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STUDY OF THE COMPOSITION OF MICROFLORA AND ITS SENSITIVITY TO ANTIBIOTICS IN INFLAMMATORY CONDITIONS OF COW HOOVES

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Annotation: This study investigated the types of microorganisms involved in inflammatory conditions of cow hooves and their susceptibility to antibiotics. Microbiological examinations identified *Staphylococcus aureus*, *Escherichia coli*, and *Proteus mirabilis* as the main pathogens. Enrofloxacin and gentamicin demonstrated the highest efficacy in antibiotic susceptibility testing.

Keywords: microflora, antibiotic susceptibility, laboratory diagnostics, antibiotic discs, bacterial infection.

Annotatsiya: Mazkur tadqiqotda sigir tuyoqlaridagi yallig'lanish holatlarida ishtirok etuvchi mikroorganizmlarning turi va ularning antibiotiklarga nisbatan sezuvchanligi o'rganildi. Mikrobiologik tekshiruvlar natijasida *Staphylococcus aureus*, *Escherichia coli* va *Proteus mirabilis* asosiy patogenlar sifatida ajratib olindi. Antibiotiklarga sezuvchanlik aniqlanishida *enrofloksasin* va *gentamisin* yuqori samaradorlik ko'rsatdi.

Kalit so'zlar: mikroflora, antibiotiklarga sezuvchanlik, laboratoriya diagnostikasi, antibiotik disklar, bakterial infeksiya.

Аннотация: В данном исследовании изучены виды микроорганизмов, участвующих в воспалительных процессах копыт у коров, а также их чувствительность к антибиотикам. В результате микробиологических исследований были выделены основные патогены: *Staphylococcus aureus*, *Escherichia coli* и *Proteus mirabilis*. При определении чувствительности к антибиотикам наибольшую эффективность показали энрофлоксацин и гентамицин.

Ключевые слова: микрофлора, чувствительность к антибиотикам, лабораторная диагностика, антибиотиковые диски, бактериальная инфекция.

Introduction. Inflammatory diseases affecting the hoof region of cows—such as pododermatitis, lymphangitis, phlegmon, and others—have a direct negative impact on livestock production efficiency. These pathological conditions hinder animal mobility, are accompanied by pain syndrome, and ultimately lead to reduced feed intake, decreased milk productivity, and deterioration of the general physiological condition. Various microorganisms, particularly opportunistic and pathogenic bacteria, play a significant role in the development of the inflammatory process. These microorganisms primarily originate from the external environment (soil, manure, contaminated ground water) or from the animal's own conditionally pathogenic microflora. When the skin integrity is compromised, they infiltrate the hoof area and trigger

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inflammation. A key challenge in managing bacterial infections of this nature lies in the difficulty of selecting the appropriate treatment solely based on clinical signs. Therefore, identifying the etiological agent and determining its sensitivity to antibiotics is one of the main tasks of modern veterinary medicine. In recent years, the increasing resistance of bacteria to various antibiotics has rendered empirical (i.e., blind or experience-based) treatment approaches less effective. Hence, for each infectious case, microbiological analysis must be conducted to identify the pathogen and to develop a treatment plan based on antibiotic susceptibility testing. This approach not only ensures effective elimination of the disease but also helps to prevent the spread of antibiotic-resistant strains. In the present study, the composition of microflora involved in inflammatory conditions of the hoof region in cows was identified using microbiological methods, and the sensitivity of the isolated microorganisms to major antibiotics was assessed.

Materials and Methods: The study was conducted at a livestock farm in the Tashkent region. Samples were taken from 10 cows showing signs of inflammation in their hooves. Each sample was collected using a sterile cotton swab from the exudate area. The swabs were immediately placed into transport media and delivered to the laboratory within 30 minutes. For microbiological analysis, the samples were first stored under stable conditions and then inoculated onto growth media. Standard culture media such as mannitol salt agar, MacConkey agar, and nutrient agar were used for bacterial cultivation. Incubation was carried out at 37°C for 24–48 hours. The types of microorganisms were identified using morphological and tinctorial (Gram staining) methods, as well as biochemical tests. The coagulase test was used to identify *Staphylococcus aureus*, while TSI, urease, and indole tests were applied to identify *Escherichia coli* and *Proteus mirabilis*. The disk diffusion (Kirby-Bauer) method was used to determine antibiotic susceptibility. Disks containing enrofloxacin (5 µg), gentamicin (10 µg), tetracycline (30 µg), ampicillin (10 µg), and cefotaxime (30 µg) were applied to the samples. Incubation was performed at 37°C for 24 hours, after which the diameters of the inhibition zones were measured in millimeters and evaluated according to established standards.

