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MORPHOLOGICAL QUALITIES OF THE UDDER OF CROSS-BRED BLACK-AND-WHITE HEIFERS

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There are quite a lot of studies on the influence of the father's genotype on the productivity of offspring. The initial goal of our research was to determine the influence of the maternal side, as well as the influence of various linear combinations of parents on the productivity of offspring. Our studies of the morphological qualities of the udder of first-calf cows of different cross lines, as well as pure line cows, revealed very significant differences between the experimental groups. Thus, the best udder development was achieved by cows of the cross lines Vis Back Ideal with Siling Trajun Rokit, as well as cows of the pure line Reflection Sovering. It is characteristic that the "mirror" cross Siling Trijun Rokit with Vis Back Ideal had indicators of udder development slightly worse. Therefore, we can conclude that in JSC "Zarya" the greatest influence on the development of the morphological qualities of the udder is exerted by the paternal side, namely, the selection of the bull-producer. At the same time, the use of bulls-producers of the Vis Back Ideal line in this herd negatively affects the development of the udder of cows after the first lactation. The indicators of the udder size before milking in the groups of cows with the paternal side of the Vis Back Ideal are 868.2-1248.9 cm² lower than in their peers.

Keywords: cross lines, clean line, udder shape, udder measurements of first-calf cows, cow udder size.

МОРФОЛОГИЧЕСКИЕ КАЧЕСТВА ВЫМЕНИ КРОССИРОВАННЫХ ПЕРВОТЕЛОК ЧЕРНО-ПЕСТРОЙ ПОРОДЫ

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Исследований, посвященных влиянию генотипа отца на показатели продуктивности потомства довольно много. Первоначальной целью наших исследований было определить влияние материнской стороны, а также влияние различных линейных сочетаний родителей на показатели продуктивности потомства. Проведенные нами исследования морфологических качеств вымени коров-первотелок различных кроссов линий, а также коров чистых линий, выявили весьма значи-

тельные различия между опытными группами. Так, наилучшие развитие вымени имели коровы кросса линий Вис Бэк Айдиал с Силине Трайджун Рокит, а также коровы чистой линии Рефлексин Соверинг. Характерно, что «зеркальный» кросс Силине Трайджун Рокит с Вис Бэк Айдиал имел показатели развития вымени несколько хуже. Следовательно, можно заключить, что в АО «Заря» наибольшее влияние на развитие морфологических качеств вымени оказывает отцовская сторона, а именно подбор быка-производителя. При этом использование быков-производителей линии Вис Бэк Айдиал в данном стаде негативно сказывается на развитии вымени коров по первой лактации. Показатели величины вымени до доения в группах коров с отцовской стороны Вис Бэк Айдиал на 868,2-1248,9 см² ниже, чем у сверстниц.

Ключевые слова: кросс линий, чистая линия, форма вымени, промеры вымени коров-первотелок, величина вымени коров.

ҚАРА ЖӘНЕ ТҮРЛІ-ТҮСТІ ТҰҚЫМДЫ КРОССОВКАЛАРДЫҢ ЖЕЛІНІНІҢ МОРФОЛОГИЯЛЫҚ ҚАСИЕТТЕРІ

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Әкесінің генотипінің ұрпақтардың өнімділік көрсеткіштеріне әсері туралы көптеген зерттеулер бар. Біздің зерттеулеріміздің бастапқы мақсаты ана жағының әсерін, сондай-ақ ата-аналардың әртүрлі сызықтық комбинацияларының ұрпақтардың өнімділік көрсеткіштеріне әсерін анықтау болды. Біз әр түрлі кресттердегі алғашқы сиырлардың, сондай-ақ таза тұқымды сиырлардың желінінің морфологиялық қасиеттерін зерттедік, тәжірибелі топтар арасында айтарлықтай айырмашылықтар анықталды. Сонымен, ықтың ең жақсы дамуы Вис Бэк Айдиал с Силине Трайджун Рокитпен, сондай-ақ таза рефлекс сызығындағы сиырлар болды. "Айна" кросс Силине Трайджун Рокит Вис Бэк Айдиалмен бірге желіннің даму көрсеткіштері біршама нашар болды. Демек, "Заря" АҚ-да әкенің жағы, атап айтқанда тұқымдық бұқаны таңдау желіннің морфологиялық қасиеттерінің дамуына үлкен әсер етеді деп қорытынды жасауға болады. Сонымен қатар, осы табында Vis back Aidial желісінің тұқымдық бұқаларын пайдалану алғашқы лактация кезінде сиырлардың желінінің дамуына теріс әсер етеді. Вис Бэк Айдиалдың әкелік жағы бар сиыр топтарында саууға дейінгі желіннің көрсеткіштері құрдастарына қарағанда 868,2-1248,9 см² төмен.

