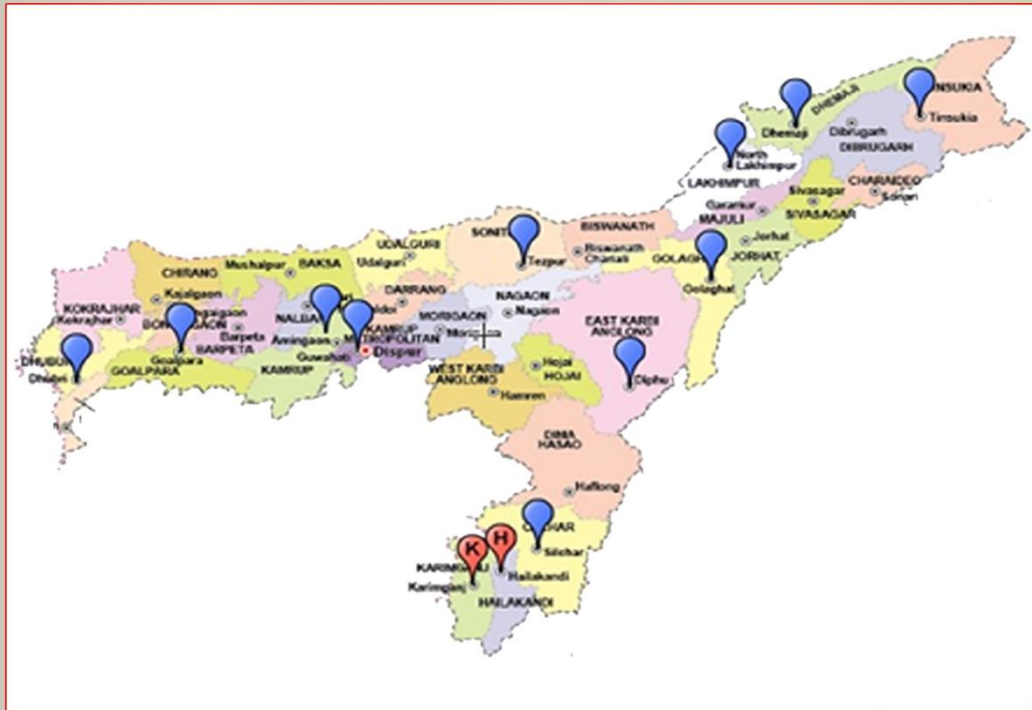
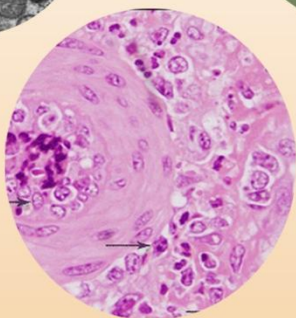
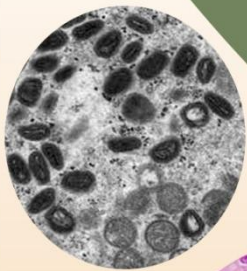
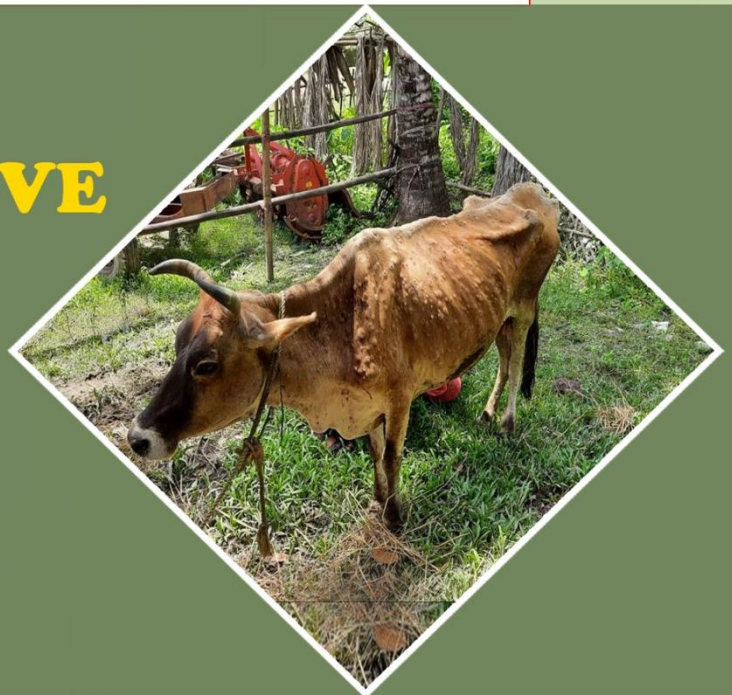




ONE STOP SOLUTION on LUMPY SKIN DISEASE



A PROSPECTIVE STUDY



DBT-ADMaC
Department of Microbiology
College of Veterinary Science
Assam Agricultural University

Assam Agricultural University

Khanapara, Guwahati

2020-21

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Lumpy Skin Disease (LSD): an overview

The Lumpy Skin Disease

Lumpy Skin Disease (LSD) is an OIE notifiable infectious disease. The disease is caused by Lumpy Skin Disease virus (double-stranded DNA virus) of the *Poxviridae* family, which leads to a massive production loss. The virus is one of the three closely related species within the genus *Capripoxvirus*, the other two species being Sheeppox virus and Goatpox virus. Lumpy Skin Disease virus (LSDV) is also known as Neethling virus.

Animals affected

LSD virus primarily infects cattle and water buffaloes. Infection may also occur in Zebu giraffes as well as Impalas.

