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MILK YIELD OF MONTBELIARD BREED COWS IN THE THIRD AND HIGHER LACTATIONS UNDER THE CONDITIONS OF THE REPUBLIC OF KARAKALPAKISTAN**U.K. Koshenova**

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Abstract. The article analyzes milk productivity, milk composition, and the characteristics of lactation in Montbéliard breed cows of various productivity traits. According to the results, the milk productivity of Montbéliard breed cows belonging to group I (milk-meat orientation) in lactation III was 5251.3, which is 705.0 kg or 15.5% ($P<0.01$), milk fat yield 27.8 kg or 15.0% ($P<0.01$), protein yield 26.7 kg or 16.3% ($P<0.05$), 4% milk content 695.1 kg or 15.0% ($P<0.001$), and milk yield coefficient 141.9 kg or 18.1% ($P<0.001$) higher than their peers in group II (meat-milk orientation). It was also established that the milk yield per 100 kg of live weight in dairy-meat-oriented cows, i.e., the milk yield coefficient, was 141.9 kg (18.1%) higher than in dairy-meat-oriented cows (Group II).

The cows in all groups maintained good milk yields until the 4th month of lactation, after which a steady decrease in this indicator was observed. The results obtained showed that during

the lactation period, dairy-meat-oriented cows, along with high milk productivity, also possessed the property of uniform lactation.

Keywords. Montbéliard breed, milk productivity of cows, direction of milk-meat and meat-milk productivity, and characteristics of lactation.

Аннотация. В статье анализируются молочная продуктивность, состав молока и особенности течения лактации у коров монбельярдской породы различного направления продуктивности. Согласно результатам, молочная продуктивность коров монбельярдской породы, относящихся к I группе (молочно-мясной направленности), в III лактации составила 5251,3, что на 705,0 кг или 15,5% ($P<0,01$), выход молочного жира на 27,8 кг или 15,0% ($P<0,01$), выход белка на 26,7 кг или 16,3% ($P<0,05$), количество 4%-ного молока на 695,1 кг или 15,0% ($P<0,001$), коэффициент молочности на 141,9 кг или 18,1% ($P<0,001$) выше, чем у их сверстниц II группы (мясо-молочной направленности). Также было установлено, что количество молока на 100 кг живой массы у коров молочно-мясного направления, то есть коэффициент молочности, был на 141,9 кг (18,1%) выше, чем у сверстников мясо-молочного направления (II группа).

Коровы во всех группах сохраняли хороший уровень надоев до 4-го месяца лактации, после чего наблюдалось равномерное снижение этого показателя. Полученные результаты показали, что в период лактации коровы молочно-мясного направления наряду с высокой молочной продуктивностью также обладали свойством равномерного течения лактации.

Ключевые слова. Монбельярдской породы, молочная продуктивность коров, направление молочно-мясной и мясо-молочной продуктивности, особенности течения лактации.

Annotatsiya. Maqolada Turli mahsuldorlik yo'nalishiga mansub manbelyard zotli sigirlarning sut mahsuldorligi, mahsulot tarkibi va laktatsiyaning kechish xususiyatlari tahlil qilingan. Natijalarga ko'ra, I guruhga (sut-go'sht mahsuldorlik yo'nalishi) mansub monbelyard zotli sigirlarning III laktatsiyadagi sut mahsuldorligi 5251,3 ni tashkil qilib, o'z tengqurlari II guruhdagi (go'sht-sut mahsuldorlik yo'nalishi) sigirlarga nisbatan tegishli ravishda 705,0 kg yoki 15,5% ga ($P<0,01$), sut yog'i chiqim 27,8 kg yoki 15,0% ga ($P<0,01$), oqsil chiqim 26,7 kg yoki 16,3% ga ($P<0,05$), 4%-li sut miqdori 695,1 kg yoki 15,0% ga ($P<0,001$), sutdorlik koeffitsienti 141,9 kg yoki 18,1% ga ($P<0,001$) yuqori bo'ldi. Shuningdek, sut-go'sht mahsuldorlik yo'nalishidagi sigirlarning har 100 kg tirik vaznga nisbatan sut miqdori ya'ni sutdorlik koeffitsienti go'sht-sut mahsuldorlik yo'nalishidagi (II guruh) tengqurlarnikiga nisbatan 141,9 kg ga (18,1%) yuqori bo'lganligi aniqlandi.