Түйінді сөздер: айқас сызықтар, таза сызық, желіннің пішіні, бірінші төл сиырлардың желінін өлшеу, сиыр желінінің шамасы.

Timeliness. As known, the productivity indicators of farm animals are determined by the influence of two main factors: heredity and the conditions of feeding, livestock keeping. And although the share of the influence of the hereditary factor is only 20-30%, it is not necessary to underestimate it, due to the fact that this trait in the animal cannot be changed, and not improved throughout a productive life. And the hereditary potential of the animal is formed only at the moment of fertilization, when the paternal and maternal gametes merge. In the course of productive use of the animal, the specialist can only influence the manifestation of inherited abilities, controlling the processes of feeding and livestock keeping. Therefore, it is so important, even before the birth of the animal, to determine its hereditary potential when selecting parents. And since all the females are left for reproduction in cattle breeding, special attention should be paid to the selection of servicing bulls. Due to the fact that in dairy cattle breeding the reproduction process is based on artificial insemination, there is a unique opportunity to use the best and proven servicing bull. Therefore, the identification of the best producers has been and remains an urgent task in practical terms for any farm.

It is also impossible to completely ignore the influence of the maternal component in the heredity of the animal, here special attention should be paid to the combination of the linear belonging of the parents, or rather the crosses of lines or pure lines. Here, the pure line should be understood as animals in which both the mother and father belonged to the same line.

To increase the genetic potential of the indicators of productive use of cows, it is necessary to carefully conduct the breeding selection of producers to the milking herd, taking into account the results of the previous selection, taking into account the compatibility of animals of different linear belonging. [1, p.6] The search for successful combinations and their repetition in the selection accelerates the pace of improvement of the breed as a whole [2, pp.87-89].

The aim of the work was to conduct a comprehensive study of the morphological qualities of the udder of first-calf cows of pure lines and first-calf cows obtained from cross lines.

Tasks of scientific research:

- to determine the correlative relationship between the indicator of milk yield for 305 days of lactation and the visual assessment of the udder, carried out at 3-5 months of lactation;
- determine the frequency of occurrence of various forms of udder in cows of experimental groups;
- take measurements of the udder of cows and determine the size of the udder and the percentage of the udder cisterns decreasing after milking.

Material and methods of research.

The research was carried out on the first-calf cow black-and-white breed in the conditions of the dairy farm of Kostanay region, Mendykarinsky district "Zarya" JSC. The experimental groups were formed based on the principle of analogous pairs (age of the first calving, live weight in the range of 50-80 kg). An alternative feature in the formation of groups was the linear belonging of the cows. In this case, both the father's line (F) and the mother's line (M) were taken into account.

Zarya JSC uses animals of the following lines: Reflection Sovering (hereinafter referred to as R. S.), Vis Back Ideal (V. B. A.) and Silling Traijun Rokit (S. T. R.). Taking into account the linear belonging, it was possible to form 4 groups of crossed first-calf cows and 2 pure groups, in which both the father and mother of the cow belonged to the same line.

The conditions of feeding and maintenance of the experimental groups throughout lactation were similar.

Visual assessment of the udder of cows was carried out at 3-4 months of lactation, when evaluating the udder, the shape of the udder, the degree of attachment of the udder, the intensity of the longitudinal udder cleft, the symmetry of the udder parts, the size of the udder reserve, etc.. Visual assessment of the udder was carried out on a 5-point scale, the score was ranked of 0.1 points pitch.

Accounting of milk productivity for 305 days of lactation was carried out according to the results of monthly control milking. Measurements of the udder of first-calf cows were taken at 3-4 months of lactation 1-2 hours before milking and immediately after milking with a measuring caliper and measuring tape with an accuracy of 1 cm. The size of the udder of cows was determined by formula 1, and the udder cisterns decreasing by formula 2.

$$Udder\ size = udder\ circumference \times \frac{depth\ of\ the\ front\ udder\ parts + depth\ of\ the\ rare\ udder\ parts}{2} \tag{1}$$

$$Udder\ cisterns\ decreasing = \frac{udder\ size\ before\ milking - udder\ size\ after\ milking}{udder\ size\ before\ milking} \tag{2}$$

Research results.