Spreading of LSD

The disease was first reported in Zambia in 1929. Until 1990, the disease remained endemic to sub-Saharan Africa later extending into North Africa and then into the Middle East. More recently, spread of LSD has been evident from parts of southeast Europe, with reports of outbreaks in Turkey and Russia amongst other countries. The disease known to have a morbidity rate of 10-40 % and mortality rate of 1-5 %. In India, the disease was first recorded in Odisha on August 2019. The disease has now spread to more than 15 states namely Maharashtra, Kerala, Karnataka, Chhattisgarh, Bihar, Madhya Pradesh and others within just 16 months. Assam was hit by LSD in June 2020 and was first confirmed in Hailakandi district. Subsequently the disease spread to other districts.

Transmission of LSD virus

Lumpy skin disease is primarily spread between animals by biting insect vectors such as mosquitoes and biting flies (*Stomoxys calcitrans*). Direct transmission of LSD virus amongst the animals is not frequent. The disease is also transmissible through infected milk to suckling calves, saliva, nasal secretion and semen of infected bulls. The virus can survive in the necrotic nodules of skin up to 33 days or more, 11 days in saliva, 22 days in semen, around 35 days in desiccated crusts and for a long time in the environment.

Prospective study on LSD in Assam

The present outbreak of LSD was fast spreading and covered large population of cattle in different districts of Assam. The Core Lab under the Advanced Animal Disease Diagnosis and Management Consortium (DBT-ADMaC), AAU, Khanapara constituted a study group to make a prospective study on the disease episode with due permission of the Director of Research (Vety), AAU, Khanapara. Various questionnaires were prepared to survey the disease epidemiology, clinical manifestation, treatment response and economic loss. Further, a controlled immune response study was done against LSDV using goat pox vaccine in two different locations in Assam.

Distribution of LSD in Assam

Lumpy skin disease or LSD was recorded in Assam for the first time in Hailakandi district [24.6811° N, 92.5638° E] of Assam during April-May, 2020. The disease was confirmed by ICAR-National Institute of High Security Animal Disease, Bhopal (Annex-i). Later on, the disease started spreading to nearby places and within a span of 3-4 months; it was reported from different districts of Assam. The disease was frequently recorded in free grazing population in comparison to stall fed animals.

Seasonal distribution of LSD was found to be variable from place to place. As the disease is transmitted by an arthropod vector, the distribution of the disease depends on the breeding season of the arthropod vector and hence, the infection may be prevalent throughout the year. However, as far as Assam is concerned, outbreak occurred in the pre-monsoon season (March-May, 2020) and highest prevalence of LSD among the animals was recorded during the monsoon season (June - October, 2020). It was observed that the incidences subsided from the month of February, 2021 onwards.

Sero surveillance

After the confirmation of the disease in Hailakandi district, 100 sera samples were randomly collected from suspected cattle flocks of other districts of Assam for seromonitoring of the disease. The sera samples were tested using the IDscreen

Capripox Double antigen ELISA kit (Make ID Vet) following the manufacturer's instructions. Out of the samples tested, 15 samples were found to be positive showing a seropositivity rate of 15 % in the suspected cattle.

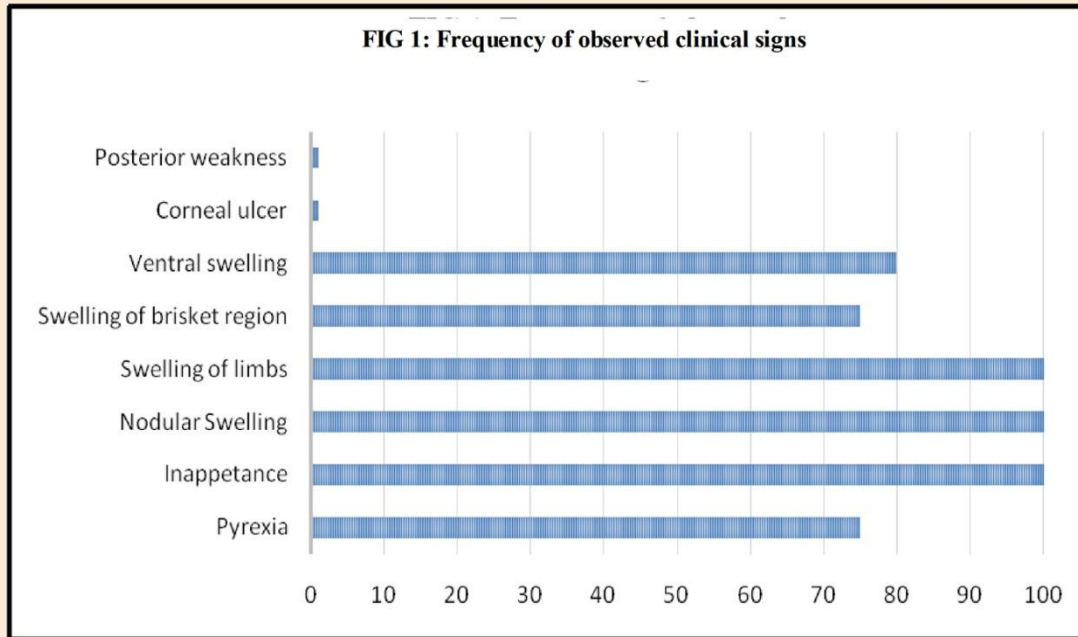
Clinical signs of LSD

The incubation period in experimentally infected animals is known to vary between four and seven days, but in naturally infected animals it may be up to five weeks. The disease is mainly characterized by sudden onset of fever ($>50^{\circ}\text{C}$), enlarged superficial lymph node and multiple nodules measuring 2- 5 cm in diameter on the skin and mucous membrane of respiratory and gastrointestinal tract. Nodules may occur on any part of the body, but particularly common on the head, neck, udder, perineum, genitalia and legs. Swollen skin nodules may separate from the healthy skin and dry and harden to form a "sit-fast" lesion. Secondary bacterial infections may occur. Rhinitis and conjunctivitis can also be seen. Infected cattle may also develop oedematous swelling in their limbs and exhibit lameness.

