

Nar Skin Nodositas in Cattle Research on Treatment and Prevention and Control

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Abstract: Bovine nodular dermatitis is an infectious disease caused by bovine nodular skin virus. The main clinical symptoms are high fever in infected cattle, widespread lumps and nodules on the skin. It is a national second class of infectious disease, decreased milk yield, and irreversible pit and scab on the skin, which seriously affects the production performance of dairy cows. We explore this problem from the perspective of comprehensive prevention and control at the grass-roots level to help prevent and control the disease. Bovine nodular skin dermatitis, also known as bovine nodular skin rash. This disease is characterized by a high fever, nodules of varying sizes on the skin, and a significant decrease in appetite. The high incidence of this disease is mainly caused by mosquitoes, horse flies and other blood-sucking insects, which spread fast and wide range. Once the cattle get sick, it will often cause a large range of infection of the whole cattle and the surrounding cattle." In this paper, scientific and reasonable suggestions are put forward to strengthen the prevention and control effect of bovine nodular skin disease, which will play a positive role in promoting the development and construction of animal husbandry.

1. Introduction

Bovine nodular dermatitis (also known as bovine nodular rash, bovine acne dermatitis, and bovine nodular dermatitis) is a disease of cattle that is transmitted through the bite of blood-feeding media such as mosquitoes, flies, and ticks. It is a smallpox disease and the clinical symptoms of affected cattle include persistent fever, severe superficial lymph node enlargement, tissue edema of the extremities, and the appearance of distinct nodules on the skin, oropharynx, epiglottis, tongue, and gastrointestinal mucosa. These include the variola lesions. It is a notifiable infectious disease of animals according to the World Organization for Animal Health (WOAH) definition, it is classified as type 2 imported animal infectious disease in Japan. The pathogen is bovine nodular dermatitis virus, which belongs to the genus Calpovirus in Japan. Poxviridae, the vertebrate poxvirus subfamily. Different genera from the vaccinia virus genus. The Calpoviridae includes three members of Calpox virus and helpox virus. There is serological cross-protection between diseases: those with goat pox and goat pox infecting humans? The nodular dermatitis virus does not infect

humans, is not infectious, and is not zoonotic. Before 2019, LSD was an important new foreign disease in Chinese cattle herds, which first appeared in Zambia in 1929 and has been reported since 1943. Regional distribution of the epidemic to South Africa: LSD first occurred in 1988-1989 in Egypt and Israel in 2012-2018 LSD outbreak in Turkey, Russia and other countries reported: Our territory and parts of the above countries pose a major threat to the LSD prevention and control in China. On August 12, 2019, LSD was confirmed cross-border and brought to Yili, Xinjiang, China. This article diagnosed this disease to enhance surveillance, prevention and control.

2. Disease profile

Bovine nodular dermatitis is also known as cattle nodular dermatitis, nodular dermatitis, bovine nodular rash, infectious skin ulcer. The pathogen is a bovine nodular skin virus, which causes high fever and affects the skin, visible mucous membranes and viscera. Ulcers are the typical clinical presentation. The disease was first discovered in Africa in 1929 and has since spread widely worldwide. The first suspected case was reported in 2019, followed by an outbreak in 11 provinces, municipalities and autonomous regions. By 2020, the official website of the Ministry of Agriculture had reported 24 cases, causing huge economic losses to the aquaculture industry. "With the progress of global economic integration, the foreign trade volume of China's beef cattle industry has gradually increased, and frequent cross-border transportation has provided conditions for the spread of the epidemic. Scientific and comprehensive prevention and control policies are the guarantee to ensure the healthy development of the beef cattle industry. It can also promote the healthy development of China's beef cattle industry and animal husbandry. The author discusses cattle in terms of clinical diagnosis and comprehensive prevention and treatment.^[1] Comprehensive prevention and treatment measures for nodular skin diseases.