Barcha guruhlardagi sigirlar laktatsiyasining 4-oyigacha sut miqdorini yaxshi darajada saqlab turdilar, keyin esa bu ko'rsatkich bir tekis pasayib borganligi kuzatildi. Olingan natijalar, laktatsiya davrida sut-go'sht mahsuldorlik yo'nalishidagi sigirlarda yuqori sut mahsuldorligi bilan birga laktatsiyaning birttekis kechish xususiyatlariga ham ega bo'lganligini ko'rsadi.

Kalit so'zlar. Monbelyard zoti, sigirsut mahsuldorligi, sut-go'sht va go'sht-sut mag'suldorlik yo'nalishi, laktatsiyani kechish xususiyatlari.

INTRODUCTION.

Rapid development of the cattle breeding sector, The effective use of high-yield cattle breeds is of great importance for rapidly developing the cattle industry, improving milk production in dairy farming practices, supplying the population with quality food products, and increasing the economic efficiency of dairy farms. In recent years, high-potential Montbéliarde cattle have been used in dairy farming for their milk production, high fat and protein content in the milk, a robust constitution, and the ability for long-term use on the farm are of particular importance.

The conditions of the Karakalpakstan Republic are characterized by a sharply continental climate, high summer temperatures, dry air, cold winters, a certain degree of mineralization in the soil and water, and the seasonal variability of the forage base. Under these conditions, studying the reproductive characteristics, physiological state, and the laws of milk yield formation in high-yielding Montbéliarde cows of various production types is of significant scientific importance. In particular, during the third and subsequent lactations, the functional development of the udder, the formation of the lactation curve, milk-giving intensity, and production level determine the efficiency of future use on the farm. In this regard, the lactation performance of Monbelyard cows studying milk production in local conditions for lactations three and higher is important for increasing the efficiency of selection work, exploring and improving the breed's adaptability, and developing recommendations for practice.

The Montbéliarde cattle breed was developed in France in the 12th century by crossing and selecting the local Red Alsace cattle with Swiss Simmental breeds. At the 1883 Universal Exhibition in France, the Montbéliarde was recognized as a breed, and in 1887, the Montbéliarde breed's studbook was created and published. This cattle breed is valued for its high meat and milk production, its milk fat and protein content, and the high-quality properties of its milk, which are highly prized in the cheese-making industry [2; 3; 4]. .

The Monbelyard cattle, while retaining its hardiness to adverse climatic and forage conditions, is a distant relative of the red and white cattle of desert regions, It is renowned for its high meat and milk production and is classified as a dual-purpose breed. The head is large and symmetrical, with a medium-length neck. The chest is deep, 70-78 cm, wide, and well-developed

in the forecrest. The withers are 140-145 cm high, and the body length is 160-165 cm. The cows on average 500-650 kg, bulls 800-1000 kg live weight, udder is cup-shaped, color is reddish-brown, cows have white markings on the lower part of the body as well as on the flank, white forehead, and red spots on the neck. Montbéliarde cattle are a widely distributed breed across Europe, Asia, Africa, and the Americas due to their good adaptability to climate change and their hardiness [1; 10.<http://www.montbeliarde.org>.].

The authors, taking advantage of the genetic potential of dairy-meat crossbred cattle of the Maine-Anjou breed, studied the exterior characteristics of the first-generation hybrids obtained by crossing them with beef-type sires. Their exterior were higher than those of pure-bred Montbeliard peers, indicating that the hybrid calves had well-developed bodies and a more meat-type conformation.

A method of crossbreeding with semen from imported dairy-beef breeding bulls, It is considered one of the important aspects aimed at further increasing the productivity of cattle and increasing product output volumes [5; 6; 8; 9].