Study design: In the present study programme, a total of 1000 cases were monitored and data were recorded based on the-

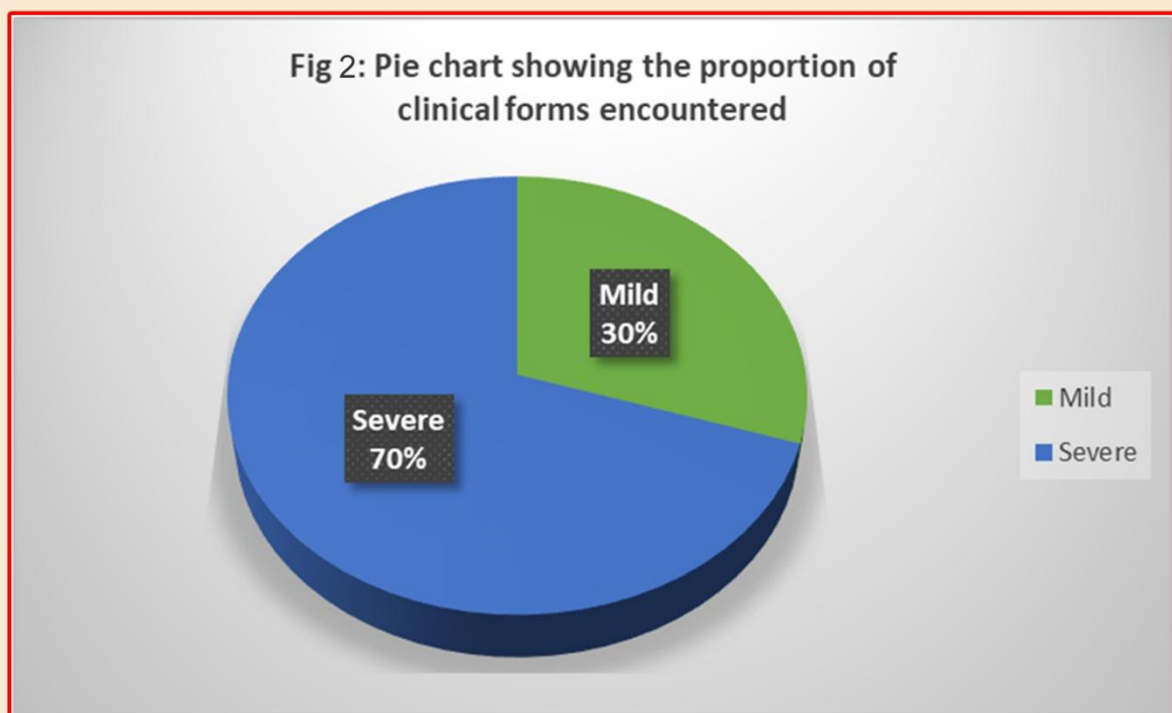
- i. Physical inspection of sick animals at farmers' door step and at different Goshala.
- ii. Response to the feedback forms circulated to various district based Veterinary dispensaries and other private practitioners around Assam.
*Certain data were also collected via telephonic conversations with owners/practitioners wherever physical inspection was not feasible.

After analysing the field data from the last outbreak of LSD in Assam, the incubation period of the disease was found to be 5-10 days. Clinical signs like nodular formation; inappetence and unilateral or bilateral swelling of the limbs were observed in all the cases while posterior weakness and corneal ulceration were observed in less than 1 percent of the cases monitored. The details of observations are graphically presented in Fig 1.



From the clinical data it could be summarized that based on the appearance of certain symptoms, the disease could be categorized as Mild form and Severe form (Fig 2).

- **Mild Form:** Focal or scattered superficial swelling affecting only few areas of the body.
- **Severe Form:** Generalized nodular swelling distributed throughout the body, swelling of limb, brisket, ventral abdomen.



Mild Form

- Lacrimation (Fig 3)
- Nasal discharge
- Enlargement of subscapular and prefemoral lymph nodes (Fig 4)
- Appearance of few nodular skin lesions (Fig 5) of 4-10 mm in diameter in face, neck and parts of the body.
- Marked unilateral swelling of leg and joint (Fig. 7). Swelling in chest region. (Fig. 12).

Severe Form

- Multiple lesions in severely infected animals (Fig 6) distributed at head and neck region, perineum, genitalia, udder and limbs (Fig 8)
- Ulceration of the centre of the lesion and scab formation on top (Fig. 9, 10).
- Persistence of skin nodules for several months.
- Development of ulcerative lesions in the cornea of one or both eyes (Fig.11) and marked swelling of the abdominal brisket region (Fig 12)
- Lesions on the legs and on top of the joints may lead to deep subcutaneous infections complicated by secondary bacterial infections (Fig. 13,14) and bilateral swelling of legs resulting in lameness (Fig. 13).
- Other common complications include pneumonia caused by secondary bacterial infections and mastitis

CLINICAL SYMPTOMS EXHIBITED BY THE AFFECTED CATTLE



Lacrimation and salivation



Enlargement of subscapular and prefemoral



In mild case few nodules form in the neck and fore leg



In severe cases multiple nodules of varying sizes (0.5 to 4 cms) appear throughout the body



Several nodules appear in the perineum and genitalia. Marked swelling of limbs (unilateral)



Nodules slowly covered with crust and later on sloughed off leaving a raw 'sit-fast' lesion



Ulcerative lesions develop in the cornea leg and joint



Marked swelling of the chest region



Skin lesions on the legs leading to deep subcutaneous infections complicated by secondary bacterial infections

In context of wound aging, most conspicuous early signs were fever, lacrimation, off feed and swelling of pre-scapular and pre-femoral lymph nodes.