Our studies have shown that the first-calf cows of the experimental groups have different indicators of the morphological qualities of the udder. Since this work is part of the thesis research, and part of the work with indicators of the level of milk productivity has already been published earlier, within the framework of this article, we do not provide milk yield indicators for 305 days of lactation. But even without this indicator, the results presented below clearly reflect the differences between the groups of first-calf cow.

Table 1-Relationship of milk yield and visual assessment of the udder of cross-bred cows and pure line cows

Groups		Number of animals	Correlation coefficient value
M	F		
R. S.	× V. B. A.	23	0.72
V. B. A.	× S. T. R.	23	0.83
S. T. R.	× V. B. A.	24	0.75
S. T. R.	× R. S.	20	0.88
Pure line			
R. S.		27	0.81
V. B. A.		20	0.64

Calculations of the correlation coefficient (Table 1) showed that there is a close relationship between the evaluation of the udder of first-calf cows carried out at 3-4 months of lactation and the milk yield of cows for 305 days of lactation. The highest value of the correlation coefficient was observed in the cross-linked first-calf cows of the V. B. A x S. T. R. and S. T. R. x R. S. groups, as well as in the first-calf cows of the pure R. S. line; these groups exceeded the analogs of the V. B. A. line by 0.17-0.24 %.

Table 2-Distribution of experimental groups of cows by udder shape

Group		Total number of animals	Quantity	Udder shape	
M	F			cup-shaped	rounded
R. S. x V. B. A.		23	animals	3	20
			%	13	87
V. B. A. x S. T. R.		23	animals	11	12
			%	48	52
S. T. R. x V. B. A.		24	animals	-	24
			%	-	100
S. T. R. x R. S.		20	animals	10	10
			%	50	50
Pure line					
R. S.		27	animals	18	9
			%	67	33
V. B. A.		20	animals	1	19
			%	5	95

Analysis of cow udder shapes (Table.2) revealed that in "Zarya" JSC first-calf cows are mainly characterized by a rounded udder shape. Thus, out of the 6 analyzed groups, three groups of first-calf cows (R. S. x V. B. A., S. T. R. x V. B. A. and pure line V. B. A.) had a predominantly rounded udder shape, the percentage of occurrence of this udder shape was 87%.

In the groups of V. B. A x S. T. R. and S. T. R. x R. S., the distribution of cows by udder shape is equal, i.e., the percentage of occurrence of a cup-shaped udder is equal to the percentage of cows with a rounded udder shape (about 50%).

And in the only group of first-calf cows of the R. S. pure line, the proportion of cows with a cup-shaped udder exceeds the group of cows with a rounded udder by 34%.

Table 3 - Indicators of udder measurements of cows of experimental groups, $\bar{x} \pm m_x$

Group		Udder measurements, cm									
		before milking					after milking				
		udder length	udder width	udder circumference	depth of the front udder parts	depth of the rare udder parts	udder length	udder width	udder circumference	depth of the front udder parts	depth of the rare udder parts
M	F										
R. S. x V. B. A.		27,3 ± 0,1	23,7 ± 0,7	85,2 ± 4,1	21,2± 0,2	23,2 ± 0, 2	24,2 ±0,4	21,6 ±0,1	83,3 ±8,1	19,8 ±0,1	20,6 ±0,3
V. B. A. x S. T. R.		31,1** ± 0,3	28,8* ±0,4	109,5 ±3,9	25,4 ± 0,1	26,4 ± 0,2	29,1 ±0,2	25,4 ±0,2	95,4 ±4,5	23,3 ±0,1	24,4 ±0,1
S. T. R. x V. B. A.		26,2* ± 0,4	22,3** ±0,1	84,4 ±8,2	20,5 ± 0,2	21,3 ± 0,3	23,4 ±0,2	20,6 ±0,1	82,4 ±7,3	18,5 ±0,1	19,8 ±0,1
S. T. R. x R. S.		27,4 ± 0,1	24,1 ± 0,3	90,1 ±7,5	22,6 ± 0,3	22,2 ± 0,1	25,5 ±0,4	22,1 ±0,3	87,0 ±5,5	20,2 ±0,3	19,2 ±0,2
Pure line											
R. S.		32,3 ± 0,1	28,5 ±0,2	108,7 ±7,3	26,7± 0,1	28,1 ± 0,1	30,2 ±0,1	26,6 ±0,2	98,5 ±4,1	24,0 ±0,2	26,3 ±0,2
V. B. A.		25,5 ± 0,2	21,3 ± 0,2	82,3 ±4,1	19,8 ± 0,2	20,8 ± 0,1	23,6 ±0,2	19,9 ±0,2	79,4 ±3,2	17,7 ±0,1	18,4 ±0,1

