British Journal of Global Ecology and Sustainable Development
Volume- 42, July 2025
ISSN (E): 2754-9291

MILK PRODUCTIVITY OF SIMMENTAL COWS DURING DIFFERENT STAGES OF LACTATION UNDER THE INFLUENCE OF VILOFOSS FEED SUPPLEMENT

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Abstract
This article examines the effects of the feed supplement Vilifoss on the milk productivity of Simmental cows during different stages of lactation. The cows were divided into three groups, and the supplement was administered at the beginning, middle, and end of lactation. The results showed that Vilifoss significantly increased overall milk yield and improved milk fat and protein content. The highest productivity was observed when Vilifoss was administered during the mid-lactation period. Additionally, positive effects on cow health, appetite, and metabolic activity were noted. These findings suggest that targeted use of Vilifoss can be an effective strategy to enhance dairy productivity in Simmental cows.

Keywords: Simmental, Vilifoss, lactation, dairy productivity, feed supplement, health, metabolism, fat content, protein content, nutrition, milk quality, energy balance, veterinary, appetite.

Main Research Background:
Currently available sources include studies dedicated to the effects of various Vilofoss feed supplements on the productive traits and productivity directions of cattle of different ages (G.M. Volodkina, E.V. Andreeva, O.Yu. Yunusova, Z.Ya. Nikitina, I.R. Fakhretdinov, N.M. Gubaydullin, A.N. Kozlovskiy, N.A. Andreeva, E.Yu. Nemtseva, V.I. Trukhachev, K.E. Khalgaeva, A.K. Natyrov [4]). In the scientific works of researchers from our republic such as Sh.A. Akmalkhanov, M.E. Ashirov, U.N. Nosirov, I. Maqsudov, B.U. Khidirov, U.Sh. Ballasov, B.M. Ashirov, Kh. Giyosov, and others, the effectiveness of using the potential of the Simmental breed in improving and crossbreeding programs has been substantiated. The results of these studies show that Simmental cattle are considered an enhancing breed regardless of the breeding regions. [3] These findings highlight the practical importance of using Simmental cattle both in

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purebred breeding and in crossbreeding practices for the development of high-performing reproductive herds, improving the productive traits of local breeds, and creating new types and herds.

Introduction

Providing dairy cows with nutritionally balanced feeding plays a crucial role in increasing milk productivity and expanding dairy production. [5] Such feeding ensures the supply of essential nutrients, minerals, vitamins, and other important elements required for the cow's body, which in turn is vital for maintaining their health, strengthening the organism, increasing resistance to various external factors, improving reproductive performance, and enhancing milk yield.

These conclusions are supported by the findings of numerous researchers. [1] Scientific studies show that in order to meet the growing global demand for livestock products, especially the primary and easily digestible ones such as meat and milk, increasing their production is of utmost importance in the context of human evolution. Achieving this objective primarily depends on improving the productivity and quality of livestock products, optimizing animal nutrition, and enhancing breed characteristics. [2]

Materials and Methods

Objective of the Study: The purpose of the study was to increase the productivity of Simmental cows under the conditions of Tashkent region by incorporating different amounts of the balanced feed supplement "Vilofoss" into their diets.

Research Tasks: To determine the effects of varying doses of the balanced feed complex on:– the intake of nutrients and feed substances in the ration, – the exterior traits of the cows,– milk productivity, – the morphological parameters of the udder, – the chemical composition, physical, chemical, and technological properties of milk, – and to evaluate the economic efficiency of using different quantities of the "Vilofoss" feed supplement.

Research Methods: The research was conducted using zootechnical methods (milk yield, milk quality indicators, exterior characteristics, udder traits, reproductive performance, feed-to-milk conversion), biological methods (clinical, hematological parameters, heat resistance index), and statistical methods (arithmetic mean and error, coefficient of variation, and statistical significance of intergroup differences). The milk fat content of cows in the experimental groups was determined monthly using the Gerber method, with samples taken individually from each cow. Milk protein content was measured monthly using the "Laktan M-4" apparatus. The live weight of Simmental cows up to the third month of the first lactation was measured individually using a livestock scale and recorded in MOL-2 cards. Milk yield was monitored through control milking every ten days over the standard 305-day lactation period. Primary data

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obtained from the experiments were processed using biometric methods according to E.K. Merkureva [1970].