Treatment and Management of the disease

LSD is caused by a virus and no such anti-viral therapy is generally employed. Therefore, the treatment of LSD is only symptomatic and targeted at preventing secondary bacterial complications using antimicrobial therapy. A survey on the treatment protocols adopted by the field veterinarians showed that a combination of antimicrobials, anti-inflammatory, supportive therapy and anti-septic solutions were successful in preventing complications in the affected animals.

Effective treatment regime

Four different treatment regimes (hereafter mentioned as T1, T2, T3 and T4) were evaluated against the field outbreak. The efficacy of treatment was evaluated based on some specific clinical improvement i.e., attaining normal body temperature, disappearance/ reduction in number of nodules, reduction in swelling of superficial lymph nodes, reduced abdominal, brisket swelling and healing of ulcerated wound lesions etc.

- ▶ T1--- Streptomycin + Penicillin + anti-inflammatory + antihistaminics + serratiopeptidase.
- ▶ T2---Enrofloxacin + anti-inflammatory + antihistaminics + serratiopeptidase.
- ▶ T3- --Ceftriaxone + anti-inflammatory+ antihistaminics + serratiopeptidase.
- ▶ T4- --Amoxicillin+ anti-inflammatory+ antihistaminics + serratiopeptidase + any traditional approach for wound management.

The efficacy of the treatment was influenced by severity (mild or severe) of the disease and the stage at which the animals were presented for treatment. (early or late). All the treatment protocols were equally effective with minimal variation in cases presented early and with mild to moderate clinical manifestation. Considering the convenience for medication, oral treatment protocol (T4) may be advised in moderate cases presented earlier where injectable treatment is not feasible/ or access to veterinary service is very limited. Treatment response was delayed in cases with

severe clinical manifestations and irrespective of the presentation of the diseased animal (early or late). However, treatment protocol T3 (Ceftriaxone + anti-inflammatory+ antihistaminic) was found to be the most effective in severe cases.

The average period of recovery ranges from 7-10 days in early presented cases, whereas in late presented cases ranges from 15-30 days.

**Early means 7 days after and late means 10-14 days after onset of the first sign.*

Economic importance of LSD

LSD causes considerable financial losses in livestock industry of affected countries. A questionnaire survey with the objectives of determining direct economic loss (milk yield reduction and draught power loss) and indirect economic loss (medication and other managerial expenses) due to LSD was carried out in different districts of Assam.

Table: Losses incurred by farmers due to LSD outbreak in Assam

Head	Sub head	Losses per 1000 head (Rs.)	Losses per head (Rs.)
Direct losses	Milk losses recorded in affected indigenous cattle	1035833.00	1035.833
	Milk losses recorded in affected cross bred cattle	9933333.00	9933.333
	Draught power losses recorded in affected indigenous cattle	5371429.00	5371.429
	Draught power losses recorded in affected cross bred cattle	NA	NA
Indirect losses	Treatment cost recorded in affected indigenous cattle	787857.1	787.857
	Treatment cost recorded in affected cross bred cattle	1402143.00	1402.143

The overall mean loss due to LSD in the farm keeping indigenous cattle was estimated at Rs. 13,052.31 (small farm, less than 5 animals), Rs. 19,632.40 (medium farm, 5-10 numbers of animal) and Rs. 33,732.41 (large, more than 10 animals), respectively. However, the overall mean loss due to LSD for dairy farm rearing cross

bred cattle was estimated at Rs. 28,011.26 (small farm, less than 5 animals), Rs. 47,231.88 (medium farm, 5-10 numbers of animal) and Rs. 79,679.75 (large, more than 10 animals) respectively. Based on an estimated duration of milk reduction for 45-73 days, a mean total loss (Rs./head) of Rs. 1,035.833 in indigenous and Rs. 9,933.333 in crossbred cattle was reported. Milk production due to LSD dropped from a mean 1.46 to 0.65 litre in indigenous cow and 8.35 to 4.58 litre per affected cross bred cattle. Economic loss is presented in Fig 15 & 16.

