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EPIDEMIOLOGY OF BOVINE NECROBACTERIOSIS IN THE LENKORAN-ASTARA ECONOMIC REGION OF THE REPUBLIC OF AZERBAIJAN

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ЭПИДЕМИОЛОГИЯ НЕКРОБАКТЕРИОЗА КРУПНОГО РОГАТОГО СКОТА В ЛЕНКОРАНЬСКО-АСТАРИНСКОМ ЭКОНОМИЧЕСКОМ РАЙОНЕ АЗЕРБАЙДЖАНСКОЙ РЕСПУБЛИКИ

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Abstract. Necrobacteriosis (*Necrobacteriosis, Necrobacillosis*) is an infectious disease characterized by purulent-necrotic lesions of tissues and organs. All types of domestic animals and most wild animals can be infected with necrobacteriosis. Bovine animals and small ruminants, pigs, horses, including humans, are susceptible to the disease. Young animals are more susceptible and more likely to develop a disease than adults. The nidus is diseased animals and bacterial carriers. The causative agent is anaerobic *Fusobacterium necrophorum*. The pathogen is localized in the skin and underlying tissues, limbs and udder, and in some cases on the mucous membranes of the oral cavity. The causative agent of necrobacteriosis is also widespread in the environment (livestock premises, sports grounds, manure, soil, pastures, sources of dead water, etc.).

Аннотация. Некробактериоз (некробациллез, некробактериоз) — инфекционное заболевание, характеризующееся гнойно-некротическим поражением тканей и органов. Некробактериоз может поражать все виды домашних животных и большинство диких животных. К заболеванию восприимчивы крупные и мелкие жвачные животные, свиньи, лошади, а также человек. Молодые животные более восприимчивы, чем взрослые, и болеют чаще. Источником заболевания являются больные животные и бактерионосители. Возбудитель заболевания — анаэробный Fusobacterium necrophorum. Возбудитель локализуется в коже и подкожных тканях, на конечностях и шее, в некоторых случаях на слизистых оболочках полости рта. Возбудитель некробактериоза широко распространен также в окружающей среде (животноводческие помещения, спортивные площадки, навоз, почва, пастбища, стоячие водоемы и т. д.).

Keywords: necrobacteriosis, cattle, etiology, pathogenesis.

Ключевые слова: некробактериоз, крупный рогатый скот, этиология, патогенез.

Until the middle of the 19th century, necrobacteriosis was registered under various names. The causative agent of the disease was first determined by R. Koch (1881), and its detailed characteristics were given by F. Leffler (1884). The disease is prevalent in all countries of the world. Farms oriented in dairy and meat sectors are caused economic losses from diseases. Mortality rate among young animals is 80% [7].

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Cattle, wild animals, birds and humans, being susceptible to the disease, each of them has different clinical forms [1-3].

Animals are mainly infected by contact with damaged areas of the skin or mucous membranes of pathogenic animals. The occurrence of the disease can include a weakening of the immune system and protective organs of the body, poor conditions of keeping and feeding, improper hoof care, and other causes.

The initial mechanism of necrobacteriosis occurs after the loss of natural skin impermeability. This situation occurs with mechanical damage to the skin and hooves of animals, as well as with impaired mineral and vitamin metabolism in the body. Enteral and subcutaneous microflora penetrates through the damaged skin into the anaerobic conditions of the subcutaneous tissue. If the causative agent of necrobacteriosis in such a situation causes a necrotic process, then various abscesses are caused by another pathogen or conditionally pathogenic microflora.

The natural impermeability of the skin occurs against the background of a lack of calcium in the feed or a malfunction of the intestinal glands responsible for its absorption (https://beti.az/az/pages/77/63/news/33).

This kind of cases are observed when, instead of fodder and hay, acidic foods and concentrates are preferred in the ration of ruminants, as well as when they are deprived of their pasture. This time prevents the involvement of hormonal forms of vitamin D in interstitial intestinal cells in the absorption of calcium from food. At the same time, the level of calcium in the blood plasma is regulated by washing it out of the bones with the help of parathyroid hormone (a hormone secreted by the parathyroid glands that regulate the levels of calcium and phosphorus in the blood).

In the Republic of Azerbaijan, necrobacteriosis is prevalent in bovine animals. *Fusobacterium necrophorum* (the causative agent of necrobacteriosis) is usually a harmless microorganism found in the gastrointestinal tract of ruminants. It is the violation of the basic metabolism of calcium in the body that makes them the causative agents of severe pathologies of bone tissues, muscles and internal organs of the animal.

