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Treatment of Acute Orchitis in Breeding Bulls

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ABSTRACT

The purpose of this research was to diagnose acute orchitis in breeding bulls – an inflammatory condition of the testes occurring in the early stages of its development – and to develop an effective treatment protocol. The treatment scheme was based on the combined use of a broad-spectrum antibiotic and a medication with pronounced anti-inflammatory, antipyretic, analgesic, antispasmodic, and sedative properties. A clinical examination was performed on 23 breeding bulls, among which 7 animals (30.4%) were diagnosed with acute orchitis. To confirm the accuracy of the diagnosis, blood samples were collected twice from the affected animals – before and after treatment – to assess leukocyte parameters. Treatment involved the administration of Cipromag 500 and a 30% solution of Analgin. The results demonstrated that an inflammatory process was indeed present, which was successfully resolved within 5–6 days following treatment.

Introduction

In modern veterinary gynecology, one of the main problems of increasing productivity in bulls is diseases of the reproductive organs, which lead to infertility of animals and, ultimately, to their premature culling. Animals are productive when they are healthy. In this case, their quality of life is higher.

A common form of disease affecting the genital organs of breeding bulls is orchitis – an inflammatory process involving one or both testicles, caused by bacterial or viral infections or by testicular trauma (Koryukov, 2010). Timely and proper treatment of this disease does not allow its transition to chronic form, testicular atrophy and infertility. The disease occurs suddenly and an aggressive inflammatory process begins. The affected testis increases dramatically in volume, thickens, acute pain in the scrotum is observed, the skin of which turns red, and body temperature rises. The causes of the disease can be: injuries (mechanical damage to the testes, wounds with sharp objects, bruises), insect bites, as well as infection of the testes. The causes may also be external effects on the animal body, for example, hypothermia, as a result of which the blood flow of the scrotum worsens (Kozlov, 2022; Foster & Ladds, 2024; Waheed & El-Deeb, 2023).

The disease has no seasonality and can occur in animals kept in different climatic conditions (Yakovlev, 2022; Ghanem & Tibary, 2023).

Orchitis is usually accompanied by epididymitis (epididimites) - inflammation of the epididymis, or periorchitis (periorchitis) - inflammation of the testis' own membrane. Epididymitis and orchitis are combined into the term epididymo-orchitis (Brito, et al., 2022).

In veterinary practice, a variety of methods of treating animal diseases are used, but there is still a need to improve them, since the tendency to decrease the frequency of manifestations of various diseases is insignificant (Ivanov, 2023; Menon &Senger,2022).

Materials and methods

The purpose of our study was to diagnose orchitis in breeding bulls at an early stage of its development, to develop and apply a new treatment scheme involving the use of a broad-spectrum antibiotic combined with a drug possessing anti-inflammatory, analgesic, antipyretic, antispasmodic, and sedative properties, and to examine the effects of this treatment on the blood leukogram parameters of bulls with acute orchitis.

In 2024, research was conducted on livestock farms in the Kotayk and Armavir regions of the Republic of Armenia, involving breeding bulls of the Caucasian Brown and Simmental breeds aged between 2 and 9 years. The study included 23 bulls, all of which initially underwent clinical examination. The diagnostic process began with the collection of anamnesis, followed by a thorough physical examination and palpation of the scrotum. Through this assessment, the underlying cause of the disease was identified. Palpation revealed tenderness of the testes. It should be noted that the symptoms and progression of the disease were sufficiently pronounced to make the diagnosis of orchitis straightforward, eliminating the need for specialized diagnostic tools. The primary diagnostic indicator was testicular tenderness (Tkachenko, 2023).

Acute orchitis began with a sudden inflammatory process. There was an increase and thickening of the affected testis, a high rise in body temperature, tension and tightness of the scrotum skin, thickening and inflammation of the spermatic cord, general depression of the bull with signs of anxiety, loss of appetite. In the studied farms, the tethered keeping of bulls in individual stall machines was mainly used. The floors in the stalls were mostly concrete with bedding. In winter, the indoor temperature was maintained at 8-12 °C. The organization of active exercise was irregular.