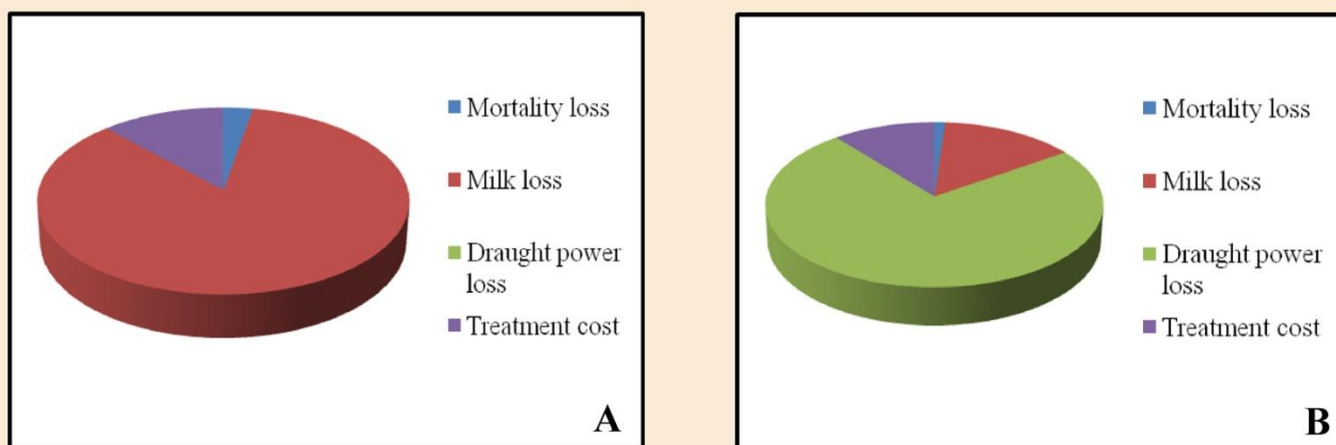


Fig. 15. Comparison of the economic impact of LSD outbreak in Assam (A) in crosses bred cattle, (B) in indigenous cattle (Loss/head)

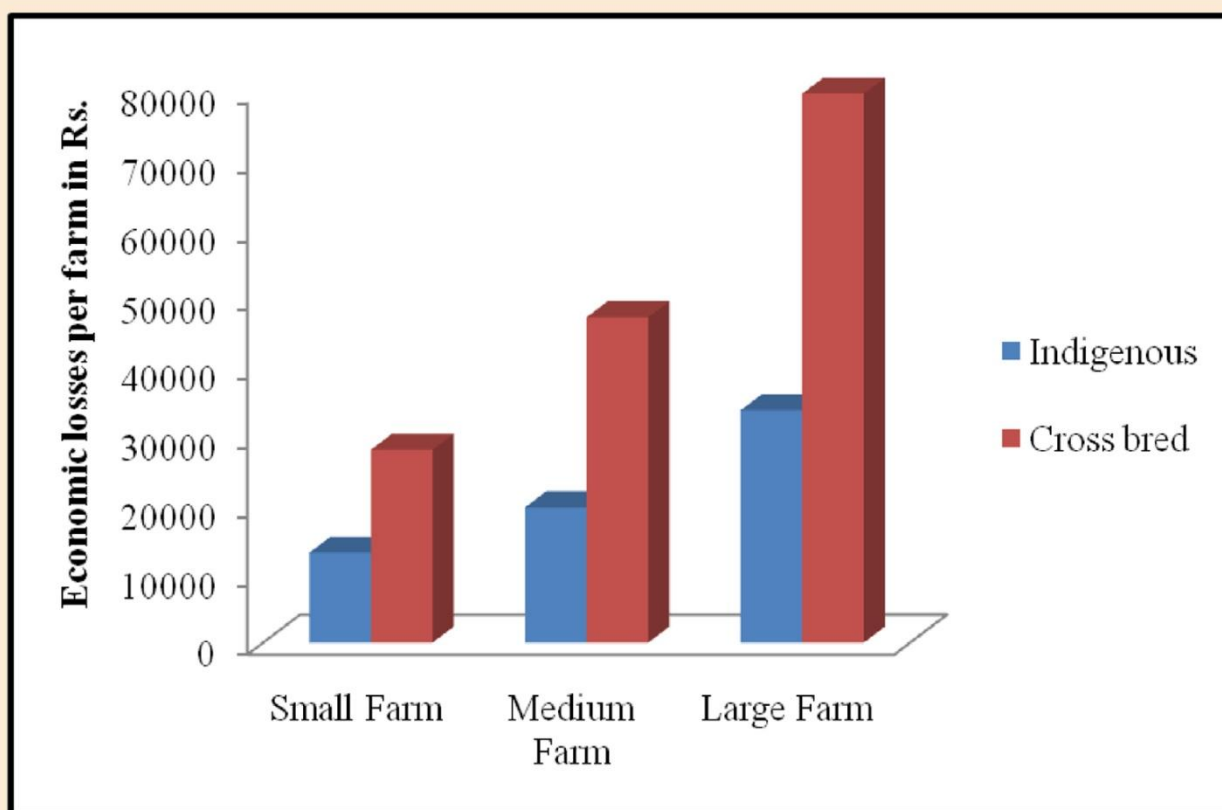


Fig. 16. Comparison of the economic impact of LSD outbreak in different categories of farm rearing cross bred and indigenous cattle

Vaccination Trial

Studies have revealed that successful control and eradication of LSD depends on early detection of the index case, followed by a rapid and widespread vaccination campaign (OIE, 2017). Commercially different live vaccines are licensed for use in different countries although the most common LSDV strain used in attenuated vaccines is the Neethling strain which was reported to be highly effective in controlling epidemics in the Balkans (Klement *et al.*, 2018). Capripox viruses exhibit cross-reactivity within the genus and therefore, it is possible to protect cattle against LSD using strains of capripox virus derived from sheep or goats (Coakley & Capstick, 1961). In countries where goat pox is present, attenuated goat pox virus strains have been used (Hovari *et al.*, 2018). Following the outbreaks in Assam, a study was designed for evaluating the efficiency of Goat pox vaccine against LSD in cattle.

Goat pox vaccine manufactured by Hester Biosciences, Ahmedabad was used for the trial at different dose rates in order to evaluate variation in the immune response generated. The antibody titre was estimated using the IDscreen Capripox Double antigen ELISA kit (Make: ID Vet) following the manufacturer's instructions.