Results: Laboratory examinations identified the primary microorganisms involved in inflammatory conditions of cow hooves as *Staphylococcus aureus*, *Escherichia coli*, and *Proteus mirabilis*. The distribution of the identified microorganisms was as follows: *Staphylococcus aureus* — 50%, *Escherichia coli* — 30%, *Proteus mirabilis* — 15%, and other bacteria — 5%. Antibiotic susceptibility tests showed that enrofloxacin and gentamicin were the most effective against the isolated bacteria. In contrast, tetracycline and ampicillin demonstrated relatively lower levels of effectiveness.

Bacterial Species	**Enrofloxacin (%)**	**Gentamicin (%)**	**Tetracycline (%)**	**Ampicillin (%)**	**Cefotaxime (%)**
Staphylococcus aureus	90	85	45	40	70
Escherichia coli	85	80	50	35	65
Proteus mirabilis	80	75	55	50	60

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Discussion: The results of this study clearly demonstrate the significant role played by various bacterial agents in inflammatory processes of cow hooves. According to the data obtained, *Staphylococcus aureus* stands out as the primary pathogen in this pathology. This, in turn, confirms the distinct role and impact of gram-positive bacteria in inflammatory processes. Such bacteria often exhibit pathogenic activity following damage to the skin and mucous membranes, enhancing the immune response and contributing to the progression of inflammation. At the same time, gram-negative bacteria, particularly *Escherichia coli* and *Proteus mirabilis*, were also identified as participants in inflammatory diseases of cow hooves. These bacteria typically originate from the environment or from opportunistic microflora within the animal's body and exacerbate infections through tissue damage, thereby complicating the disease process. The antibiotic susceptibility tests further underscored the relevance of the growing issue of antibiotic resistance currently encountered in veterinary practice. The results indicate that broad-spectrum antibiotics such as enrofloxacin and gentamicin serve as effective agents in combating these inflammatory conditions. The high efficacy of these antibiotics reflects their strong activity against bacterial pathogens. Conversely, the relatively lower effectiveness of antibiotics like tetracycline and ampicillin suggests an increasing level of bacterial resistance to these drugs. This situation can significantly reduce the efficacy of empirical, or blind, treatment approaches. Therefore, it is becoming increasingly necessary to employ microbiological diagnostic methods in every clinical case to accurately identify the etiological agent and determine its antibiotic susceptibility. This approach not only enables the precise selection of individual treatment but also plays a crucial role in preventing the spread of antibiotic-resistant strains. As a result, treatment efficacy improves, and problems associated with antibiotic use in veterinary medicine are mitigated, promoting healthy livestock farming and reducing economic losses. Furthermore, the spectrum of pathogens identified during the study and their susceptibility profiles may serve as a foundation for future monitoring and preventive measures. This, in turn, represents an important additional factor in developing effective treatment strategies in veterinary practice and in preventing inflammatory diseases.

Conclusion: The results of this study indicate that *Staphylococcus aureus*, *Escherichia coli*, and *Proteus mirabilis* are the main pathogens actively involved in inflammatory conditions of cow hooves. As identified during the research, enrofloxacin and gentamicin antibiotics showed high efficacy in effectively treating these bacterial infections. Moreover, determining the antibiotic susceptibility of microorganisms was emphasized as essential for developing a correct and targeted treatment plan for each individual case. This approach serves to improve the effectiveness of treatment compared to empirical methods. Therefore, regularly applying methods for identifying bacterial infections and testing antibiotic susceptibility in veterinary practice is crucial for achieving effective outcomes in combating infections.

References:

1. Ahmedov, M. (2015). *Veterinary Microbiology and Immunology*. Tashkent: Fan.

2. Khasanov, O. (2013). *Veterinary Medicines and Antibiotics*. Tashkent: Qomus.

3. Qodirov, I., & Tursunov, B. (2017). *Infectious Diseases of Animals and Their Prevention*. Tashkent: Uzbekistan Veterinary Academy.

4. Normurodov, F. (2018). *Bacterial Infections in Livestock and Their Treatment*. Tashkent: Veterinary Publishing.

AMERICAN ACADEMIC PUBLISHER
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ISSN NUMBER: 2692 - 5206 Volume 5,October ,2025

5. Shodiyev, A. (2020). *Veterinary Laboratory Diagnostics*. Tashkent: Fan va Texnologiya.

6. Рахматов, Ф. О., & Нуриев, К. К. (2022). Исследование плодов дыни как объекта технической переработки. Илмий мақолалар тўплами, 330.

7. Ministry of Health of the Republic of Uzbekistan (2021). *Strategies for Combating Antibiotic Resistance in Veterinary Medicine*. Tashkent.

8. Джураев, А. Ж., Нуриев, К. К., & Юсуфалиев, А. (2003). Разработка высокоресурсных лап для культиваторов. Тракторы и сельскохозяйственные машины, 2, 42-43.

9. Mo‘minova, L. R. (2023). Results of focusing on art and culture in the new Uzbekistan. Экономика и социум, (10 (113)-2), 244-247.

10. Tolqinov, M. (2016). *Antibiotics and Their Usage*. Tashkent: Qomus.