* - P<0.01; **P <0,1

Characterizing cows by udder size (Table.3) you can note the following: two groups of first-calf cows have the best indicators of udder development – these are the cross lines of V. B. A. x S. T. R. and the pure line of R. S. All measurements of the udder of these groups are 2-26 cm higher than similar measurements of the udder of cows of other groups.

It should be noted that the "mirror" crosses of V. B. A. x S. T. R. and S. T. R. x V. B. A., which differ from the maternal and paternal sides, have far from similar indicators. The differences in all the analyzed features are significant and are in the range of 4-25 cm.

And at the same time, in those crosses where the paternal side acts as a line of V. B. A., the indicators of the groups are quite close, so the udder measurements of the groups of cows R. S. x V. B. A.; S. T. R. x V. B. A. and V. B. A. differ by 1-2 cm.

Table 4-The size of the udder of cows of the experimental groups

Group		Udder size, cm ²		Udder cisterns decreasing, %
M	F	before milking	after milking	
R. S. x V. B. A.		1870,3 ± 123,2	1619,1 ± 117,8	13.4
V. B. A. x S. T. R.		2780,5 ± 105,6	2233,5 ± 100,3	19.7
S. T. R. x V. B. A.		1722,8 ± 160,7	1517,3 ± 118,1	12.0
S. T. R. x R. S.		1980,1 ± 127,5	1697,2 ± 119,3	14.3
Pure line				
R. S.		2916,0 ± 111,2	2450,1 ± 120,9	16.0
V. B. A.		1599,4 ± 110,1	1383,4 ± 109,8	13.5

It is natural that the size of the udder of cows, calculated on the basis of measurements, has interrelated trends in improving the indicators of the groups of V. B. A. x S. T. R. and the pure line of R. S. The first-calf cows of the above groups were characterized by the size of the udder before milking at the level of 2848.3 cm², which is 868.2 – 1248.9 cm² more than in the herdmates of other groups. The average size of the udder after milking in the groups of V. B. A x S. T. R. and the pure line of R. S. was 2341.8 cm², which is 644.6 – 958.4 cm² more than in the herdmates. That is, even by the difference in the size of the udder after milking, you can notice a large cows udder cisterns decreasing of the groups V. B. A x S. T. R. and the pure line of R. S.

Analyzing the percentage of cow's udder cisterns decreasing after milking in the whole herd, it should be noted that in this farm the cows udder cisterns decreasing is slightly lower than in other farms analyzed by us. For example, the black-and-white first-calf cows of Viktorovskoe LLP had a percentage of udder cisterns decreasing after milking at the level of 23-35%, i.e. 9-21% higher than the first-calf cows of Zarya JSC [3, pp.43-50].

Conclusion. Our studies of the morphological qualities of the udder of first-calf cows of different cross lines, as well as pure line cows, revealed very significant differences between the experimental groups. Thus, the best udder development was achieved by the cows of the cross lines Vis Back Ideal with Siling Traijun Rokit, as well as the cows of the pure line Reflection Sovering. It is characteristic that the "mirror" cross Siling Trijun Rokit with Vis Back Ideal had indicators of udder development slightly worse. Therefore, we can conclude that in "Zarya" JSC the greatest influence on the development of the morphological qualities of the udder has the paternal side, namely the selection of the service bull. At the same time, the use of service bulls of the Vis Back Ideal line in this herd negatively affects the development of the udder of cows after the first lactation. The indicators of the udder size before milking in the groups of cows with the paternal side of the V. B. A. are 868.2-1248.9 cm² lower than in their herdmate.

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