Thus, the use of semen from dairy-beef type sires is considered one of the important aspects aimed at further increasing the productivity of cattle and increasing product output [5; 6; 8; 9]. creating populations and high-yield herds resistant to various natural and climatic conditions, breeding them for their economically valuable traits, and propagating them in the dairy and dairy-beef directions, thereby, conducting scientific research to increase the resistance of Montbéliarde cows to intensive dairy production technologies and various natural and climatic conditions, for which it is necessary to improve the conditions for proper feeding and housing of the cows, especially, functional development of the udder in cows during the first lactation, the formation of the lactation curve, the rate of milk secretion, and the level of productivity, creating opportunities to increase the efficiency of their future use in farming, the functional development of the udder in cows during the first lactation, the formation of the lactation curve, the rate of milk secretion, and the level of productivity, creating opportunities to increase the efficiency of their future use in farming, these cows of the

to improve the efficiency of selection work by studying the milk yield of these cows in their first lactation under local natural and climatic conditions, determining the breed's adaptability potential and developing recommendations for practice is important.

Objective of the research. The aim of the study is to investigate the milk yield and economic-useful traits of Monbeliarde cows in the third and higher lactation periods under the natural and climatic conditions of the Republic of Karakalpakstan, depending on different production systems.

The research tasks are as follows:

The **objectives** include determining the 305-day milk yield of Montbéliarde cows in their third lactation and higher, analyzing the fat, protein, and dry matter content of the milk, and studying the characteristics of the cows' lactation course.

Research Location and Methods. The scientific research will be conducted during 2025-2026 on the cattle herd at the “Kong'iratbay Mexri” breeding farm in the Nukus district of the Republic of Karakalpakstan.

The formation of the experimental groups was carried out in accordance with the methodological recommendations for conducting zootechnical research in livestock farming in the Republic of Uzbekistan. Specifically, cows in third lactation and above of the Montbéliarde breed, imported from France and available on the farm, were selected.

For the experiment, two groups of 12 cows each were selected based on homogeneity criteria—origin, breed, age, live weight, and milk yield—one group for the dairy-meat production type and the other for the meat-dairy production type. of which Group I was composed of Montbéliarde cows of the dairy-beef dual-purpose type and Group II of those of the beef-dairy dual-purpose type.

In the study, the cows' milk yield was determined by a monthly control milking, and the milk fat and protein content were also measured once a month using a Laktan 4-M milk tester.

Milk fat and protein yields, 4% milk content, and the milk-yielding coefficient were determined using the methods generally accepted in zootechnics.

The milk solids and skimmed milk residue, as well as the milk sugar content, were determined using the method of N.V. Barabanshikov (1986).

The obtained data were subjected to biometric processing using Microsoft Excel 2010 software, in accordance with the methodological guidelines of A.M. Yakovenko, T.I. Antonenko, and M.I. Selionova (2013) [7].

Research results and analysis. Studying the milk yield and lactation characteristics of Montbéliarde cows with different production directions makes it possible to select high-yielding cows. This makes it possible to establish high-yield herds of Montbéliarde cows, create a new type in the dairy production direction, and improve the breed.

Therefore, in our study, we investigated the milk yield of Montbéliarde cows of different production directions, and the results are presented in Table 1.

Table 1**Milk Yield of Montbéliarde Cows of Different Productive Directions in Third Lactation and Higher**

Indicators	Group, (n=12)			
	I		II	
	Production directions			
	Dairy-meat		Meat-dairy	
	$\bar{X} \pm S\bar{x}$	Cv, %	$\bar{X} \pm S\bar{x}$	Cv, %
Live weight, kg	567,5±4,83***	2,95	580,8±4,68	2,79
Milk yield, kg	5251,3±167,40**	11,04	4546,3±129,50	9,87
Fat content in milk, %	4,06±0,03	2,55	4,08±0,03	2,59
Protein content, %	3,60±0,05	4,47	3,62±0,05	5,11
Milk fat yield, kg	212,8±6,29**	10,25	185,0±4,50	8,43
Milk protein yield, kg	190,4±7,86*	14,30	163,7±5,16	10,91
Quantity of 4% milk, kg	5319,5±157,36***	10,25	4624,4±112,58	8,43
Milk fat-protein ratio, kg	925,8±29,79***	11,15	783,9±25,05	11,07
Dry matter, %	12,56	-	12,62	-
Fat-to-protein ratio, %	8,52	-	8,54	-
Lactose, %	4,34	-	4,34	-

