



UDC: 619:616.98:579.852.134

**EPIZOOTIOLOGICAL AND CLINICAL EFFICIENCY OF A TRIGGER-FACTOR-
BASED INTEGRATED PREVENTION APPROACH FOR CONTROLLING
NECROBACTERIOSIS IN HIGH-YIELDING DAIRY CATTLE**

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ABSTRACT

This study systematically analyzes the key trigger factors influencing the development of necrobacteriosis in high-yielding dairy cattle. The disease was considered a multifactorial pathological process formed under the influence of both endogenous and exogenous factors.

Hoof rot, interdigital dermatitis, metabolic imbalances, and technological stressors were identified as the principal risk factors. An integrated prevention model targeting these trigger factors was developed and evaluated under field production conditions.

The results demonstrated a reduction in the incidence of necrobacteriosis, stabilization of the clinical condition, and preservation of milk productivity.

The findings confirm that a trigger-factor-based integrated approach is highly effective for the control of necrobacteriosis in high-yielding dairy cattle.

Keywords: Necrobacteriosis, cattle, hoof rot, trigger factors, integrated prevention, epizootiology, *Fusobacterium necrophorum*, *Dichelobacter nodosus*

INTRODUCTION

In modern intensive cattle farming, achieving high productivity is associated with increased physiological and metabolic stress on the animal organism. These conditions often lead to reduced immunological reactivity, thereby creating favorable conditions for the development of infectious diseases, including necrobacteriosis.

Necrobacteriosis is a widespread disease in cattle, primarily manifested by lameness, decreased productivity, and reproductive disorders. The main etiological agents are *Fusobacterium necrophorum* and *Dichelobacter nodosus*.

However, the clinical manifestation of the disease is not solely determined by the presence of infectious agents, but also depends on additional contributing factors that activate the pathological process. These factors are defined in scientific literature as “trigger factors” and play a crucial role in the pathogenesis of the disease.

Hoof rot, interdigital dermatitis, subclinical acidosis, mineral deficiencies, and technological stressors are considered the principal factors accelerating the development of necrobacteriosis.

From this perspective, it is essential to consider necrobacteriosis not merely as an infectious disease, but as a complex multifactorial pathological process, and to focus preventive strategies on the management of trigger factors.

Aim of the Study. The aim of this study was to identify the main trigger factors involved in the development of necrobacteriosis in high-yielding dairy cattle and to scientifically evaluate the epizootiological, clinical, and economic effectiveness of an integrated prevention model targeting these factors.

Objectives of the Study. To achieve this aim, the following objectives were defined:



- To analyze the prevalence, seasonal dynamics, and clinical characteristics of necrobacteriosis in cattle within the studied farms.
- To evaluate hoof rot, interdigital dermatitis, metabolic disorders, and technological factors as key trigger factors contributing to the development of necrobacteriosis in high-yielding cattle.
- To determine the relationship between clinical forms of necrobacteriosis and trigger factors using epizootiological and statistical methods.
- To develop and implement an integrated prevention model based on trigger factors under field conditions.
- To assess the effectiveness of the proposed prevention model based on disease incidence, clinical recovery time, and milk productivity indicators.
- To evaluate the economic efficiency of the integrated prevention model and develop scientifically grounded recommendations for its practical implementation.

MATERIALS AND METHODS

The study was conducted between 2022 and 2025 in cattle farms with different production systems across the republic. High-yielding dairy cattle were selected as the study subjects. Observations were primarily carried out in lactating cows at early and mid-lactation stages, as these periods represent the highest risk for necrobacteriosis development.

A trigger factor–based integrated approach was applied to study necrobacteriosis, considering the disease as a complex pathological process activated by endogenous and exogenous factors. The main trigger factors included hoof rot, interdigital dermatitis, metabolic disorders (particularly subclinical acidosis), mineral deficiencies, and technological stressors such as dietary imbalance, insufficient exercise (motion), poor hygiene, high humidity, seasonal climatic variations, concrete flooring, and high stocking density.

Epizootiological analysis involved evaluating disease incidence, clinical forms, seasonal dynamics, and the relationship between necrobacteriosis and trigger factors. Trends in disease occurrence were assessed at the farm level, and high-risk animal groups were identified.

Clinical examinations included assessment of general condition, degree of lameness, and pathological changes in hoof and interdigital tissues, including swelling, exudation, necrosis, and signs of metabolic disturbances. Clinical forms of necrobacteriosis were classified in relation to hoof rot and the depth of pathological lesions.