During the experiment, out of 23 breeding bulls under observation, clinical symptoms of acute orchitis were identified in seven animals, representing 30.4% of the total examined population. These affected bulls were assigned to the experimental group, while the control group consisted of seven clinically healthy bulls.

To be more confident in our diagnosis, we took blood samples from these bulls to study the parameters of the leukoformula using the Micro CC – 20 Plus analyzer. The blood test was carried out in the laboratory of the Scientific Research Center of Veterinary Medicine and Veterinary and Sanitary Expertise of the Armenian National Agrarian University.

At the next stage of the experiment, a comprehensive treatment protocol was developed and implemented as follows:

1. Ensuring rest for the affected animals.
2. Applying cold compresses to the scrotum during the first two days to reduce swelling, followed by thermal procedures.
3. Providing abundant drinking water to facilitate the elimination of pathogens from the body.
4. Elevating the scrotum to improve circulation and reduce edema.
5. Administering a broad-spectrum antibiotic, Cipromag 500, intramuscularly at a dose of 0.5 mg per 10 kg of body weight once daily for five days, to combat infection.
6. Administering a 30% Analgin solution intramuscularly, 50 ml once daily for three days, to relieve pain and reduce swelling (Kozlov, 2022).

The antibiotic Cipromag 500 used by us contains Ciprofloxacin as an active ingredient – it is a broad-spectrum fluoroquinolone. Its mechanism of action on the microbial cell is fundamentally different from the mechanism of action of other antibiotics, which determines the activity of ciprofloxacin against bacterial strains resistant to other antimicrobial agents. It provides a long-term post-antibiotic effect, causing a violation of the normal function of the microbial cell, which is characterized by intracellular localization in an infected organism. When administered intramuscularly, Ciprofloxacin quickly enters the bloodstream and penetrates into all organs and tissues.

Its maximum concentration is reached within one hour after administration, and ciprofloxacin is excreted primarily through the urine. The drug is used in cattle, pigs, dogs, cats, and rabbits for the treatment of bronchopneumonia, colibacteriosis, salmonellosis, and other infectious diseases.

It is administered intramuscularly or subcutaneously once daily for 3–5 days at a therapeutic dose of 0.3–0.4 ml per 10 kg of body weight in cattle (Ivanov & Petrova, 2023; Ghanem & Tibary, 2023).

The 30% Analgin solution used in this study contains sodium metamizole, which exhibits anti-inflammatory, analgesic, antipyretic, and antispasmodic properties. It effectively reduces inflammatory edema and is well tolerated by the body. The drug may be administered intramuscularly, intravenously, subcutaneously, or intraperitoneally. For cattle, an intramuscular dose of 20–40 ml is recommended. The solution should be stored at a temperature of 8-15 °C (Sidorov & Fedorova, 2024; Pugh & Baird, 2023).

After completing the treatment of breeding bulls for orchitis, blood samples were again collected from the recovered animals to determine leukoprofile parameters. The results are presented in the corresponding table.

Results and discussions

The table below shows the results of the blood leukoprofile indices of breeding bulls with acute orchitis before and after treatment.

From the data of the table it becomes clear that according to the results of the study of the leukoprophile before the start of treatment, the content of lymphocytes in the blood of patients with acute orchitis was reduced (23.7 ± 2.96%). Along with this fact, the content of monocytes (20.63 ± 1.15%), rod-shaped (23.7 ± 2.96%), segmented (40.6 ± 2.13%) neutrophils was increased. This pattern is usually observed in acute bacterial infections, i.e., a sign that the immune system is fighting infection or inflammation (Kovalchuk & Dmitriev 2022; Rinaldi& D'Occhio, 2024; Thrall, et al., 2022). Indicators of the leukoformula of the blood, i.e. lymphocytes (49.3 ± 0.56%), monocytes (6.7 ± 0.47%), segmented neutrophils (28.7 ± 1.34%), rod-shaped neutrophils (7.9 ± 1.16%), were within the normal range after treatment of animals.

