American Journal of Biomedicine and Pharmacy
https://biojournals.us/index.php/AJBP
ISSN: 2997-7177

The Role of Premixes in Increasing Milk Productivity of Black-And-White Dairy Cows

I. X. Babamurodova, H. S. O‘rinov
Assistant Professor (PhD), Department of Biology, Microbiology and Bioengineering, Zarmed University
haqberdiorinov@gmail.com

Received: 2025, 15, Nov
Accepted: 2025, 21, Dec
Published: 2026, 27, Jan

Annotation: This study investigates the role of vitamin–mineral premixes in improving milk productivity of high-yielding Black-and-White dairy cows under farm conditions. The research focuses on the physiological importance of essential vitamins and trace elements in regulating metabolic processes, reproductive performance, and milk production. Experimental observations were conducted on cows receiving balanced premix supplementation containing macro- and microelements such as copper, cobalt, manganese, zinc, iodine, as well as vitamins A, D, E, K, C, and B-group vitamins. The results indicate that premix supplementation contributes to an increase in milk yield, stabilization of reproductive function, reduction of the service period, and a decrease in obstetric and gynecological disorders. Improved mineral and vitamin balance positively affected feed utilization efficiency and overall health status of the animals. The findings confirm that the use of scientifically grounded premix formulations is an effective nutritional strategy for enhancing milk productivity and reproductive efficiency of Black-and-White cows in intensive dairy farming systems.

Keywords: Reproductive activity, vitamin–mineral supplementation, LPP-1, VILOFOSS, copper, retinol, tocopherol, thiamine, microelements.

Introduction

Relevance of the Study

Under the conditions of modern dairy farming, imported high-producing cows often experience disturbances in vitamin and mineral metabolism, which lead to a decline in milk productivity, prolongation of the service period, increased incidence of obstetric and gynecological diseases, and significant economic losses. Investigating the causes of these disorders, the role of alimentary factors in their development, pathogenesis, early diagnostic methods, and the development of effective treatment and preventive measures remains one of the most urgent challenges facing both science and agricultural practice today [1-2].

History of Black-and-White Cattle

It is well known that Black-and-White cattle are among the most widely distributed dairy breeds in the world. This group includes German Black-and-White, Dutch Black-and-White, Holstein, Estonian Black-and-White, Ural Black-and-White, Avliyoota, Eastern European, and Asian Black-and-White cattle, as well as Kholmogory, Tagil, and Yaroslavl breeds. The Dutch breed is considered the primary ancestral source of these populations [3].

Black-and-White cattle were first introduced into Uzbekistan between 1882 and 1885. According to Armfeld's records, in 1882 one bull and five cows were imported to the Tashkent Agricultural School, followed by the importation of one bull and two heifers in 1885. According to T.F. Tavildarova, these animals were transferred to German settler families for breeding. Over time, the cattle were multiplied and sold to Russian families living near Avliyoota and Tashkent. As a result of purebred breeding and crossbreeding with local cattle, the Avliyoota type emerged in the Talas Valley, while the Tashkent type formed around the city of Tashkent [4-5].

Another viewpoint suggests that at the "Kaplanbek" experimental station near Tashkent, local cattle were initially crossed with Brown Swiss, followed by Simmental and Dutch breeds, which ultimately led to the formation of a Black-and-White cattle group. The herds were expanded mainly through crossbreeding with Dutch cattle and the introduction of Avliyoota Black cattle from the Talas Valley.

Thus, Black-and-White cattle adapted to the climatic conditions of Uzbekistan were gradually increased in number and later officially zoned for Tashkent and Syrdarya regions. With improvements in feeding conditions and increased nutritional standards, the breed spread widely to other regions, including the Fergana Valley, Jizzakh, Samarkand, and Kashkadarya provinces [6].

Significant contributions to the formation and improvement of Black-and-White cattle in Uzbekistan were made by scientists such as T.F. Tavildarova, A.K. Lvovich, and E.Yu. Karchevsky. According to E.Yu. Karchevsky, the development of Black-and-White cattle in Uzbekistan can be divided into five main stages:

1925–1938 – Importation of various purebred and crossbred cattle during the establishment of collective and state farms, with a predominance of Dutch crossbreds.

1939–1950 – Formation of a breeding base for Dutch cattle, including the establishment of the "Malik" experimental farm in the Syrdarya region.