For laboratory analysis, samples were collected from affected hoof and interdigital tissues and examined using standard microbiological methods to detect *Fusobacterium necrophorum*. In addition, blood analyses were conducted to evaluate the immune status of animals.

To assess preventive effectiveness, animals were divided into control and experimental groups. The control group received conventional preventive measures, whereas the experimental group was subjected to an integrated prevention model targeting trigger factors. This model included hoof care, improvement of hygienic conditions, regular hoof baths, dietary metabolic correction, regulation of animal movement, continuous disinfection of housing facilities, and the use of local antiseptic agents.

The effectiveness of preventive measures was evaluated based on disease incidence, clinical recovery time, reduction in lameness, and milk productivity. The obtained data were statistically analyzed to determine significant differences between the control and experimental groups.

RESULTS AND DISCUSSION

The results of the study demonstrated that necrobacteriosis is widely распространён among high-yielding dairy cattle in the republic and represents a significant source of economic loss in



livestock farms. The incidence of the disease varied considerably depending on technological conditions, hoof care practices, feeding systems, and housing management.

The findings indicated that the high prevalence of necrobacteriosis is closely associated with feeding conditions, zoohygienic environment, and herd management practices. In particular, imbalanced rations in terms of energy, protein, and minerals, the use of hard concrete flooring, lack of adequate bedding, high humidity levels, restricted animal movement, as well as overcrowding and insufficient ventilation were identified as major risk factors contributing to disease development.

These factors act synergistically, leading to hoof tissue damage, increased microbial contamination, and activation of the infectious process. The complex of identified trigger factors contributes to the intensification of the epizootic process of necrobacteriosis.

Epizootiological analysis revealed that necrobacteriosis occurs most frequently in cows during early and mid-lactation. This is associated with metabolic stress, decreased immune reactivity, and increased mechanical load on the hooves during peak milk production. Seasonal analysis showed higher incidence rates during autumn and winter, which is linked to increased humidity and deterioration of hygienic conditions.

The study also demonstrated that the presence of hoof rot and interdigital dermatitis significantly aggravates the clinical course of necrobacteriosis. Moreover, metabolic disorders, particularly subclinical acidosis and mineral deficiencies, were associated with increased susceptibility to the disease.

Clinical examinations revealed that the main signs of necrobacteriosis include lameness, swelling of interdigital tissues, exudation, and necrotic lesions. In most cases, the disease occurred in association with hoof rot, resulting in deeper pathological changes.

Laboratory findings confirmed the presence of *Fusobacterium necrophorum* in interdigital tissue samples, highlighting its key etiological role in disease pathogenesis. Blood analyses revealed inflammatory changes such as leukocytosis, neutrophilia, and decreased erythrocyte and hemoglobin levels, indicating impaired immune response.

Application of the integrated prevention model resulted in a significant reduction in disease incidence in the experimental group compared to the control group. In addition, clinical recovery time was shortened, lameness severity decreased, and milk productivity remained stable. Furthermore, the integrated approach contributed to reducing the risk of antimicrobial resistance development.

The findings suggest that targeting trigger factors provides a more effective strategy for controlling necrobacteriosis compared to conventional approaches focused solely on infectious agents.

CONCLUSION

The study confirmed that necrobacteriosis is a widespread and economically significant disease in high-yielding dairy cattle, particularly during early and mid-lactation periods.

It was scientifically established that hoof rot, interdigital dermatitis, metabolic disorders, and technological stressors play a key role as trigger factors in disease development. The frequent association of necrobacteriosis with hoof pathologies highlights its multifactorial nature.

The integrated prevention model significantly reduced disease incidence, shortened recovery time, decreased lameness, and maintained milk productivity.

Therefore, a trigger-factor-based integrated prevention approach is an effective strategy for controlling and preventing necrobacteriosis in dairy cattle.

Practical Recommendations. Early detection and regular hoof care are essential for effective disease prevention.



Preventive monitoring should be intensified, particularly in high-yielding cows during early and mid-lactation.

Balancing rations according to metabolic requirements, preventing subclinical acidosis, and correcting mineral deficiencies significantly reduce disease susceptibility.

Improving housing conditions—reducing humidity, optimizing flooring, providing bedding, and avoiding overcrowding—is crucial for minimizing trigger factors. Adequate ventilation also plays a key role in reducing microbial contamination.

Implementation of a trigger-factor-based integrated prevention model is strongly recommended in livestock practice to effectively control disease spread and reduce economic losses.

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