Note: *P<0,05, **P<0,01, *P<0,001**

Table 2 data analysis showed that the Montbéliarde cows in Group I (dairy-beef dual-purpose) were characterized by high milk production. Specifically, the 305-day milk yield of the cows in Group I (dairy-meat production type) was 5,251.3 kg, compared to their counterparts compared to the cows in Group II (dual-purpose breed) by 705.0 kg or 15.5% (P<0.01), milk fat yield by 27.8 kg or 15.0% (P<0.01), protein yield by 26.7 kg or 16.3% (P<0.05), The 4% milk yield was 695.1 kg or 15.0% (P<0.001), and the milkability coefficient was 141.9 kg or 18.1% (P<0.001). Additionally, the fat and protein levels in the milk were 4.06% and 4.08%, and 3.60% and 3.62%, respectively. This indicates that as milk yield increases, its fat and protein levels decrease, and vice versa. the less milk, the higher the fat and protein content, which shows a negative correlation. This data indicates that the Montbéliarde cows have a high genetic potential for milk production.

In order to achieve high milk production in the first 3 months of lactation, the amount of milk obtained from them over 305 days must be at least to at least 45%, is considered important for improving selection work in dairy cattle breeding. Therefore, in our research, we paid special attention to these specific aspects.

To assess the adaptability of Montbéliarde cows of different production types to environmental conditions and to improve their ability to maintain a stable monthly milk yield during lactation, We conducted research into their lactation performance and its stability.

One of the factors determining a cow's milk yield is the characteristics of its lactation course. An increase in milk yield was observed, followed by a steady decline in milk quantity in subsequent months. Therefore, in our research we studied the characteristics of cows' lactation progression and presented them in Table 2.

Table 2

Changes in monthly milk yield, the stability coefficient of the milking period, and the milk decline index during the cows' lactation

Lactation months	Group, (n=12)					
	I			II		
	Milk yield, kg	Constancy coefficient of the lactation period	Decrease index of milk yield, %	Milk yield, kg	Constancy coefficient of the lactation period	Decrease index of milk yield, %
I	595,0	100,0	81,0	530,5	100,0	82,2
II	735,0	123,5	-	645,0	121,6	-
III	685,0	115,1	93,2	595,5	112,3	92,3
IV	635,0	106,7	86,4	565,0	106,5	87,6
V	585,5	98,4	79,7	505,5	95,3	78,4
VI	532,1	89,4	72,4	450,2	84,9	69,8
VII	465,0	78,2	63,3	395,5	74,6	61,3
VIII	415,2	69,8	56,5	335,3	63,2	52,0
IX	330,0	-	44,9	288,8	-	44,8
X	273,5	-	37,2	235,0	-	36,4
Total	5251,3	97,6	-	4546,3	94,8	-

