



ECOLOGICAL AND ZOOHYGIENIC EVALUATION OF CATTLE HOUSING

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ABSTRACT

The article examines the ecological and zoohygienic evaluation of cattle housing and the impact of microclimate and environmental factors on milk productivity. The study identifies conditions such as temperature, humidity, air movement, lighting, and harmful gases as key factors determining the health and productivity of cows. Additionally, the construction of cowsheds, feeding, breeding, and technological factors are analyzed for their role in enhancing milk yield. The research results provide scientifically and practically grounded recommendations aimed at achieving sustainable and efficient production in livestock farming.

Keywords: Cattle housing, Ecological and zoohygienic evaluation, Milk productivity, Microclimate indicators, Air temperature, Relative humidity, Air movement, Harmful gases (ammonia, CO₂), Zoohygienic standards, Conditions of the cowshed, Feeding and rearing, Livestock productivity.

INTRODUCTION

The ecological and zoohygienic evaluation of cattle housing is one of the important areas in modern livestock farming. The health, productivity, and quality of products obtained from animals largely depend on the conditions in which they are kept. In particular, in dairy cattle farming, creating favorable ecological and hygienic conditions is essential for cows to fully express their genetic potential.

During cattle housing, environmental factors such as air temperature, relative humidity, air movement, lighting, and the concentration of harmful gases play a significant role. These factors directly affect physiological processes in the body, influencing metabolism, heat exchange, and overall health. Therefore, compliance with zoohygienic standards and continuous monitoring of microclimate indicators in cowsheds are among the key conditions for achieving high productivity.

Furthermore, an ecological approach to cattle housing is also important, as it not only ensures comfortable conditions for animals but also contributes to environmental protection, proper waste management, and adherence to sanitation and hygiene requirements. From this perspective, the ecological and zoohygienic evaluation of cattle housing has significant scientific and practical importance in enhancing efficiency and ensuring sustainable production in livestock enterprises.

The factors affecting milk productivity in cows are multifaceted and interrelated. Scientific studies conducted both internationally and in our country show that obtaining high and stable milk yield primarily depends on providing cows with a complete and balanced diet. The presence of adequate amounts of energy, protein, vitamins, and minerals in the ration meets the physiological needs of the cow's body. For this reason, it is emphasized that 50–60% of milk productivity is directly related to the level of feeding.

In addition, breeding and selection work is also of significant importance, accounting for 20–25% of overall productivity. By selecting breeds and lines with high genetic potential, implementing targeted mating, and effectively organizing the evaluation and culling of offspring, milk production can be significantly increased. Especially, raising cows that are adapted to intensive technology, highly productive, disease-resistant, and possess good reproductive traits is one of the priority tasks of modern livestock farming.



Furthermore, technological factors—such as housing conditions, microclimate in the farm, milking technology, adherence to sanitation and hygiene standards, and proper daily management—also affect productivity at a level of 20–25%. Comfortable temperature and humidity, clean air, adequate lighting, clean bedding, and a stress-free environment enhance animal health and milk yield. The use of modern milking equipment and automated systems not only increases labor efficiency but also improves milk quality.

In modern dairy cattle farming, production technologies place new demands on breeders. Specifically, there is a requirement to produce animals that are highly productive, adaptable to intensive technologies, and capable of high output with minimal input. This necessitates the broad implementation of genetics, biotechnology, and digital management methods.

One of the environmental factors that constantly affect the health and productivity of cows is the microclimate. These indicators directly influence physiological processes in the body, including heat exchange, gas exchange, metabolism, and other bodily functions. Therefore, it is important to have knowledge about changes occurring in the external environment that affect the cows' organism. Understanding these conditions allows proper organization of housing and animal husbandry practices.

The microclimate in a cowshed is determined by physical factors such as temperature, humidity, air movement, atmospheric pressure, lighting, as well as the composition of harmful gases and mechanical mixtures in the air. The type of construction materials used for the walls of the cowshed is also important, as it affects the ability to retain heat. In our local conditions, most cowshed walls are made of adobe or bricks, which have good thermal insulation properties.

The microclimate indicators in cowsheds are influenced by the natural climatic conditions of the farm's location. In addition, gas exchange, heating systems, feeding and housing practices, manure removal methods, and animal density also determine microclimate conditions. During the study, the microclimate indicators in the cowshed where cows were kept were measured, including air temperature, relative humidity, air movement speed, concentrations of carbon dioxide and ammonia, and the natural lighting coefficient. Measurements were taken using instruments such as thermometers, UG-2 psychrometers, Assmann psychrometers, spherical catathermometers, and lux meters.