The agricultural and industrial complex forms the basis of the economy of the Lenkoran-Astara economic region. The structure of agriculture is dominated by precocious vegetable growing, potato growing, horticulture, viticulture, grain growing, and animal husbandry. The economic district is an important citrus area. This economic region accounts for up to 99% of the tea produced in Azerbaijan, more than half of the products of vegetable growing, melons and gourds. Crop production, animal husbandry and fish processing occupy an important place in the food industry [2].

Since the Lenkoran-Astana economic region is a subtropical area, humidity and dampness are constantly present in the region, which can be considered a source of necrobacteriosis. At the same time, cuts that occur on the hooves and skin of animals as a result of walking, grazing on rocky, muddy territories and in areas where there are sharp objects cause the spread of infection. Poor nutrition and stress weaken the immune system of animals and reduce their resistance to bacteria. Thus, in the course of our research, it was found that the animals are fed unilaterally, keeping conditions are unsatisfactory, and the mineral-vitamin mixture is not used in the feed ration [6].

Therefore, the spread of necrobacteriosis, the study of bacterial carrier in animals in the Lenkoran-Astara economic region of the Republic of Azerbaijan is of great scientific and practical importance.

Material and methods

When studying the epidemiology of bovine necrobacteriosis in the Lenkoran-Astara Economic Region in the Republic of Azerbaijan, the methodologies of the Agrarian Services

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Agency under the Ministry of Agriculture of the Republic of Azerbaijan, the Food Safety Institute of the Azerbaijan Food Safety Agency, the Veterinary Scientific and Research Institute, the World Organization for Animal Health (Office International des Epizooties – OIE) and our personal research were used. Laboratory diagnostics was carried out in accordance with the guidelines. When studying bacterial carrier, other factors were taken into account, based on the sex, breed, and age of the animal [2].

Purpose of the study: The study of the epidemiology of necrobacteriosis in the Lenkoran-Astara economic region of the Republic of Azerbaijan will be invaluable for the formation of a database on the foci of the disease and their elimination and prevention.

Implementation of epidemiological control of necrobacteriosis using a modern information technology system, development and implementation of preventive veterinary and sanitary measures, taking into account the natural and climatic conditions, strategic, geographical location of the Lenkoran-Astara economic region.

Studies and Outcomes

The epidemiology of bovine necrobacteriosis in the Lenkoran-Astara economic region of the republic has been assessed in accordance with our study materials and literature. Thus, the economic region includes the Jalilabad, Astara, Lerik, Lenkoran, Masalli and Yardimli administrative districts and the city of republican significance of Lenkoran. The economic region is located in the south of Azerbaijan, on the roads leading to Iran and Turkey. It borders the Caspian Sea to the east and the Islamic Republic of Iran to the west and south. 26% of the territory of the economic region is covered with forests. The region differs from other economic regions of the country due to its natural conditions, having a humid subtropical climate.

In the Lenkoran-Astara economic region there is kept 316,341 head of cattle (of which 159,655 cows) in all categories of livestock farms. According to individual entrepreneurs, peasant families and households, 314,538 head of cattle are kept, of which 158,791 cows. Across the country, the Lenkoran-Astana economic region accounts for 12.8 percent of the livestock population. At the same time, 402,089 head of small ruminants (SR) are kept, which is 5.8% of the total number of SR in the country (https://www.stat.gov.az/source/agriculture/).

Within the framework of our research, we have determined that in economic areas cattle and small ruminants are kept in individual business enterprises, family peasant farms and households. Thus, as a result of the reforms carried out in our country in the agricultural sector, the system of collective farms and state farms was eliminated, and individual and private farms were created. Therefore, animal health protection and the implementation of therapeutic and preventive measures against special infectious diseases are of particular importance in such farms. The care of animals, their breeding and feeding in an individual business enterprises, family peasant farms and households are carried out individually, not comprehensively. It also serves as a gateway for the emergence and spread of diseases. Given the strategic location of the region, this area is always considered a risk area for the disease.

In the course of our study, the breeds of cattle kept and reared in the region were initially examined, and their adaptation to the terrain was studied. Within the framework of research, we observed that, along with local breeds, farms keep dairy, dairy-meat and meat breeds previously imported to the region. Thus, breeding of purebred animals of Brown Latvian, Red Estonian, Red Lithuanian, Red Desert, Red Belarusian, Black and Scarlet, Lebedin, Simmental, Halleway, Aberdeen Angus, Hereford, Charolais, their hybrids and derivatives was revealed in the territories. In addition, cattle species such as zebu (local and imported from the Republic of Cuba) have been found reared in the farm.

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During the examination, specific antibodies were detected by CBR in the blood serum of sick animals, *Fusobacterium necrophorum* and their antigens were detected by light or fluorescence microscopy in pathological material, as well as free release of the pathogen in nutrient medium, and laboratory animals and their identification were determined.