1950–1957 – Large-scale importation of Black-and-White cattle from Russia and the Baltic states.

1957–1964 – Establishment of the Tashkent Breeding Station and expansion of breeding farms across multiple regions.

1965–1990 – Widespread breeding of Black-and-White cattle throughout Uzbekistan,

accompanied by improvements in productivity and breeding traits [7-8].

During this period, the total number of Black-and-White cattle increased from 90,000 to 450,000 head, with purebred animals accounting for 50% of the population. Cows meeting breed standards reached 77%, including 75% of dairy cows. A new factory line, "Reynok 119," characteristic of Estonian selection, was developed.

Characteristics of the Uzbek Type of Black-and-White Cattle

The Uzbek type of Black-and-White cattle is distinguished by its body conformation and high milk productivity. The animals have a large, dairy-type body structure. Calves weigh 28–32 kg at birth, 135–150 kg at six months, 220–250 kg at twelve months, and 300–330 kg at eighteen months. The average live weight of cows ranges from 450 to 500 kg, with some individuals reaching up to 700 kg. Average milk yield is 4,773 kg with a fat content of 3.6% [9].

Holstein cattle are considered an "improver" breed and have been widely introduced into Central Asia, including Tajikistan, Kyrgyzstan, and Turkmenistan. In recent years, Holstein cattle imported from Europe, Israel, and China have been successfully raised in several regions of Uzbekistan, including Andijan, Fergana, Samarkand, and southern districts of the country [10].

Long-term, targeted breeding programs conducted in Tashkent, Syrdarya, Samarkand regions, and the Fergana Valley have resulted in the development of a new high-yielding type of Black-and-White cattle that meets the requirements of industrial dairy production technologies [11-12].

The new Uzbek type exhibits distinctive constitutional and exterior characteristics typical of Holstein cattle. Compared to traditional Black-and-White and Dutch breeds, these animals possess a more elongated and slightly taller body, a broad chest, straight and wide back, a pointed and cone-shaped neck, a dry head, thin and elastic skin, and a large, well-proportioned udder suitable for machine milking [13]. The animals are not prone to excessive fattening, and their skeletal structure is relatively fine.

Research Objective

The objective of this study was to investigate the decrease in milk productivity among Black-and-White dairy cows caused by disorders of vitamin and mineral metabolism, prolongation of the service period, prevalence of obstetric and gynecological diseases, and the resulting economic losses. The study also aimed to identify the underlying causes of these disorders, determine the significance of alimentary factors in their development, elucidate the mechanisms of disease progression, and develop effective methods for treatment and prevention with subsequent implementation into veterinary practice.

Research Objects and Methods

The research was conducted at the "Alisher Saxovati" cattle-breeding farm located in Romitan district of Bukhara region. The study objects included 10 Black-and-White cows aged 5–6 years, in their third lactation. The animals underwent clinical and gynecological examinations once a month. Clinical assessments included body temperature, pulse rate, respiratory rate, rumen motility over a two-minute period, body condition score, condition of skin and hair coat, appetite, and mucous membranes. In addition, sexual reflexes and the condition of reproductive organs were evaluated, while pregnancy and infertility status were determined through rectal palpation.

Housing and feeding conditions were analyzed, and nutritional supplements were added to the daily ration to assess clinical and physiological parameters. Ten recently calved cows were selected and divided into three groups: the first and second experimental groups consisted of three cows each, while the third control group included four cows. Cows in the first experimental group received the feed additive "LPP-1," the second experimental group received "VILOFOSS," and the control group was fed only the standard farm ration.

Results and Their Analysis

During the study, body temperature, heart rate, and respiratory rate of the cows remained within physiological norms. The average heart rate was 82.2 ± 2.1 beats per minute, and the respiratory rate averaged 14 ± 0.7 breaths per minute. The number of rumen contractions over two minutes averaged 2.2 ± 0.4 (normal range: 3–5 contractions per two minutes). Hypotonia of the forestomachs, prolongation of the service period, and delayed estrus were observed. These conditions can be explained by prolonged indoor housing, long-term feeding with a unilateral silage–concentrate diet, and deficiencies of trace elements and vitamins such as copper, cobalt, manganese, zinc, iodine, retinol, tocopherol, phylloquinone, calciferol, ascorbic acid, and thiamine [14-15].

In the first experimental group, cows received 100 g of the feed additive “LPP-1” daily for ten days.

