Influence of economic use duration on milk yield with intensive heifer milking

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Abstract. In the study the influence of milking intensity of first heifers on milk productivity of cows of black-spring breed on the example of dairy farm in Chui valley was studied. A sample of 100 first-calf Holstein heifers was formed, which were given different amounts of feeding and milking in the first lactation. The results showed that cows with milk yields between 3001 and 4000 kg of milk in the first lactation had the best milk yield and length of utilization. The study emphasizes the importance of optimal management of milking and feeding to improve production efficiency in dairy cattle breeding.

1 Introduction

The article deals with the influence of different modes of milking of first-calf heifers on their milk productivity and longevity in the herd. The decisive factor in achieving a high level of milk productivity of cows, growth of young stock, and manifestation of normal reproductive functions is the organization of rational feeding of all sex and age groups of animals. Cow milk yield is a fundamental indicator of profitability of milk production.

Indicators of milk productivity depend on two groups of factors: genetic and non-genetic. The first group is determined by the heredity of the animal, its breed and lineage. The second group of factors is determined by environmental conditions: feeding and housing, season of the year, climate, geographical zone and others. Thus, the potential of dairy productivity is determined by heredity, and the degree of realization of heredity by the technology of animal housing [1, 2].

To obtain high productivity it is important to create not only optimal conditions of feeding and housing of the animal to realize the genetic potential of the animal, but also to ensure maximum transfer of heredity from the maternal organism to the offspring. In accordance with the Program of improvement of black-breed cattle in the Republic, prepared with the participation of scientists of the Kyrgyz National Agrarian University, the most promising is the dairy direction of breeding for milk production in the suburban area.

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One of the most important problems that need to be solved in a short period of time is the search for effective ways to increase the production of cheap livestock products. In connection with the significant rejuvenation of the dairy herd and its maximum milk yields, the study of the suitability of repair young stock and commercial and technological properties of milk obtained from first-calf heifers for herd selection is relevant [3].

To achieve high milk productivity of cows it is necessary to take into account the influence of not only genetic factors, but also the conditions of housing and feeding. The milking intensity of first-calf heifers plays a key role in their further productivity. It is important to study how different milking regimes affect milk production and long-term animal health [4].

Dairy productivity of cows is the result of complex interaction of genetic and environmental factors. The genetic potential of animals determines their possible productivity, but the realization of this potential depends largely on housing and feeding conditions. An important role in increasing milk productivity is played by rational feeding, which should take into account the needs of animals depending on their physiological state and stage of lactation.

First-calf heifers require special attention during the milking period, as it is during this period that their future milk production is formed. Intensive milking, including frequent milking and increased feeding, can contribute to faster udder development and increased milk yield. However, it is important to keep in mind that excessive stress on young bodies can lead to negative consequences such as udder disease and reduced overall cow longevity [5, 6].

The study of the influence of milking intensity on milk productivity of first-calf heifers allows us to identify optimal feeding and housing regimes that contribute to achieving high productivity without negative consequences for animal health. Optimal conditions of maintenance and rational feeding allow to realize genetic potential of animals that promotes increase of economic efficiency of dairy production [7].

In modern conditions, dairy cattle breeding faces many challenges, such as the need to increase productivity while maintaining animal health and minimizing maintenance costs. An important aspect is the creation of conditions conducive to the realization of the genetic potential of animals and ensuring high milk productivity. In this context, the milking intensity of first-calf heifers plays a key role [8].

2 Material and methods of research

The herd of the agricultural cooperative "Vetka" was used as a material for scientific research, in which the milk productivity of cows for five lactations depending on the intensity of milking of first heifers was studied. For the first time in the conditions of Chui valley the potential of milk productivity was evaluated and the commercial and technological qualities of milk of black-spring cows obtained from mothers of different age and level of milk productivity were determined. The combination of selection-technological methods most effective in dairy cattle breeding was established.

Modern methods of selection and genetics allow to increase significantly the productivity of cows, but without appropriate conditions of maintenance and feeding these achievements can remain unrealized. Rational feeding, including the necessary nutrients in optimal amounts, and creation of comfortable housing conditions contribute to the achievement of high milk productivity.

3 Results of the study

In the course of the study, the milk productivity of black-breed cows was evaluated depending on the milking intensity of first heifers in the first lactation. The results made it possible to determine the commercial and technological properties of milk and economically useful traits of their offspring.

Table 1. Milk productivity of cows depending on milking intensity of first-calf heifers.

