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BOVINE EPHEMERAL FEVER: ITS DISTRIBUTION, CLINICAL SIGNS, DIAGNOSIS AND PREVENTION

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Abstract
This article examines bovine ephemeral fever, including its causes, causative agent, distribution, pathogenesis, clinical signs, and pathological and anatomical changes. It also outlines methods of diagnosis, differentiation from other infectious diseases, treatment, development of immunity, prevention, and control measures. The economic damage caused by the disease to the livestock sector and the importance of veterinary and sanitary measures are also considered.

Keywords: Cattle, bovine ephemeral fever, virus, causative agent, vector-borne disease, pathogenesis, diagnosis, treatment, immunity, prevention, veterinary and sanitary measures.

Introduction

Ephemeral fever (Latin: Febris ephemera; English: bovine ephemeral fever; Russian: эфемерная лихорадка, трёхдневная лихорадка) is an infectious disease of cattle characterized by an acute course and viral transmission. Its main signs include a short-term increase in body temperature; inflammation of the mucous membranes of the nose, mouth, oesophagus and eyes; stiffness of the muscles of the body and limbs; difficulty moving; and lameness.

Historical background

Bovine ephemeral fever has been recorded in various parts of the world at different times. The disease was identified in Africa in 1867, 1907, 1908 and 1915; in Asian countries in 1887–1891, 1906–1908 and 1919; and in Australia in 1936–1937. The disease has been extensively studied in Africa, Australia and Japan, with research focusing on its causative

agent and antigenic properties. It has also been recorded in European countries such as Finland, Germany, the Czech Republic, Slovakia, the Netherlands and Denmark.

Relevance of the topic

In Uzbekistan, ephemeral fever was first recorded in 1984 under the name “Termez fever”. Subsequent cases of the disease were recorded in 2002 and 2013 by X. S. Salimov and A. Mengliyev. The epizootic spread of the disease can cause serious economic losses to livestock farming. These losses are associated with reduced production of animal products, the death of some animals, expenditure on medicines for treatment, and the costs of disinfection and disinsection measures.

Causative agent

Bovine ephemeral fever is caused by an RNA-containing virus. According to the textbook cited in the source article, this virus belongs to the family Rhabdoviridae and the genus Rhabdovirus. The virus is bullet-shaped or conical and measures 70–80 × 140–170 nm. Its genetic material is reported to have characteristics that distinguish it from other rhabdoviruses. Some researchers have also noted the existence of neurotropic strains, meaning strains with an affinity for nervous tissue.

Under laboratory conditions, the virus can be propagated in cell cultures such as VNK-21 and BEP, as well as in experimental animals. Repeated passage may lead to changes in its replication properties and virulence. After the virus enters the body, the immune system produces virus-neutralizing and complement-fixing antibodies against it.

Virus strains isolated from pathological material may differ in certain characteristics. In 1971, Japanese researchers Y. Ito, Y. Tanaka and Y. Inaba reported antigenic similarities between the bovine ephemeral fever virus and the bluetongue virus of sheep, also known as the infectious catarrhal fever virus.

Studies have shown that the virus can multiply in 4–7-day-old chicken embryos and in cell cultures prepared from bovine embryonic kidneys. Under these conditions, epizootic strains may produce a cytopathic effect (CPE) in cells. However, no cytopathic effect was observed during viral replication in certain cell cultures prepared from the kidneys of foals, piglets and calves; the kidneys of hamster and rat embryos; and the testes of young bulls. When the virus is inoculated into the yolk sac of a chicken embryo, it causes the death of the embryo. The virus also develops well in cell cultures obtained from hamster brain, kidney and lung tissues, as well as in tumour cells capable of continuous propagation. Within two to three days, the viral titre reaches the cytopathic effect dose (CPED) level.

In experimental studies, 1–3-day-old suckling mice are used to investigate the virus. When a virus-containing suspension is injected into their brains, paralysis of the limbs may occur, and the mice may die. Serial passage of the virus in mice and hamsters increases its virulence. During the first passage, 17% of the animals die on average by the 12th day; during the third passage, 100% die on average by the 5th day; and by the eighth passage,

laboratory animals die within three days. Adult mice, rats and hamsters are considered insusceptible to the virus, even when virus-neutralizing antibodies are not detected in their bodies.

Resistance of the causative agent to environmental conditions. One of the important characteristics of the bovine ephemeral fever virus is its resistance to environmental factors. The virus can withstand drying, freezing and repeated freeze–thaw cycles. It may remain active for more than 30 minutes at 56°C. However, the virus is sensitive to the acidity and alkalinity of its environment: it is inactivated within 10 minutes at pH 2.5 and within 1.5 hours at pH 9.1.

Bovine ephemeral fever is not considered a readily contagious disease transmitted directly from one animal to another. Blood-sucking insects, including Culex annulirostris, Anopheles annulipes and other types of flies, play an important role in its spread. These insects contribute to the persistence and transmission of the virus in nature. One of the main characteristics of the disease is its ability to spread over large areas within a short period.

The main sources of infection are diseased cattle and cattle carrying the virus. A fly becomes infected with the virus while sucking blood from a diseased animal. It may then transmit the virus to another, healthy animal when it feeds on its blood. Infected flies can be carried hundreds of kilometres by strong winds, allowing the disease to spread beyond one locality to other regions, countries and even continents.

With regard to the outbreak observed in Surkhandarya Region in early August 2002, it was concluded that the virus had been introduced by infected flies carried by winds from Afghanistan. This conclusion was based on the fact that the disease had been recorded at different times in parts of Asia, Africa and Australia, including Australia, Indonesia, Japan, China, India, Kuwait, Iraq, Jordan, Syria and Iran.