3. Pathway of transmission

Bovine nodular skin disease is a systemic infection in cattle, mainly caused by the bovine nodular skin disease virus of the genus Poxviridae and cephalpox virus, and the clinical symptoms are cutaneous nodules. One is to control the source of infection. The main source of infection of this disease is that bovine nodular dermatitis can infect all cattle breeds and ages, thus requiring enhanced surveillance for the diagnosis of bovine nodular dermatitis, regardless of breed or age.yes. The disease can be transmitted through direct contact, insect vectors, and vertical transmission. Mechanical transmission of vampire insects such as mosquitoes, flies, ticks, fleas, ticks, and lice is the main route of infection. Biological vectors carry the virus and spread after taking the blood of diseased cattle. Bleeding and swelling of the skin and subcutaneous mucosa formed subcutaneous embolism, formation of connective tissue necrosis, scab skin rupture and falling off, accumulation of pus and blood, leading to the bite of blood-sucking insects and the spread of infection. Movement and feeding diseases of blood-sucking insects. Cows, cows and Asian buffalo of various strains and ages can contract the disease, with particularly high rates in dairy cows, calves and farm cattle.^[2]

4. Clinical symptoms

After 2 weeks, the skin gradually grew up to 5 cm; the scapular and inguinal lymph nodes became enlarged, and subsequently spread to the nasal lens with visible mucosal ulceration. With the development of the disease, the wound gradually increased, several spots fusion into a large scab, nodules filled with tissue fluid and purulent secretions, a few weeks later scab skin lesions off, some cattle can heal themselves; not timely treated lesions will spread to the subcutaneous tissue, necrosis and even maggot focus. The mortality rate of calves is high, the milk yield of cows

decreases significantly, the reproductive disorder appears after self-healing, and the pregnant cows are aborted and stillborn. The main symptom of infected cattle is the initial onset of elevated body temperature, up to 41°C, and persistent fever can be seen clinically. "The Superficial lymph nodes of infected cattle are obviously enlarged, with nodules with a diameter of 10~50 mm mainly appearing on the skin of the head and neck, shoulders, breasts, vulva, scrotum and other places. At the same time, lymph nodes, limbs, abdomen, and bulls infected with a nodular skin disease may be temporarily or permanently infertile, while pregnant cows infected with a nodular skin disease can cause miscarriage, with estrus delay up to a few months and a significant decrease in milk production. It also affects sex, damages the skin and affects the quality of cows. After dissection of diseased cows with nodular lesions in the gastrointestinal tract and respiratory tract, they also showed characteristic smallpox virus lesions in their internal organs. Clinical symptoms vary widely among individuals, which is related to the immunity of the animals and the amount of infected virus. The marked swelling and tenderness of nodules are typical clinical manifestations of nodular skin disease. Cattle in the neck and shoulders, but may also occur in the limbs and abdomen. It may have first occur on the skin of the head and neck. The nodules on the limbs cause joint swelling and movement; the bull becomes temporarily or permanently infertile; the cow is more likely to miscarriage, the production of the cows drops sharply, affecting the production capacity of the cows; affects the milk yield of the dairy farm, and the cows decrease. With the development of the disease, the nodules may disappear, but the scab often falls off in the skin lesions, leaving deep ulcers, causing insect bite, skin damage, and even secondary bacterial infection and lead to the death of animals. The nodules are deep into the skin layer and subcutaneous tissue; also visible at the ulcer. Ulcers also appear on the skin of the mouth, lips, and nose because it often invades adjacent muscle layers. The above main clinical features of LSD provide a rationale for the initial diagnosis of LSD^[3].

5. Pathological features and the differential diagnosis

5.1 Skin connective tissue is complicated by edema and infiltration

The tracheal mucosa was congested and swollen, with large amounts of viscous exudates. By observation, it can be found that the lungs, heart, kidneys, gallbladder, etc. are enlarged, with hemorrhagic points and masses, the edges can be infiltrated, the liver boundary is blunt, the spleen is brittle, the skin tissue section microscopic examination, vasculitis, perivascular fibrous tissue hyperplasia, cell infection, syncytial and vacuole-like lesions. Pathpathological features are easy to distinguish from tinea, urticaria, actinomyces, insect bite, centennial filarial disease, and the diagnosis can be established through laboratory diagnosis. The commonly used laboratory diagnosis of virus isolation and culture, electron microscope, bovine nodular skin disease laboratory diagnosis of the preliminary diagnosis should be based on the epidemiology, clinical symptoms and autopsy changes. However, the clinical symptoms of bovine nodular dermatitis are similar to bovine herpes virus disease, pseudobubala and scabies. Please note that for a more accurate diagnosis of bovine nodular dermatitis, samples from suspected cases need to be collected and clinical examination. The virus neutralization test in the laboratory can effectively detect antibodies using enzyme-linked immunosorbent test and other methods, but also need to collect skin scab, mouth and nose swabs, anticoagulant, etc. Finally, the accurate diagnosis of bovine nodular skin disease need to detect by polymerase chain reaction and fluorescent polymerase chain reaction for viral nucleic acid, autopsy results show that the typical lesions is located in the respiratory tract and gastrointestinal tract, LSDV has tissue tropic, lymph node enlargement including lymph node hyperplasia, edema, lymph node enlargement, etc. It becomes congested with bleeding. The heart was swollen, cardiac muscle fibers were congested, bleeding, and blood was visible. Pulmonary edema, pleuritis with