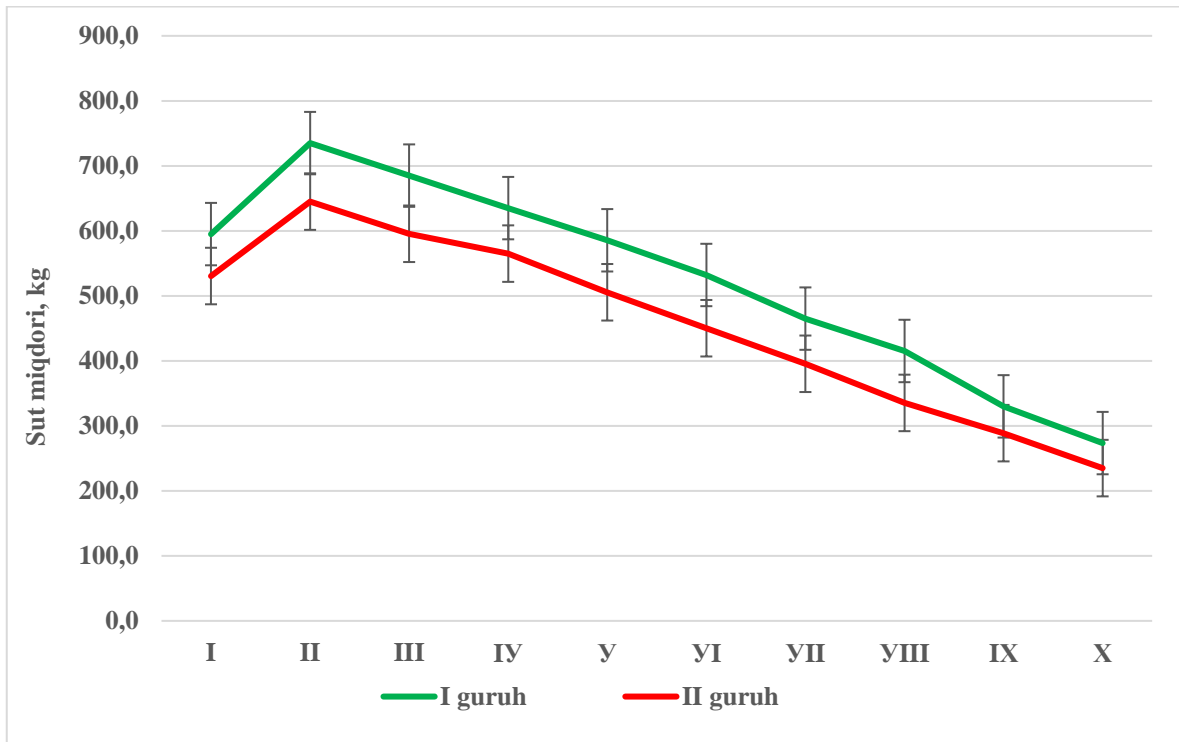


Figure 1. Change in the lactation curve of cows.

As shown by the data in Table 2 and Figure 1, the coefficient of consistency of the milking period and the decline indices of milk yield during lactation in third-lactation Montbéliarde cows were observed to increase up to the fourth month of lactation. Specifically, in the first month of lactation, the cows in Group I (dairy-beef dual-purpose) yielded 595.0 kg, while in the second month, they yielded 735.0 kg, an increase of 140 kg (23.5%), 685.0 kg in the 3rd month, or 90 kg (15.1%), and 635.0 kg in the 4th month, or 40 kg (6.7%). In the subsequent months of lactation, a uniform decrease was observed (8.3–11.2%).

Also, In the second group (dual-purpose, meat-and-milk), this figure was 530.5 kg in the first month of lactation, increasing to 645.0 kg in the second month, or 114.5 kg (21.6%), 595.5 kg in the 3rd month, or 65 kg (12.3%), and 565.0 kg in the 4th month, or 34.5 kg (6.5%). In the later months of lactation, a uniform decrease was observed. (10,3-11,4%).

Cows in all groups maintained a good milk yield until the fourth month of lactation, after which this indicator was observed to decline steadily. The results obtained indicate that during lactation, dairy-beef dual-purpose cows exhibited not only high milk production but also a consistent course of lactation.

Thus, it can be concluded that the milk yield of Montbéliarde cows in their third lactation and higher remains consistent throughout the lactation months.

Conclusion. When fed under similar conditions on the farm, the milk production of 305-day lactations in third and higher lactations of dairy-beef crossbred cows (Group I), showed that the

milk yield of dairy-beef crossbred cows over a 305-day period, when fed under identical conditions, was characterized by higher values compared to beef-dairy crossbred cows. Also, the amount of milk per 100 kg of live weight, i.e., the milk-to-weight ratio, for the dairy-meat type cows was higher compared to the beef-dairy type.

(Group II) was found to be 141.9 kg (18.1%) higher compared to their peers.

Thus, studying the milk yield and lactation characteristics of different production-type Montbéliarde cows makes it possible to create high-yielding herds. This increases the efficiency of selection and contributes to breed improvement and the creation of new herds.

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