In Surkhandarya Region, bovine ephemeral fever was first recorded in 1984, for the second time in 2002, and for the third time in 2013. During the 2002 epizootic, the disease was detected in all districts of the region. In September of that year, it was also reported in certain districts of the region. In 2013, the disease was recorded again in the territory of Surkhandarya Region, nine years after the second major epizootic.

Although bovine ephemeral fever occurs mainly in warm-climate regions such as Africa, Asia and Australia, it has also been detected in cattle in the temperate European countries of Germany, the Netherlands, Denmark, the Czech Republic and Slovakia. Therefore, the possibility of the disease emerging in areas where it has not previously been recorded cannot be completely ruled out.

Epizootological characteristics and seasonality. According to Australian researchers, the bovine ephemeral fever virus can multiply in flies belonging to the genus Culex. Consequently, the spread of the disease depends on the climate and seasons of a

particular area. It occurs most often from May to October in warm and humid conditions, especially near riverbanks. Depending on the region, the interval between recurrences of the disease may range from 5–7 years to 10–20 years.

Cattle are primarily susceptible to the disease; buffaloes, yaks and sheep may also be affected. In newly affected areas, up to 75–100% of cattle may become infected. Morbidity and mortality rates vary depending on the previous epizootic situation in the area and the susceptibility of the animals.

Pathogenesis. After entering the body, the virus spreads through the bloodstream to various organs and tissues. It localizes in endothelial cells lining the blood vessel walls and in leukocytes, triggering inflammatory processes. As a result, blood circulation is disrupted, lesions and haemorrhages may develop in the mucous membranes and muscles, and muscle weakness, stiffness of the limbs and lameness may occur.

Course of the disease and clinical signs. The incubation period usually lasts 2–10 days. The disease may occur in acute, subacute or asymptomatic forms. In the acute form, body temperature rises to 41–42°C and often returns to normal within 2–3 days. In some cases, the fever may recur.

The main clinical signs include:

• Decreased appetite and cessation of rumination;
• Depression, weakness and muscle tremors;
• Pain in the joints and tendons of the limbs, lameness and difficulty moving;
• Coughing, increased respiratory rate and pulmonary wheezing;
• In some animals, weakness of the tongue and throat muscles, with difficulty swallowing and breathing due to swelling;
• The development of ulcers on the mucous membranes of the mouth, nose, gums, udder and external genital organs.

According to observations, body temperature returns to normal within 2–3 days in approximately 80% of animals and within 4–5 days in 10–20%. Atony of the rumen, increased heart rate and rapid breathing may also be observed. In the subacute form, clinical signs are often less pronounced.

Pathological and anatomical changes. In this disease, the mucous membranes of the nose, larynx, pharynx and trachea become reddened, and ulcers may develop in some cases. Pneumonia and emphysema may occur in the lungs, while inflammatory and degenerative changes may be observed in the muscles of the body and limbs. Inflammation of the tendons (tenosynovitis), inflammation of the joints (arthritis) and haemorrhages in certain tissues may also be detected.

Diagnosis and differential diagnosis. A preliminary diagnosis is made on the basis of clinical signs, epizootological data and pathological and anatomical changes. The final diagnosis is confirmed by laboratory tests, including virus isolation, biological assays, detection of viral antigens and serological reactions. Bovine ephemeral fever must be differentiated from diseases such as cattle plague, foot-and-mouth disease, malignant catarrhal fever, infectious bovine rhinotracheitis and viral diarrhoea.

Treatment. Treatment is aimed at improving the animal's general condition, reducing the clinical signs of the disease and preventing complications. Infected cattle are placed in a clean, cool and separate area. Where necessary, specific sera and symptomatic treatments are used. The use of caffeine sodium benzoate, camphor, certain antibiotics, fluids, glucose, vitamins and other preparations has been recommended. The oral mucous membranes are treated with appropriate agents, while local treatments are applied to the joints of the limbs.

Animals that recover from the disease develop immunity for a certain period. Its duration depends on the viral strain and the animal's immune status. Antibodies transferred from the mother to the calf through colostrum may persist for approximately 6–7 months. The textbook notes that immunity may last up to six months when an inactivated vaccine is administered twice.

Prevention and control measures. The following measures are important for preventing the disease:

- Import cattle from disease-free areas and subject them to veterinary inspection;
- Keep cattle housing clean, carry out regular disinfection and safely treat manure;
- Conduct disinsection measures against blood-sucking insects;
- Provide animals with proper nutrition and comply with zoohygienic requirements;
- If the disease is suspected, immediately notify a veterinary specialist and isolate sick animals;
- Prevent uncontrolled movement of animals within the farm and avoid mixing animals from different groups.

Restrictions established by the veterinary authorities are imposed on a farm or area where the disease has been detected. Diseased animals are isolated, and the necessary treatment and sanitary measures are carried out. Restrictions are lifted in accordance with the decision of the competent veterinary authority and the applicable procedure.

Conclusion

To prevent bovine ephemeral fever and limit its spread, regular preventive disinsection should be carried out in livestock farms, farming enterprises and animal housing facilities in private households. In this regard, the use, in accordance with the relevant instructions, of solutions containing 0.5% Neocidol, 0.015% Sumbush, Karate, 0.5% Ectomin, 3%

Creolin, 0.015–0.025% cypermethrin or 0.0062–0.125% Nurel-D can help control insects that transmit the disease and reduce the risk of the infection being introduced from other areas and spreading further.

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