mediastinal lymphnode enlargement in severe cases. The kidney has a bleeding point in the tracheal mucosa congestion, containing a lot of mucus. Gastric mucosal bleeding. Diffuse small intestinal bleeding. Early in the disease, LSDV is very evident in the cytoplasm of infected cells. Eosinophils combined with LSD epidemiological features, clinical symptoms, general changes at autopsy as well as histology.^[4]

5.2 Pathological diagnosis LSDV is cytotropic and can be detected in different strains or species.

Replication in the cultured cells. LSDV has a unique morphological structure, allowing for the selection of sheep testicular cells for the isolation and identification of LSDV. The collected diseased material was inoculated with sheep testicular cells to form a typical sheep testicular cytopathy, and the cell cultures were observed by transmission electron microscopy to reveal brick-shaped particles with typical poxvirus morphology. Electron microscopy can only identify the virus as poxvirus, but cannot identify the specific genus or species of the virus, diagnosis requires PCR (polymerase chain reaction) and indirect fluorescent antibody detection. Molecular biology diagnosis PCR (polymerase chain reaction) and fluorescence quantitative PCR can specifically detect LSDV nucleic acid, and can also be used to detect cattle nodular skin disease virus, goat pox virus, sheep pox virus, at the same time can distinguish the LSDV common detection in cattle skin nodules, skin scab, saliva, blood, mouth and nose secretions for sick, by detecting virus nucleic acid diagnosis. Early disease, often use PCR technology to detect virus nucleic acid, but with the progress of the disease, due to produce antibodies against the virus, and clinical symptoms not 3) immunological diagnosis method commonly used to detect LSD positive cow whole blood antibodies, the main detection methods include indirect immunofluorescence antibody test (IFAT), enzyme-linked immunosorbent test (ELISA), virus and test LSDV antibody detection methods are VNT (VNT) and agglutination test (AT), the most commonly used detection technology is VNT, only detect neutralizing antibodies. ELISA uses viral protein or partial protein instead of intact virus as coated antigen to detect LSDV antibodies. The ELISA method construct used LSDV P32 protein with lower 98% sensitivity and specificity up to 99% compared to VNT, improved data consistency compared to the ELISA method using whole virus as coated antigen construct, with antigen ELISA kits up to 100%, specificity up to 99.7% and higher sensitivity than VNT.^[5] Animals can acquire specific antibodies by natural infection and rehabilitation or by vaccine immunization, but when testing antibodies in whole blood for disease diagnosis, attention must be taken to distinguish animal-specific antibodies. Antibodies were obtained by vaccination or by wild viral infection. The final diagnosis of LSD must be comprehensively judged based on the test results. Consistent with the epidemiological, clinical manifestations and pathological change characteristics, it was identified as a suspected case of LSD. LSD can be diagnosed by the combination of epidemiology, clinical symptoms, pathological changes, positive EM morphological observation, PCR test, viral neutralization test or ELISA test results.

6. Promotion of prevention and control measures

6.1 Be sure to get vaccinated. The best way to prevent it is through early vaccination

After vaccination, cattle will produce antibodies, which can prevent the virus from fighting in cattle. Vaccination is often used to prevent the nodular skin diseases and increase the resistance of cattle. Therefore, the farms should develop vaccination plans in advance, and they must be strictly implemented. Pre-vaccination can reduce morbidity in cattle."cattle. Regular vaccination is necessary, especially in cattle farms in high-risk areas. Immunization usually begins one month

after vaccination.

6.2 Conscientiously do a good job of daily quarantine inspection.

In some areas, the quarantine mechanism has not been established, even if it is established, it is not detailed enough, resulting in circulating cattle susceptible to infection with the disease. Therefore, a thorough quarantine, regular observation of the diet and excretion of cows, monitoring of physical symptoms, if fever, runny nose, body surface nodules and other conditions should be timely treatment. Professional veterinarians regularly check the health status of the cows, and find and treat the cows in time. The frequency of quarantine should be increased, and the quarantine of cattle should be comprehensive and thorough, especially in the period of high incidence of diseases.