As a result of examinations carried out in the blood serum (27 blood samples belonging to 27 head of animals, the causative agent was detected in all examined), bacterial carrier for necrobacteriosis was detected. It should be noted that even during hematological examination, changes in the blood characteristic of necrobacteriosis were detected in animals of this species.

A total of 68 cattle were examined, including the head of animals among such breeds as brown Latvian (10), red Estonian (7), red Belarusian (6), red Lithuanian (6), red mottled (7), Simmental (10) and Schwyz (7) breeds, as well as brown Caucasian (10) and zebu (5).

Among animals of other breeds, namely the Simmental and Schwyz breeds, bacterial transmission due to necrobacteriosis infection accounts for 4-13% of individual farms, which indicates the relative resistance of these animals to necrobacteriosis infection.

It can be seen from our long-term studies that the carriage of *Fusobacterium necrophorum*, the causative agent of necrobacteriosis among cattle, differs depending on the breed of the animal. Thus, the largest number of infections with the disease, 32%, falls on brown Latvian, red Estonian, red Belarusian, red Lithuanian and red desert Karakalpak breeds. Thus, when studying the carriage of the disease in this breed of cattle in different regions, it was found that the percentage of infection sometimes reaches 35-43%. Among the black-and-white cattle breed, the percentage of infection with necrobacteriosis is also high, which is 18%. But even among this breed of animals, the carriage of the causative agent of necrobacteriosis was not the same, which largely depends on which regions these animals were imported from. The presence of a high incidence in red-black-scarlet breed of cattle indicates that these animals are more susceptible to necrobacteriosis.

In the course of our research, we found out that necrobacteriosis in cattle usually occurs in the form of small epizootic foci, the spread of which is limited to individual farms, herds and livestock farms. We found that the disease can also occur as a secondary infection in animals after ulcers, smallpox, ecthyma, and various types of stomatitis. I would like to note that animals become infected through damaged (inflamed) areas of the skin or mucous membranes, and tissue injury (mechanical, toxic, physical, chemical, biological) is a favorable moment for the reproduction of the causative agent.

Thus, for the prevention of necrobacteriosis, it is necessary to include animal feed and mineral supplements rich in calcium in the diet. In order to prevent necrobacteriosis, it is necessary to regularly clean grazing areas, farms where they are kept, and territories from cutting and injuring objects that are permanent pasture for animals.

When a normal diet is needed in accordance with the condition of the gastrointestinal tract of ruminants, these endocrine secretory glands supply blood and related organs with calcium as a result of the absorption of mineral and vitamin substances from feed. In chronic serous catarrhal and catarrhal inflammation of the small intestine, the endocrine secretory glands do not digest calcium from the feed and excrete it with excrement.

From all of the above, it can be concluded that one of the measures to prevent necrobacteriosis was to provide ruminants with protein-rich, rather fodder, and a large number of concentrated and acidic feeds should be abandoned.

For the prevention of necrobacteriosis, it is important to know about the features of its epizootic process and the ability to manage them. To prevent this serious infectious disease, which causes great damage to agriculture, it is necessary to develop an action plan. Such measures should be developed by veterinarians, instructions and recommendations should be mandatory!

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Despite the prevalence of the pathogen in the environment, proper diet and exercise, the normal functioning of the gastrointestinal tract, the condition of the gastrointestinal tract, the health of the joints of the lower extremities, regular professional biochemical blood tests of cattle will allow timely prevention of necrobacteriosis in animals and completely eliminate this pathology from the livestock. In its treatment, antibiotics belonging to the group of penicillin, tetracycline, erythromycin or lincomycin are used from antibiotics. Antiseptic solutions and ointments (Iodine, Furacilin, Chlorhexidine, Levomekol, etc.) are applied topically. Vitamin and mineral supplements (A, D, E and selenium) strengthen the animal's immunity. Keeping animals in dry and clean places accelerates the healing process. We also used the antibiotic amoxicillin in complex treatment.

Comprehensive treatment includes a balanced feed ration (with a mineral and vitamin mixture), improved sanitary and hygienic conditions, the use of personal protective equipment by caregivers, the absence of grazing animals on rocky and muddy areas, the absence of contact with animals with suspected disease, etc.

Proposals

The premises for cattle and pastures should be maintained dry and clean; animals should be given feed rich in minerals and vitamins; feed additives containing calcium, phosphorus, magnesium and zinc enhance tissue regeneration; sick animals should be isolated immediately; animals should regularly take baths for extremities with antiseptic and disinfectant solutions; conducting regular biochemical blood tests of cattle on risky farms; to carry out preventive vaccination against the disease.

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