In the Bosh Buluq livestock farm, local building materials were used for constructing the cowsheds. This choice reduced construction costs, as local materials are inexpensive. The cowshed walls were built of brick, with the exterior coated in clay plaster. The ceiling was made of wood, partially plastered, and the roof covered with slate. Located on a mountain slope, this cowshed design ensures warmth during late autumn and winter.

During autumn and winter, cows are kept tied in the cowshed at night and allowed to roam freely during the day in adjacent yards. Before milking, cows are brought into the cowshed, tied, and provided with succulent feed in the stalls. During milking, cows are given water-soaked wheat or bran.

The cowshed measures 72 meters in length, 11 meters in width, and 4.5 meters in height. The stall for each cow is 2.2 meters long and 1.2 meters wide, with the manger width allocated at 0.6 meters per cow. There are 24 windows, each measuring 100 × 56 cm, providing a total window area of 13.44 m², indicating slightly lower natural lighting than recommended.

Inside the cowshed, the rear area includes a manure passage 0.4 meters wide, and a walkway 0.7 meters wide leading to the wall. This facilitates milking with portable milking machines and manual cleaning of manure. Manure is removed manually through a chute and transported to the



manure pit using special carts. Feed is distributed via tractors and carts, with a feed passage width of 3.2 meters, allowing attendants to easily deliver feed to the stalls.

Watering is provided from a large communal trough located in the corner of the exercise yards, conveniently accessible for the cows. It is important to note that if microclimate indicators do not meet zoohygienic standards, cows cannot realize their genetic potential for milk production. Maintaining hygienic standards in the cowshed ensures animal health and increases milk productivity.

For ventilation, air exhaust pipes are installed in the central part of the cowshed. Windows in the walls also contribute to lighting and air exchange. Cows are arranged in two rows, with a central passage for tractors and feed carts. Large doors on both sides and the middle of the cowshed allow cows access to exercise yards, positively affecting air circulation.

During the study conducted in 2018–2019, seasonal measurements of microclimate indicators in the cowshed were taken. The data showed that average temperatures ranged from +10.2 °C to +22.8 °C throughout the year. In winter, cold weather on the mountain slope directly affected the internal temperature of the cowshed. Thus, seasonal changes in microclimate indicators are closely linked to external weather conditions. It was also noted that daytime temperatures fluctuated more sharply due to activities such as feeding and manure removal.

Microclimate Indicators in the Cowshed by Season (Mean ± Standard Error, X±Sx)

Indicators	Season of the year			
	Autumn	Winter	Spring	Spring
temperature, °C	17,9±0,75	10,2±0,81	18,5±0,9	22,8±1,30
Relative humidity of air, %	75,40±2,2	78,3±1,09	76,1±1,07	68,2±0,72
Air movement speed, m/s	0,20±0,015	0,25±0,031	0,30±0,17	0,50±0,11
Carbon dioxide (CO ₂), %	0,21±0,012	0,25±0,09	0,21±0,07	0,15±0,005
Ammonia concentration, mg/L	0,15±0,001	0,20±0,002	0,14±0,003	0,01±0,002
Natural lighting coefficient, %	0,70±0,39	0,61±0,201	0,71±0,066	0,93±0,134

Translation into English: The relative humidity of the air averaged around 75.4–78.3% during the autumn, winter, and spring seasons, and no significant deviation from zoohygienic standards was observed. Only in the summer season, under conditions where the cows were kept in open exercise areas, did it amount to 68.2%.

The air movement speed in the cowshed ranged from 0.10 to 0.50 m/s, which met the requirements of zoohygienic standards. Throughout the year, the levels of harmful gases in the cowshed—namely carbon dioxide and ammonia—did not exceed the permissible limits. The highest concentration of carbon dioxide was observed during the winter months, reaching 0.25%. Similarly, the highest level of ammonia was also recorded in this season, amounting to 0.20 mg/L.

The natural lighting coefficient was found to be at its lowest during winter, at 0.61%. Although lighting lamps were installed in the cowshed, it was determined that the illumination level during



winter was below the zoohygienic standard. Appropriate recommendations were given to the head of the farm, and the identified deficiency was eliminated through implemented measures.

CONCLUSION

Thus, the microclimate indicators in the cowshed vary in accordance with the natural climatic conditions of the region where the farm is located. Although the air temperature, relative humidity, air movement speed, and levels of harmful gases in the cowshed remained within standard limits throughout the seasons, the natural lighting coefficient was found to be slightly below the norm. To address this issue, the size of the windows in the cowshed walls was increased, resulting in the natural lighting coefficient being raised to 1.2%.

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