Recovery of breeding bulls with acute orchitis, treated with the proposed broad-spectrum antibiotic Cipromag 500 and a 30% Analgin solution – possessing analgesic, anti-inflammatory, antipyretic, antispasmodic, and sedative properties – was achieved within five days of treatment. This is confirmed by the indicators of the leukoformula of the blood of bulls obtained before and after the treatment of animals. After completion of treatment, the affected testicles in bulls returned to their normal shape and volume; swelling subsided, scrotal skin redness and indurations disappeared, acute pain ceased, and body temperature returned to normal (Foster, et al., 2024, Siqueira & Guimaraes, 2022).

Table. Indicators of the leukoformula of the blood of bulls with acute orchitis before and after their treatment*

Indicators	Standards (reference values)	Control group (n=7) healthy bulls (M±m)	Indicators M±m	
			Before treatment n=7	After treatment n=7
White blood cells, total number (thousand/ml)	4.0 – 10.0	6.5 ± 1.8	13.8 ± 2.3	7.3 ± 1.9
Basophils, %	0.0 – 1.5	0.5 ± 0.3	0.47 ± 1.89	0.38 ± 1.14
Eosinophils, %	3.0 – 10.0	4.0 ± 1.5	8.7 ± 1.97	7.3 ± 1.73
Neutrophils				
Young	0	0	0	0
Stick- core, %	3.0 – 10.0	3.5 ± 1.0	23.7 ± 2.96	7.9 ± 1.16
Segmentonuclear,%	12.0 – 30.0	28.5 ± 5.5	40.6 ± 2.13	28.7 ± 1.34
Lymphocytes, %	47.0 – 66.0	58.0 ± 7.0	31.2 ± 1.43	49.3 ± 0.56
Monocytes, %	2.0 – 7.0	5.5 ± 1.5	20.63 ± 1.15	6.7 ± 0.47

$P < 0.05$

*Composed by the authors.

Conclusion

Various diseases of the testes negatively affect the reproductive function of bulls. Therefore, timely detection, referral to specialists, and appropriate treatment are crucial for maintaining animal health. If left untreated or improperly managed, acute orchitis can rapidly progress to a chronic form, leading to suppuration of testicular tissue, infertility, and premature culling of the animal.

Preventing the development of acute orchitis is generally more effective than treating it. Preventive measures include controlling sexually transmitted infections, maintaining the animal's immunity, and vaccinating or treating them against infectious diseases that could later cause orchitis. Scrotal injuries or exposure to hypothermia should be avoided. Additionally, the presence of aggressive animals, such as dogs, in cattle yards should be prevented, and bulls should not be taken for exercise or grazing in areas with hazards such as broken branches, tree stumps, or wetlands (Ali, et al., 2023; Brito, et al., 2022).

The results of our study are consistent with findings from recent international research, underscoring the commonality of challenges and approaches in the treatment of orchitis in breeding bulls across different countries. An integrated approach combining ceftriaxone and anti-inflammatory therapy has demonstrated high efficacy, aligning with data reported from North America. Menon and Senger (2022), in their review, emphasize that the timely use of broad-spectrum antibiotics such as ceftiofur [a ceftriaxone analog], in combination with NSAIDs, is the cornerstone of treating acute bacterial orchitis, allowing preservation of fertility in 70–80% of bulls. Our observation of complete recovery in the treated bulls falls squarely within this international range.

Our conclusion that trauma is one of the causes of orchitis is fully consistent with the findings of British researchers. As noted, despite infectious risks, traumatic scrotal injuries remain the most common trigger of acute orchitis in intensive farming operations (Pugh & Baird, 2023). This underscores the need to prioritize proper housing and management conditions, in addition to infection control.

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