Trial design

The animals which were found negative for the presence of antibodies against *Capripoxvirus* were included in the study. Four groups (A, B, C, D) were formed, The details of which are presented in Table 1

Sl No	Groups	Vaccine virus concentration	No. of animals vaccinated
1	A	$10^{3.0}$ TCID ₅₀	8
2	B	$10^{3.5}$ TCID ₅₀	8
3	C	$10^{4.0}$ TCID ₅₀	8
4	D	PBS (Control group)	8

The sera samples were collected from each of the animals on the 0th, 15th, 30th, 90th and 120th day post vaccination. The vaccination trial was carried out in two different locations- at Gauhati, Goshala (Fig. 17) and at Diphu cattle farm, Karbi Anglong (Fig. 18).



Fig. 17 Vaccination trial at Gauhati, Goshala



Fig. 18 Vaccination trial at Diphu, Karbi Anglong

Post vaccination Observations:

- ▶ No untoward reactions were observed in the animals vaccinated with Goatpox vaccine.
- ▶ Thermal reactions in the vaccinated animals were within the acceptable range after vaccination.
- ▶ Higher sero-conversion was recorded in Group C (4.0 TCID₅₀) which was maintained up to 90 days post vaccination. However, in the other two groups there was a sharp decline in the Mean ELISA titres 30 days post vaccination Fig. 19.

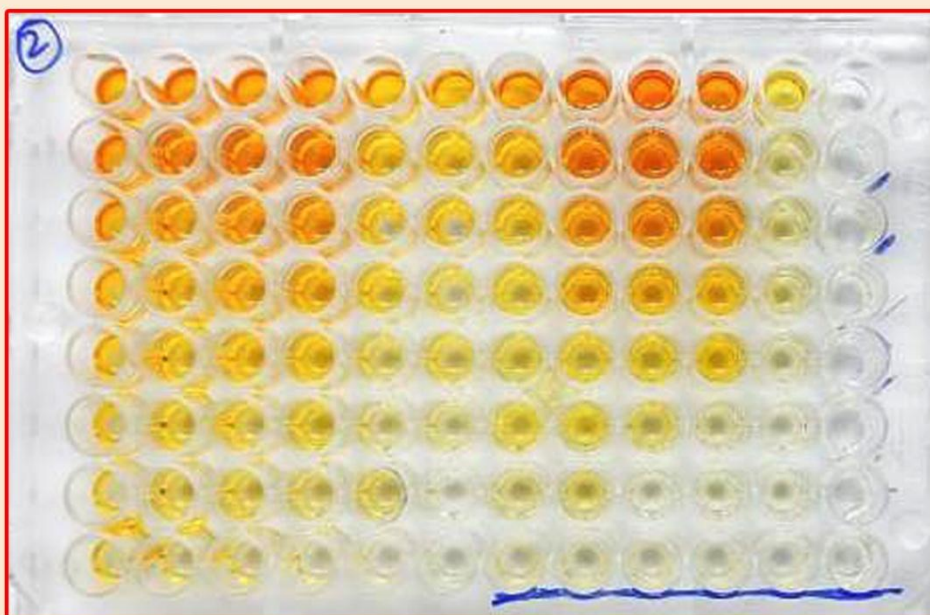


Fig. 19: Antibody detection using ELISA

Recommendation

Control of any infection depends on accurate diagnosis treatment and prophylaxis. LSD is a highly contagious viral disease that has emerged in recent time among the cattle population of Assam. After going through the literatures available in the public database, it can be speculated that, the disease will be affecting the cattle population of Assam every year and it may take the form of an outbreak. This may lead to severe economic setback to the farmers. Hence, we may be consider it as an alarming situation for us and we need to be prepared for controlling such new diseases. Therefore, in order to tackle this challenge, the following recommendations may be considered based on recently conducted prospective study. Accordingly appropriate strategies have to be formulated for controlling the disease.

- ▶ As the disease is new to the farmers of Assam, wide publicity using print (Annex-ii) as well as electronic media is the first step to create awareness among the farmers about the disease, necessary preventive measures to be adopted and preparedness to contain the outbreak.
- ▶ LSD is basically a vector borne disease. Based on analysis of risks data, prohibition of free grazing, maintenance of hygiene in cattle shed and surrounding to discourage breeding of insects, covering dung pit properly, adoption of regular fogging and use of mosquito net in the cattle shed has to be practiced.
- ▶ Appropriate diagnostic tools should be available in all district diagnostic laboratories to ensure early detection and treatment of LSD cases.
- ▶ Annual vaccination at the pre-monsoon time (December-January) using recommended dose (10 times higher dose of goat pox vaccine) of goat pox vaccine can be an effective strategy for controlling the disease. Booster vaccination after 3 months of primary immunization is essential to confer protective immunity to the vaccinated cattle.
- ▶ In the face of outbreak, early clinical disease should be identified based on clinico-hematological parameters and treatment should be rendered with T3 combination (Ceftriaxone + anti-inflammatory + antihistaminics + serratio-peptidase) for early recovery minimize economic loss.
- ▶ Proper disposal of dead animals preferably by incineration followed by cleaning and disinfection of premises are recommended.

the political negotiations also bring to a logical conclusion so as to usher in peace situation. The meeting also put on record the "failure" of the government of the day on various fronts.

Viral disease among cattle hits milk yield in Assam

Rokibuz Zaman | TNN

Guwahati: Milk producers in the state, already hit by a drop in sales over Covid fear, are now facing the threat of a highly contagious viral skin disease among cattle that can drastically reduce milk yield.