6.3 If farmers do not understand the nodular skin disease and do not pay enough attention to the disease, the disease will be widespread.

Of course, we need to regularly send professional veterinarians to conduct on-site inspections and carry out in-depth public relations activities. At the same time, Wechat public accounts, Toutiao and other public accounts can be rationally used to deliver epidemic prevention knowledge and response skills to farmers in real time, so that farmers can effectively prevent the epidemic. In order to effectively prevent and control the outbreak and spread of LSD, comprehensive epidemic prevention measures must be taken." Epidemics can be prevented through daily preventive activities, and even if infectious diseases do occur, they can be controlled to a minimum and quickly suppressed in place. Vaccination can effectively prevent the outbreak and spread of LSD. Blood feeding insect vector is an important vector of the disease. Farms should properly kill mosquitoes, flies and other biological vectors to block the transmission route. Publicity and education, improve biosafety awareness and strengthen biosafety management. Relevant departments can formulate culling measures in advance, seal off the epidemic area, and prohibit the transport of live cattle; Cattle diagnosed with LSD should be slaughtered immediately and the carcasses disposed of; Weak vaccines should be used for emergency vaccination. Surface healthy cattle in the endemic zone: isolate the cattle in the same group, identify confirmed positive cases, cull and limit the activities and activities of surface healthy animals within 1 month after emergency immunization; 10% lime water and 20% plant ash water 2 kill vectors in the endemic area; and thoroughly disinfect with 100% caustic soda water. We should pay more attention to the epidemic situation of LSD at home and abroad, reserve LSD vaccines and diagnostic prevention and control products, scientifically prevent and control LSD, and achieve early detection, reporting, diagnosis and treatment of the epidemic. In order to protect the healthy and sustainable development of the cattle industry, relevant departments should scientifically design immunization programs, strengthen daily monitoring and implement vaccination, which is an important measure to effectively prevent and control bovine nodular skin diseases. Therefore, animal husbandry operators and farmers should be combined with the actual situation, systematic, reasonable and planned vaccination. A general herd immunization schedule includes centralized immunization of all herds in the spring to achieve good herd immunity. Therefore, both animal husbandry organizations and individual farmers should attach great importance to bovine nodular skin disease, carry out planned vaccination scientifically, and carry out vaccination work actively and independently. Relevant personnel should implement specific vaccination plans, establish corresponding records, and actively accept immunization.

6.4 Strengthen animal husbandry and veterinary training to realize scientific agriculture

In order to comprehensively prevent and control bovine nodulosis, the prevention and control of animal disease institutions were supervised and inspected, together with relevant departments and institutions, the occurrence of bovine nodulosis was effectively controlled through systematic vaccination, and achieved good results. This preventive effect will help China's cattle industry to gradually establish a complete immune system and disease prevention mode, and effectively strengthen the prevention and treatment of bovine nodular skin disease. In addition, the livestock and poultry disease prevention and control centers at all levels should give full play to their functions, perform their own duties, strengthen the daily monitoring of the impact of livestock and poultry disease, and play a good supervisory role for animal husbandry enterprises and individual farmers. Animal husbandry operations can be effectively maintained, and individual farmers can also fully implement the planned vaccination. In addition, the livestock and poultry disease prevention and control centers at all levels should make a scientific and reasonable assessment of the specific implementation of the planned immunization of animal husbandry enterprises and individual farmers, and encourage animal husbandry enterprises and individual farmers to provide specific and reasonable vaccination plans, reasonable guidance. By providing the necessary technical support, the immune effect can be effectively guaranteed, the potential epidemic risks can be eliminated in time, and the healthy, stable and sustainable development of animal husbandry can be ensured.

7. Conclusion

Animal husbandry departments and veterinary departments at all levels play an important role in the prevention and control of cow nodular dermatitis and are an important basis for effective management. Therefore, animal husbandry and veterinary colleges and universities at all levels should pay more attention to professional human resources, strengthen the training of animal husbandry and veterinarians and veterinarians, implement systematic and step-by-step professional knowledge and technical training, and make effective use of professional human resources. We need to develop them in a meaningful way. This will further improve the professional technical level of epidemic prevention technical personnel, strengthen their professional quality, and provide talent and technical support for the prevention and treatment of bovine nodular skin disease.

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