Scientific Novelty of the Research:

- For the first time, the optimal dose of the Vilofoss protein-mineral supplement for feeding Simmental cows under the climatic and feed base conditions of Uzbekistan has been determined;
- It was established that feeding with Vilofoss supplement has a positive effect on improving the chemical composition of milk produced by Simmental cows;
- The Vilofoss supplement is recommended as an effective tool for preventing metabolic disorders such as hypocalcemia, ketosis, and acidosis that may occur during the lactation period;
- The ration enriched with Vilofoss was adapted to the existing feed base of Uzbekistan, including hay, silage, grain, and feed additives;
- The relationship between the lactation characteristics of cows and indicators such as exterior traits, udder morphology, and feed-to-milk conversion efficiency was identified;
- The economic efficiency of the Vilofoss supplement was assessed, revealing that the additional daily cost per cow leads to increased income from additional milk production.

Results and Discussion

Milk Productivity of Cows During Different Stages of Lactation in Experimental Groups

Milk productivity is a key indicator in evaluating the breeding value of dairy cows. Producing high-quality milk is of particular importance, as [49; pp. 2–5] emphasize that milk significantly differs from many other food products in terms of its chemical composition. It contains more than a hundred essential nutrients, including over 30 types of fatty acids, 20 amino acids, 3 types of milk sugar, 12 vitamins, 40 minerals, carbohydrates, and other beneficial substances. This highlights the great importance of producing high-quality milk for maintaining human health.

Table 1 presents data on the milk productivity of cows in the experimental groups over 180 days of their second lactation.

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Table 1 Milk Productivity of Cows in the Experimental Groups During 180 Days of Lactation, kg

Indicators	Groups					
	Control group (basic ration only)		Group I (basic ration + 170 g Vilofoss)		Group II (basic ration + 220 g Vilofoss)	
	$\overline{X} \pm S\,\overline{x}$	Cv%	$\overline{X} \pm S\,\overline{x}$	Cv%	$\overline{X} \pm S\,\overline{x}$	Cv%
Milk yield, kg	3279,1±5,8	0,05	3665,9±7,2***	0,05	3447,3±7,6**	0,06
Milk fat content, %	3,89±0,03	0,23	4,01±0,01**	0,07	3,93±0,02*	0,15
Milk fat yield, kg	127,6±1,89	0,44	147,0±1,6*	0,32	135,5±2,1**	0,46
Milk protein content, %	3,82±0,027	0,21	3,76±0,020**	0,15	3,79±0,024***	0,18
Milk protein yield, kg	125,3±1,78	0,42	137,8±1,10**	0,23	130,6±1,81*	0,41
4% fat-corrected milk (FCM), kg	3188,93±4,48	0,04	3675,06±5,14*	0,04	3386,97±6,75**	0,05
Total solids, %	12,89		12,96		12,91	
Solids-not-fat (SNF), %	9		8,95		8,98	

Note: * – P > 0.95; ** – P > 0.99; *** – P > 0.999 indicate statistical significance levels.

According to the data presented in Table 1, intensive feeding of cows and the inclusion of the Vilofoss feed supplement in their diet significantly increased milk productivity during the second lactation. In particular, cows in Group I, which received the basic ration supplemented with 170 g of Vilofoss, produced 386.8 kg or 10.55% more milk over 180 days of lactation compared to the control group (P > 0.999). The milk fat yield increased by 19.4 kg or 13.19% (P > 0.95), milk protein yield by 12.5 kg or 9.07% (P > 0.99), and 4% fat-corrected milk (FCM) by 486.13 kg or 13.22% (P > 0.95).

No significant intergroup differences were observed in the content of total solids, solids-not-fat (SNF), and lactose, indicating that these parameters remained within standard requirements and reflect a high nutritional value of the milk produced.

Cows in Experimental Group II, which received an additional 220 g of Vilofoss per day, also outperformed their control counterparts during the 180-day lactation period. Their milk yield exceeded that of the control group by 168.2 kg or 4.87% (P > 0.99), fat yield by 7.9 kg or 5.83% (P > 0.99), protein yield by 5.3 kg or 4.05% (P > 0.95), and 4% FCM by 198.04 kg or 5.84% (P > 0.99).

Our findings are consistent with the results reported in previous studies [113; pp. 3–5]; [157; pp. 4–6], which also demonstrated that high-level feeding of Holstein cows not only improved milk yield but also enhanced their adaptation to new environmental conditions.