Several cases of this disease called the lumpy skin disease or LSD, has been reported from Southern Assam's Hailakandi and Cachar districts in the past few weeks. Officials fear a good number of cattle have been affected in 10 other districts, but they could not come up with the actual figures. A source said at least 30% of the cattle may have contracted the disease in these districts.

However, Dr Nagenra Nath Barman, professor, department of microbiology, College of Veterinary Science, Khanapara, here told TOI that representational samples of different districts were sent for testing to the National Institute of High Security Animal Disease, Bhopal, but the samples from Hailakandi and Cachar tested positive.

"We suspect the disease has spread more or less across the state. It was first more prevalent in the bordering districts of neighbouring Bangladesh like Dhubri and Cachar and then spread throughout the state," Barman said. He added that the infection is most prevalent in Hailakandi, Cachar

Another professor at the college, said research has shown the disease can be controlled by using the Goat Pox vaccine. "Studies are on for using the vaccine," he said.

An official at the Animal Health Centre, North Eastern Regional Disease Diagnostic Laboratory (NERDDL), said the animal husbandry and veterinary department has not issued any guideline yet for veterinary officers on how to deal with the disease.

"The disease does not kill but affects cattle production and the livelihood of people. Since milk production is reduced, it affects the economy," he said.

The state government on July 7 had issued an advisory regarding LSD, which the government urged be circulated widely among farmer and veterinarians.

"There are reports of cattle and buffaloes suffering from a condition showing symptoms of eruption of round cutaneous nodules on the skin all over the body. These may be suspect cases of Lumpy Skin Disease, a notifiable disease of bovines. The first notification of the disease has already been submitted from some districts of Odisha," the advisory signed by Prodeep Kumar Gogoi, deputy director, Animal Health Centre, NERDDL, stated.

The treatment cost varies between Rs 1,500 and Rs 2,000, and the skin gets affected and this is a cumulative loss.



The infection is most prevalent in Hailakandi, Cachar

Grenade found at

Annex i

No. AHC-187	12-08-2020	1	Parbhani, Hailakandi, Hailakandi	Swab ID: NER.LSD-18	Unfit for testing
NERDDL		2	Kamrupa, Hailakandi, Hailakandi	Swab ID: NER.LSD-19	Unfit for testing
ASF		3	Bardola, Hailakandi, Hailakandi	Swab ID: NER.LSD-20	Unfit for testing
Test Result		4	Narayanpuri, Hailakandi, Hailakandi	Swab ID: NER.LSD-21	Positive for LSDV by PCR and Real time PCR
2020-21		5	Bardola, Hailakandi, Hailakandi	Swab ID: NER.LSD-22	Positive for LSDV by PCR and Real time PCR
613		6	Chandpur, Hailakandi, Hailakandi	Swab ID: NER.LSD-23	Positive for LSDV by PCR and Real time PCR
Dated		7	Bardola, Hailakandi, Hailakandi	Whole Blood ID: NER.LSD-24	Negative for LSDV by PCR and Real time PCR
06.08.20		8	Narayanpuri, Hailakandi, Hailakandi	Swab ID: NER.LSD-25	Positive for LSDV by PCR and Real time PCR
		9	Bardola, Hailakandi, Hailakandi	Whole Blood ID: NER.LSD-26	Negative for LSDV by PCR and Real time PCR
		10	Dhankar IV, Hailakandi, Hailakandi	Whole Blood ID: NER.LSD-27	Negative for LSDV by PCR and Real time PCR
		11	Kachila Grant, Hailakandi, Hailakandi	Swab ID: NER.LSD-28	Positive for LSDV by PCR and Real time PCR
		12	Rajyemcampur, Hailakandi, Hailakandi	Swab ID: NER.LSD-29	Positive for LSDV by PCR and Real time PCR
		13	Bardola, Hailakandi, Hailakandi	Swab ID: NER.LSD-30	Negative for LSDV by PCR and Real time PCR
		14	Manascheria, Hailakandi, Hailakandi	Swab ID: NER.LSD-31	Negative for LSDV by PCR and Real time PCR
		15	Abdullapur, South Karimganj, Karimganj	Whole Blood ID: NER.LSD-32	Negative for LSDV by PCR and Real time PCR
		16	Station Road, South Karimganj, Karimganj	Whole Blood ID: NER.LSD-33	Negative for LSDV by PCR and Real time PCR
		17	Jatrapur, South Karimganj, Karimganj	Whole Blood ID: NER.LSD-34	Unfit for testing
		18	Faramphasha, South Karimganj, Karimganj	Whole Blood ID: NER.LSD-35	Negative for LSDV by PCR and Real time PCR
		19	Ratapur, South Karimganj, Karimganj	Whole Blood ID: NER.LSD-36	Positive for LSDV by PCR and Real time PCR
		20	Bagful, Badarpur, Karimganj	Whole Blood ID: NER.LSD-37	Negative for LSDV by PCR and Real time PCR
		21	Badarpur W-2, Badarpur, Karimganj	Whole Blood ID: NER.LSD-38	Unfit for testing
		22	Bundashil, Badarpur, Karimganj	Whole Blood ID: NER.LSD-39	Negative for LSDV by PCR and Real time PCR
		23	Umarpur, Badarpur, Karimganj	Whole Blood ID: NER.LSD-40	Negative for LSDV by PCR and Real time PCR
		24	Jum PL-IV, Badarpur, Karimganj	Whole Blood ID: NER.LSD-41	Negative for LSDV by PCR and Real time PCR
		25	Maha, Badarpur, Karimganj	Whole Blood ID: NER.LSD-42	Unfit for testing