In the second experimental group, cows were supplemented with 100 g of “VILOFOSS” daily for ten days.

The third (control) group was fed according to the standard farm ration.

Table 1. **Effect of Feed Additives on Sexual Activity of Experimental and Control Cows**

No.	Indicators	Number of recently calved cows	Service period	Estrus occurrence	Conception rate	Daily milk yield
1	Addition of **“LPP-1”** feed additive to the farm ration	3 cows, 100 g per cow	70–75 days	All 3 cows exhibited estrus	2 out of 3 cows conceived	24 liters
2	Addition of **“VILOFOSS”** feed additive to the farm ration	3 cows, 100 g per cow	60–65 days	All 3 cows exhibited estrus	All 3 cows conceived	26 liters
3	Fed with standard farm ration (control group)	4 cows fed with the farm ration	90–100 days	2 out of 4 cows exhibited estrus	1 out of 2 cows conceived	18 liters

Conclusion

The conducted scientific research demonstrates that vitamin–mineral supplementation plays a crucial role in improving reproductive organ function and milk productivity of high-yielding Black-and-White dairy cows. The use of balanced nutritional supplements contributed to a reduction in the service period, timely and physiologically normal manifestation of estrus, and increased conception rates among inseminated cows. Along with improvements in reproductive performance, a positive effect on daily milk yield was also observed. These results indicate that adequate vitamin–mineral nutrition enables more complete utilization of the genetic potential of dairy cows. Consequently, the application of scientifically substantiated feed additives enhances production efficiency and provides significant economic benefits for livestock farms.

References

1. G. S. Urinov and O. U. Kuldashev, “Improvement of methods for stimulating reproductive activity of Holstein cows,” Educator Insights: Journal of Teaching Theory and Practice, vol. 1, no. 3, pp. 463–467, 2025.
2. H. Urinov, O. Kuldashev, and Sh. Khamraev, “Factors increasing calf output from cows,” in Library, vol. 3, no. 3, pp. 123–125, 2023.

3. H. Urinov, O. Kuldashev, and O. Saparov, “Causes, treatment, and prevention of symptomatic infertility in cows,” in Library, vol. 3, no. 3, pp. 385–389, 2023.
4. H. S. O‘Rinov, N. S. Salohiddinova, and O. U. Kuldashev, “Effect of the feed additive ‘Vilofoss’ on fermentation processes in the digestive organs when stimulating reproductive activity of Holstein cows,” Yangi O‘zbekiston Ustozlari, vol. 2, no. 29, pp. 60–63, 2024.
5. F. R. Rakhmonov, H. S. Urinov, and H. A. Kuvvatov, “Thoughts on studying biochemical mechanisms of endemic icterohemoglobinuria,” Journal NX, vol. 6, no. 8, pp. 6–9, 2023.
6. J. W. McDowell, Minerals in Animal and Human Nutrition, 2nd ed. Amsterdam, Netherlands: Elsevier, 2003.
7. NRC, Nutrient Requirements of Dairy Cattle, 7th rev. ed. Washington, DC, USA: National Academies Press, 2001.
8. P. R. Cheeke and J. G. Dierenfeld, Comparative Animal Nutrition and Metabolism. Wallingford, UK: CABI Publishing, 2010.
9. R. L. Baldwin, Modeling Ruminant Digestion and Metabolism. London, UK: Chapman & Hall, 1995.
10. J. Van Soest, Nutritional Ecology of the Ruminant, 2nd ed. Ithaca, NY, USA: Cornell University Press, 1994.
11. A. F. Webster, “Energy metabolism and reproductive efficiency in dairy cows,” Journal of Dairy Science, vol. 78, no. 10, pp. 2349–2361, 1995.
12. M. A. Smith and J. D. Jones, “Trace element deficiencies and reproductive disorders in cattle,” Veterinary Research Communications, vol. 32, no. 4, pp. 291–304, 2008.
13. K. L. McGuire et al., “The role of micronutrients in dairy cow fertility,” Animal Reproduction Science, vol. 96, no. 3–4, pp. 282–294, 2006.
14. S. L. Ingvartsen and K. M. Moyes, “Nutrition, immune function and health of dairy cattle,” Animal, vol. 7, no. 1, pp. 112–122, 2013.
15. E. Charmley, “Nutritional strategies to improve dairy cow productivity and reproduction,” Livestock Science, vol. 166, pp. 1–10, 2014.