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It is also worth emphasizing that the milk fat content of cows in all three groups closely corresponded to the breed standard, indicating their high breeding value in this trait and their importance for the production of high-quality dairy products.

Throughout the experiment, Simmental cows were fed the standard farm ration supplemented with the Vilofoss feed additive. Specifically, cows in Group I received 170 g of Vilofoss per head per day, while Group II received 220 g per head per day.

Milk productivity was also monitored over the 305-day lactation period for the experimental Simmental cows in their second lactation. Cows in Group I, which consumed 170 g of Vilofoss daily, produced 594.5 kg or 11.03% more milk than the control group (P > 0.99), with fat yield increasing by 32.81 kg or 14.71% (P > 0.95), protein yield by 25.8 kg or 12.15% (P > 0.999), and 4% FCM by 818.98 kg or 14.68% (P > 0.95).

Cows in Group II, which consumed 220 g of Vilofoss daily, exceeded their control counterparts by 401.9 kg or 7.46% in milk yield (P > 0.99), 22.13 kg or 9.92% in fat yield (P > 0.999), 17.3 kg or 8.15% in protein yield (P > 0.95), and 553.05 kg or 9.91% in 4% FCM (P > 0.99).

Again, no statistically significant differences were found between the groups in terms of total solids, solids-not-fat, and lactose content. These indicators remained within acceptable norms, confirming the high nutritional value of the milk produced (see Table 2)

Table 2 Milk Productivity of Cows in the Experimental Groups During 305 Days of Lactation, kg

Indicators	Groups					
	Control group (basic ration only)		Group I (basic ration + 170 g Vilofoss)		Group II (basic ration + 220 g Vilofoss)	
	$\overline{X} \pm S\,\overline{x}$	Cv%	$\overline{X} \pm S\,\overline{x}$	Cv%	$\overline{X} \pm S\,\overline{x}$	Cv%
Milk yield, kg	4792,2±14,67	0,09	5386,7±17,49**	0,09	4984,8±16,31**	0,09
Milk fat content, %	3,97±0,18	1,36	4,14±0,24	1,73	4,03±0,13	0,96
Milk fat yield, kg	190,2±2,34	0,36	223,01±2,38*	0,32	200,88±2,44***	0,36
Milk protein content, %	3,89±0,42	3,23	3,94±0,45	3,42	3,91±0,41	3,14
Milk protein yield, kg	186,4±2,58	0,41	212,2±2,91***	0,41	194,9±2,64*	0,40
4% fat-corrected milk (FCM), kg	4756,25±11,85	0,07	5575,23±12,45*	0,06	5022,18±13,4**	0,08
Total solids, %	12,91		12,94		12,93	
Solids-not-fat (SNF), %	8,94		8,81		8,9	

Note: * – P > 0.95; ** – P > 0.99; *** – P > 0.999 indicate statistical significance levels.

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The analysis of the data in table 2 indicates that during the 305-day lactation period, cows in the control group were fed the farm's standard basic ration. In contrast, cows in the first experimental group received an additional **170 g of** Vilofoss per head per day, and cows in the second experimental group received 220 g of Vilofoss daily. Upon evaluating milk productivity, it was found that the highest milk yield was recorded in the first experimental group, which was supplemented with 170 g of Vilofoss per day. These cows outperformed both the control and second experimental group in terms of milk yield.

Thus, supplementation of the daily ration with 170 g of Vilofoss per head significantly contributed to increasing milk productivity in lactating cows.

Conclusion

The results of the conducted experiment demonstrate that feeding Simmental cows a basic ration supplemented with Vilofoss feed additive significantly improves their milk productivity. In particular, cows in the first experimental group, which received 170 g of Vilofoss daily, showed a statistically significant advantage over the control group in milk yield, fat and protein yield, and 4% fat-corrected milk during both the 180- and 305-day lactation periods. This indicates that Vilofoss is an effective supplement for increasing milk production.

Furthermore, no significant differences were observed in the chemical composition of milk (total solids, solids-not-fat), confirming that milk quality and nutritional value remained high across all groups. Despite the second experimental group receiving a higher dose of 220 g of Vilofoss, the best results were recorded in the first group, suggesting that the optimal dose of Vilofoss is 170 g per cow per day.

In conclusion, adding 170 g of Vilofoss per head per day to the ration of lactating cows is an economically and biologically efficient strategy for improving both the quantity and quality indicators of milk production.

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