Page 2 of 3

Tel. No. 0755-2759204, FAX: 0755-2758842, Website: www.nihad.nic.in

16/8/20



গৰু-মহৰ ছালত হোৱা লদ ৰোগ (লাম্পি স্কিন ডিজিজ)

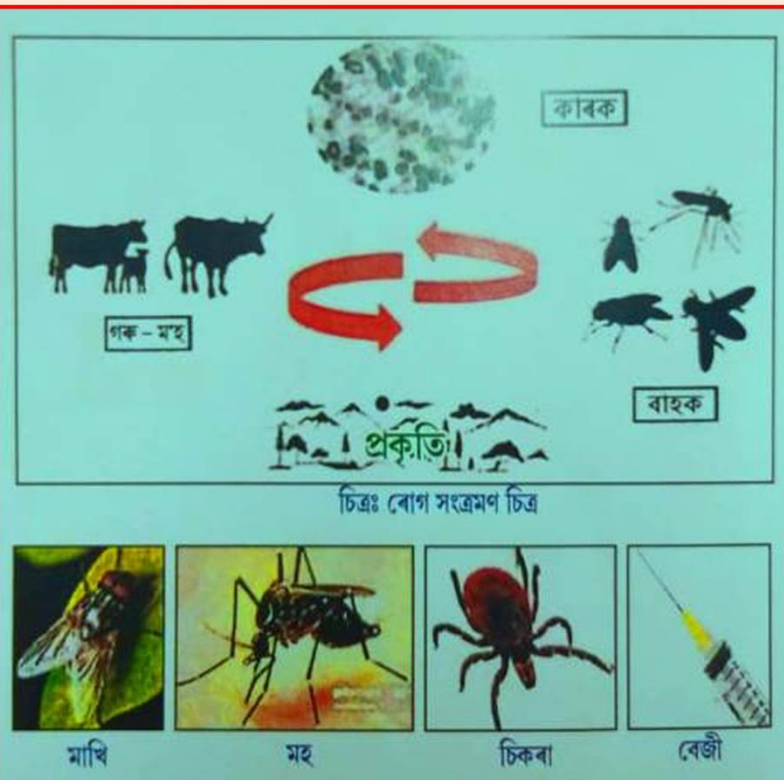


বাহকৰ দ্বাৰা দ্রুত সংক্ৰমিত এক ভাইৰাছজনিত বেমাৰ



বাহক নিয়ন্ত্ৰণ আৰু প্ৰতিৰোধ ব্যৱস্থাই হ'ব উত্তম বিধান

DBT- ADMaC
&
Department of Pathology
College of Veterinary Science
Assam Agricultural University, Khanapara, Guwahati-22



GOVERNMENT OF ASSAM
OFFICE OF THE DEPUTY DIRECTOR, ANIMAL HEALTH CENTRE
NORTH EASTERN REGIONAL DISEASE DIAGNOSTIC LABORATORY
ANIMAL HUSBANDRY & VETERINARY DEPARTMENT
KHANAPARA :: GUWAHATI 781022

No. AHC_107/NERDDL/LSD/2020-21/ 517

Dated Khanapara the 7th July, 2020

From: Prodeep Kumar Gogoi
Deputy Director, Animal Health Centre, NERDDL
A.H & Veterinary Department, Khanapara

To: All District A.H & Veterinary Officer
A.H & Veterinary Department

Sub: Advisory for Lumpy Skin Disease – reg

Sir/Madam,

In reference to the above mentioned subject this is to inform that there are reports of cattle and buffaloes suffering from a disease condition showing symptoms of eruption of round cutaneous nodules on the skin all over the body. These may be suspect cases of Lumpy Skin Disease (LSD), an OIE notifiable disease of bovines and first notification of the disease in the country has already been submitted from some districts of Odisha.

In this regard, please find enclosed an advisory for LSD for information and wide circulation amongst field veterinarians, veterinary institutions in your district for awareness raising and necessary advice to the farmers. Further, you are requested to direct all concerned to investigate all suspected cases of LSD/ pseudo LSD on priority and forward clinical/ necropsy samples along with the epidemiological format as per Annexure enclosed.

Please treat as TOP MOST URGENT

Yours faithfully,



Deputy Director,
Animal Health Centre, NERDDL
A.H & Veterinary Department, Khanapara

No. AHC_107/NERDDL/LSD/2020-21/ 517-A

Dated Khanapara the 7th July, 2020

Copy to:

1. The Commissioner & Secretary to Government of Assam, A.H & Veterinary Department, Dispur Guwahati-6 for favour for kind information.
2. The Director, A.H & Veterinary Department, Assam, Chenikuthi, Guwahati-03 for favour for kind information.
3. The C.E.O., Assam Livestock Development Agency (ALDA), Khanapara, Guwahati-22 for favour for kind information and necessary action.



Deputy Director,
Animal Health Centre, NERDDL
A.H & Veterinary Department, Khanapara

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4	Shree Shree Gauhati Goshala Samittee	
5	Dr. J N Das	Visiting Doctor, Gauhati Goshala
6	Dr. Dilip Mahanta	DVO, Karbi Anglong, Diphu
7	Dr. Amitav Chakraborty	Veterinary Officer, NERDDL, Khanapara
8	Dr. Jiten Bardoloi	DIO, NERDDL, A.H and Veterinary Department, Govt. of Assam
9	Dr. David Bordoloi	Veterinary, Officer, ICDP, Manja, Karbi Anglong
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“Being in Prevention Vigilance Mode” is always rewarding.....



Adopt proper bio-security measures to raise healthy and productive Cattle herd

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