffalo, and transmitted by mechanically arthropod vectors such as mosquitoes and stable flies. Recently, sporadic outbreaks have been reported from certain parts of India. The disease was first recorded in Zambia in 1929and then in southern and northern African countries. The first occurrence of LSD in cattle in India was reported from Odisha, and subsequently it a has spread to Kerala,

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Tamil Nadu, Andhra Pradesh, Telangana, Jharkhand, West Bengal, Assam, Tripura, Chhattisgarh, Maharashtra, and Madhya Pradesh.Recently it is reported from Gujarat and Rajasthan also.According to the OIE, this disease is currently present in a number of African, European, and Asian countries. The disease's spread to India is uncertain; however it could be the result of cattle migration across international boundaries or vector movement from neighbouring nations.

Etiology:

Capripoxviruses are the cause of sheeppox, goatpox and lumpy skin disease (LSD) of cattle. LSDV (lumpy skin disease virus) is a member of the Capripox genus in the Poxviridae family. The virus's prototype strain is also known as Neethling poxvirus. It has also been discovered that the LSD virus has an antigenic link with the sheep and goat pox viruses. The virus is stable in ambient conditions for long period. It can last 35 days in dry skin crusts, 33 days in necrotic nodules, and at least 18 days in air-dried hides. Although sunlight and lipid detergents can immediately kill viruses, they can survive for months in dark environments such as animal shelters and feed stores. The virus is susceptible to ether (20%), chloroform, formalin(1%), phenol (2% for 15 min), sodium hypochlorite (2–3%),iodine compounds (1:33 dilution) and quaternary ammonium compounds (0.5%).

Host risk factor and susceptibility

Though cattle of all breeds and all age group, both sex are susceptible, Bos*taurus*are particularly more vulnerable to clinical disease than zebu cattle. Younger animals are frequently affected and show more severe disease than adult ones. Theoccurrence of disease is high during wet seasons when bitingly populations are abundant and it decreases or ceases during the dry season.

Transmission:

Mechanicaly, LSDV transmission occur through blood-sucking arthropods such as stable flies (*Stomoxyscalcitrans*), mosquitoes (*Aedesaegypti*), and hard ticks (*Rhipicephalus*and *Amblyomma*species).Indirect LSDV transmission might occur when cattle are sharing feed or water troughs contaminated by saliva or nasal discharge from infected animals. Recently, intrauterine transmission of LSDV has been documented. It is also likely to be transmitted from mother to calf via contaminated milk or skin lesions on the mother's udder and teats, but this assumption needs to be experimentally confirmed.

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Pathogenesis:

Lumpy skin disease is produced by entry of infectious LSDV through skin or GIT mucosa, and thenviremia accompanied by a febrile reaction occurs. On Subcutaneous or intradermal inoculation of cattle with LSDV, there is inflammation and development of a localized swelling at the site of inoculation after 4 to 7 days. After development of localized swelling there is enlargement of the regional lymph nodes and generalized eruption of skin nodules within 7 to 19 days after inoculation. LSDV is epitheliotrophic in nature, hence there is Skin localization. Viral replication occurs in pericytes, endothelial cells, cells in blood vessel and lymph vessel walls causes vasculitis and lymphangitis. In severe cases infarction may occur, which results in to edema and necrosis of different organs. Immunity after recovery from natural infection is life-long in most cattle. Calves of immune cows acquire maternal antibody and are resistant to clinical disease for about six months.

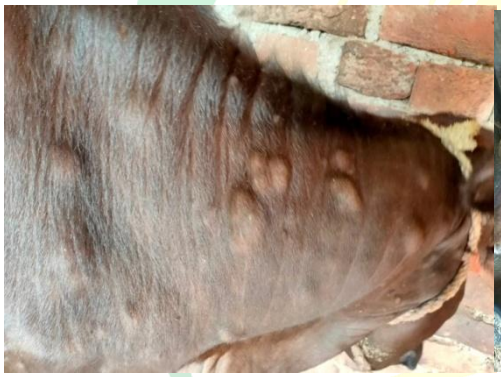

Figure 1: Cattle affected with lumpy skin disease showing characteristic Skin lumps

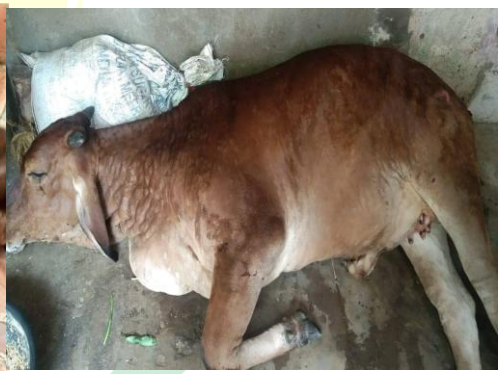

Figure 2: Affected cattle showing swollen limbs

Clinical signs:

The clinical courses of LSD may vary, and these are acute, sub-acute, or in-apparent. Typical LSD is characterized by high body temperature (>41^{0}C) and Skin nodules about 0.5-5 cm in diameter all over the body (Fig. 1) especially on the head, neck, udder, scrotum, vulva and perineum. All the superficial lymph nodes become enlarged. The lesions then progress towards papules, vesicles, pustule with exudation and then slowly to scab formation. Papules can be found in hairless parts of the perineum, udder, inner ear, muzzle, and eyelids. The nodules affect the dermis and epidermis, and may extend to the underlying sub cutis and sometimes the adjacent striated muscle may involve. Nodules can also form in the mouth and alimentary tract, particularly the abomasums, as well as the trachea and lungs, resulting in

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primary and secondary pneumonia. The nodules on the mucous membranes of the eyes, nose, mouth, rectum, udder, and genitalia quickly ulcerate, and by then, all secretions, ocular and nasal discharge, and saliva contain LSD virus (LSDV).The ulcerated lesions may be contaminated by secondary bacterial infection and infestation of fly worms may lead to fly strike. Oedematous and inflammatory swellings of the face, brisket and limbs may also be seen. The animal may be reluctant to move due to oedematous swelling (Fig. 2).In some cases, the pregnant animals may abort, and affected female remain in anestrus for months or become sterile.

Diagnosis:

Field diagnosis is often based on characteristic clinical signs and lesions of the disease. Biopsy of lesions, where eosinophilicintra cytoplasmic inclusion bodies in keratinocytes, fibroblasts and macrophages, *etc.* is observed. There is no diagnostic test tool in the market. ELISA is the test that detects and measures of antibodies in blood. FAT detects the presence of a particular antigen. A fairly new assay called Immuno-peroxidase Monolayer Assay (IPMA) has been identified for potential use in LSD diagnosis. Polymerase Chain Reaction (PCR), is most efficient and accurate diagnostic tool for detecting LSDV. Skin nodules, saliva and nasal secretions and blood are the suitable samples for the detection of LSDV. Loop-mediated isothermal amplification (LAMP) is a simple, specific and cost-effective method.

Differential diagnosis: The disease must be differentiated from the following disease conditions.

- Pseudo-lumpy skin disease (BHV-2) (Allerton strain):Pseudo lumpy skin diseasecharacterized by aless prominent, flat skin lesion, whichresolves rapidly and is accompanied by amild transient feverand also can be differentiated from lumpy skin disease by PCR.
- Pseudo cowpox (Para poxvirus): In pseudo cowpox lesions occurs mainly on teat and udder and disease can be differentiated from Lumpy skin disease by PCR.
- Dermatophilosis: The lesions of dermatophilosis are superficial, often moist and appear as crusts of keratinized material as scabs of 0.5- to 2 cm diameter. The organism can be demonstrated by Giemsa staining.

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- Demodicosis, Photosensitization,insect bites; and Ringworm could also be considered as the differentialdiagnosis.

Treatment and Control strategies

Symptomatic treatment of affected animals with wound repair sprays and antibioticslike penicillins, cephalosporins, tetracycline's, fluroquinolones etc. are indicated for 5-7 days depending on severity of the disease to check secondary infection. Administration of anti-inflammatory and anti-histamine preparations may also be considered. Parenteral / oral multivitamins may be used. Feeding of liquid food, soft feed and fodder and succulent pasture is recommended for the infected animals. Currently no antiviral drugs are available for the treatment of LSD, thus prevention through vaccination is the only effective way of restraining the disease.

NDDB has suggested to use of ethno-veterinary medication to reduce the symptoms associated LSD. To prepare one oral dose: Betel leaves 10 number, Black pepper- 10 grams, salt: 10 grams; and jaggery as required, they are blend or mix to form a paste, and administered orally. One dose every three hour first day and from second day three doses daily for two weeks. Care should be taken to prepare each dose freshly. For external wound, it is recommended to use *AcalyphaIndica* leaves - one handful, Garlic- 10 pearls, Neem leaves - one handful, Coconut or Sesame oil- 500 ml, turmeric powder- 20 grams, Mehendi leaves - one handful and Tulsi leaves - one handful. Then, blend all the ingredients and mix with 500 ml Coconut or Sesame oil and boil and bring to cool. After cleaning of wound, apply directly on it. In case of maggoted wound, apply Anona leaf paste or camphorated coconut oil only for the first day.

For the effective control of LSD, strict quarantine, vector control, prophylactic vaccine and effective surveillance may be the preferred remedy for limiting disease risk factors. At present only live, attenuated vaccines are available against LSD virus. Pre-emptive vaccination (applied before the virus enters a region or country at risk) is highly recommended when LSD is detected across borders in neighbouring countries. Currently, Kenyan sheep and goat pox strain (KS-1), Yugoslavian RM 65 sheep pox strain, Romanian sheep pox strain, and South African neethling lumpy skin disease virus strain are used as vaccines to control the lumpy skin disease outbreak. In India the GTPV Uttarkashi strain is

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being evaluated for level of protection against LSD as compared to the LSDV vaccine and is already used for emergency vaccination.