Milk yield of first calves, kg	Total, heads	On average over five lactations		
		milk yield, kg	fat, %	live weight, kg
Up to 3.000	35	3467±25	3.78±0.01	517±1.2
3001-3500	31	4000±24***	3.79±0.01	531±1.1***
3501-4000	28	4649±46*	3.77±0.01	535±1.5***
Total	94	3803±135	3.78±0.01	524±0.6

When analyzing the obtained data it was found that from cows with milking intensity for the first lactation from 3001 to 4000 kg of milk on average for five lactations received 533 kg more milk, and from the group of cows with milk yield for the first lactation over 4000 kg by 1173 kg more milk compared to the group of animals that had milk yield for the first lactation less than 3000 kg. The difference in milk yield is reliable ($P<0.0001$).

The results of the study for lactation depending on the intensity of their milk yield for the first lactation during the period of the experiment were combined into 4 groups: I group up to 3000kg of milk; II -3001-3500kg; III-3501-4000kg; IV group over 4000kg of milk. The milk yield for the first lactation was less than 3000 kg of milk for the whole period of experience 146 cows or 17,7%; 377 cows or 45,8% had milk yield from 3001 to 3500 kg of milk; 232 cows or 28,2 had milk yield within the range from 3501 to 4000 kg of milk and 68 liters or 8,3% had milk yield over 4000 kg of milk for the first lactation.

Duration of economic use of this group of animals is the longest-5.35 lactations (Table 1) duration of use and productivity of cows at different intensity of their milking for the first lactation are shown in Table 2. The most optimal level of milk yield for the first lactation of cows of black-and-brown breed can be considered as milk yield in the range of 3001-3500 kg of milk.

Table 2. Duration of utilization and milk productivity of cows at intensity of their milking for the first lactation.

Milk yield first heifers, kg	Total cows, head	Medium duration duration of cow utilization, lactations	Received per 1 cow			
			total		incl. per lactation	
			of milk, kg	milk fat, kg	of milk, kg	milk fat, kg
Up to 3,000	146	5.3	21862±	828.6±	4125±	156.3±
3001-3500	377	4.8	21422±	812.0±	4463±	169.1±
3501-4000	232	4.4	21476±	813,9±	4881±	185.0±
Over 4000	68	3.3	17025±	646.9±	5159±	196.0±

The most optimal level of milk yield of cows of black-and-spring breed for the first lactation can be considered as milk yield in the range of 3001-3500 kg of milk. Practical significance of the obtained results. The obtained results of the research have high practical significance for agricultural enterprises engaged in breeding of cattle of dairy direction. In the process of research the optimum conditions of milking of first heifers promoting maximization of milk productivity and improvement of economically useful features of their offspring were determined. These scientific developments can be widely used to improve production performance and efficiency of peasant-farms, which in turn contributes to sustainable development of agriculture [9].

4 Discussion

In the discussion let us consider the obtained results of the study and their significance for the practice of dairy cattle breeding.

The study showed that milking intensity of first-calf heifers significantly affects the milk production of black-and-brown cows. Cows that were provided with intensified feeding and three times a day milking in the first months of lactation showed high milk yields both in the first lactation and in the average of five lactations. This confirms that optimal nutrition and rational milking contribute to the realization of genetic potential of animals.

Influence of milking intensity on productive characteristics. The results of the study show that cows with milk yield from 3001 to 4000 kg of milk in the first lactation produce on average 533 kg more milk in five lactations compared to the group of cows with milk yield less than 3000 kg in the first lactation. This difference is statistically significant and indicates the importance of maintaining an optimal level of milking to achieve high production results.

Practical significance of the research results. The obtained data have practical application in agricultural enterprises engaged in breeding of dairy cows. Optimal conditions of milking revealed in the course of the research can be used for development of recommendations on improvement of production indicators and economic efficiency of farms.

Evaluation of genetic potential and technological aspects. Evaluation of commodity-technological properties of milk and economically useful traits of the offspring of cows of black-and-brown breed allows to select optimal selection and technological methods that contribute to the improvement of quality and quantity of produced products. These data can be used for further improvement of breeding programs and maintenance of high production standards.

Thus, the results of this study confirm the need for an integrated approach to management of milking and feeding of cows to achieve optimal milk productivity.

5 Conclusions

The study revealed that milking intensity of first heifers has a significant effect on milk productivity of black-and-brown cows. Cows with milk yields from 3001 to 4000 kg of milk in the first lactation showed higher milk yields both in the first five lactations and on average in each lactation. This confirms the need for optimal milking and a modern approach to feeding to maximize production performance.

The conclusions of the study are important for agricultural enterprises engaged in breeding dairy cows. Recommendations on milking optimization can be used to increase the efficiency of milk production and improve the economic performance of farms. Further

development of breeding and technological approaches will help to preserve and increase the potential of dairy cattle breeding, contributing to the sustainable development of the agricultural sector.

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