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EFFICIENT METHODS IN BREEDING DAIRY CATTLE OF THE REPUBLIC OF KAZAKHSTAN

Abstract. 10077 heads of cows, daughters of 117 bulls belonging to 38 lines of 4 dairy breeds: Alatau, Holstein Black-and-white, Black-and-white,and Red Steppe were monitored. In terms of breeds, mothers of daughters of the selected Alatau bulls have had average productivity of 5515±170 kg, the Holstein black-and-white - 7871±182 kg, Black-and-white - 5741±149 kg, and the Red Steppe - 3917±104 kg. It was established that the average productivity of dairy cows in the republic of all types of farms was 5039±31 kg. The highest productivity of Holstein cows is 5280±67 kg, the smallest - of Red Steppe breed cows - 3518±38 kg. The difference between the productivity of Holstein and Alatau was 436 kg, with Black-and-white - 344 kg, with the Red Steppe - 1762 kg (P>0.999). In terms of fat and protein, cows of the Red Steppe breed have the highest rates (3.96±0.02% and 3.30±0.03%, respectively). In terms of fat content, cows of the Red Steppe breed prevail over the Alatau breed by 0.22% (P>0.999), over the Holstein - by 0.23% (P>0.999), over the Black-and-white - by 0.31% (P>0.999), the excess in protein content was: over Alatau by 0.11% (P>0.99), over Holstein - by 0.12% (P>0.99), over Black-and-white - by 0.25% (P>0.999).

In the age aspect, it was established that dairy productivity is characterized by growth (4844...5679...5458 kg) by the second or third lactation and a gradual decrease (4716...4017 kg) by the fifth lactation, i.e. this breed is characterized by a constant milk yield level. On average, for all lactations, cows of this breed gave 5123±275.4 kg of milk. The nature of the dairy productivity flow of cows of the Black-and-white breed has a peculiar specificity. So, starting from the first lactation, when there was a maximum milk yield (4936±231 kg), then there was a gradual decrease by the fifth lactation, where the lowest productivity was noted. Nevertheless, the average milk yield for all lactations was 4671±190 kg, i.e. the potential of this breed is seen, as evidenced by the variability of this selection trait (32.0...50.7%). The productivity of Red Steppe breed cows of different genotypes averaged - 3904 kg of milk, fat content - 3.77%, and live weight - 487 kg. The yield of crossbred cows is higher than those of purebred Red Steppe by - 280-365 kg. The coefficient of full value of lactation in the Red Steppe of different genotypes is within 63.77-69.83%, in the Black-and-white - 69.17%, the index of the full value of lactation is within 83.7-93.6% and 94.97%.

Keywords: selection,breeding, assortment, breeding value of cows, linear assessment of the exterior, milk yield, milk composition.

Introduction. In the modern dairy cattle breeding of our country, the main task of zootechnic science and practice is the further intensification of the industry, aimed at increasing the genetic potential of the productive qualities of domestic animals and the degree of its realization. The development of molecular biology, population genetics, biotechnology, the development and implementation of large-scale selection, the use of computer programs for analyzing selective information have enriched the arsenal of tools for studying biological patterns and managing animal heredity, breed-formation processes [1].

However, it does not mean that the methods of individual selection, which are key for creating new highly productive herds, lines, families, and obtaining animals with record numbers, have lost their value. A detailed study of intrabreed structures, in particular, breeding herds on selective and genetic parameters in dynamics, on a certain ecological background, will allow to assess the gene pool of the breed and to give a theoretical justification for its qualitative improvement, avoiding the "selection plateau", to maintain the necessary level of variability of herds, while simultaneously increasing the productivity of herds [2].

F.F. Eisner [3] considered individual selection in breeding herds to be the most important element in breeding work. Recognizing the role of modern programs based on population genetics methods, he repeatedly stressed that the greatest effect in improving the hereditary qualities of dairy cattle can be achieved with a reasonable combination of large-scale and in-depth individual selection.

A similar opinion is shared by L.K. Ernst et al. [4]. They considered it necessary to persistently search for ways to accelerate the selection process in accordance with the requirements of scientific and technological progress, to develop new efficient technologies that would contribute to the greatest realization of the genetic potential of animals. The search should go both in the direction of improving the efficiency of individual ways and methods of selection, and along the lines of developing more advanced organizational forms of breeding. Breeding work is a work for the future, and it should be carried out on the basis of clear scientific developments and long-term forecasts.

Genetic progress of the population is provided by the best animals - the prepotent bulls - leaders, the cows - champions. Researchers point out the lack of data on methods for breeding cows-champions, their use, heritability and repeatability of the most important breeding traits. The study and generalization of the methods of creating outstanding animals will justify the recommendations for their planned obtaining [5].

The essence of agrarian reform consists in a set of socio-economic and organizational measures aimed at transforming production relations, ensuring the growth of efficiency of agriculture and agro-industrial production as a whole, which should be reflected in creating conditions for the expanded reproduction of agricultural raw materials and food and improving the level and quality of life of rural residents.

Dairy cattle breeding cannot develop without solving problems of forming the effective herd, taking into account the genetic potential of dairy productivity and reproductive qualities, equipping with modern technologies of dairy cattle breeding and strong forage base. Sequential intensification and enhancement of the efficiency of dairy cattle breeding are impossible without an increase in the productivity of cows. In turn, the increase in productivity is impossible without special elaborations of a recommendatory nature in order to improve the economic efficiency of breeding dairy cattle [6].

The economic efficiency of cattle breeding reflects the ratio of production results (production and income) with the number of resources used (labor, fodder and other means of production and services) and costs. Under the conditions of the market economy, indicators of cost recovery, profit,and profitability are essential as a basis for the guarantee of simple and expanded reproduction. In assessing the effectiveness of cattle breeding in Russia, it is important to take into account the peculiarities of the formation of a multi-pattern agriculture during the period of transformations and management, and the analysis should be carried out not only as a whole, but also in the context of farm categories that have different conditions and economic management mechanisms. The development of animal husbandry is essential not only for balanced nutrition of the population, but also for ensuring the food security of our country. Modernization of selective and technical potential in dairy cattle breeding is a priority condition for the improvement of the economic efficiency of domestic and foreign cattle breeding [7].

Growing calves and increasing business output is an important factor in the reproduction of dairy cattle livestock, affecting the profitability of milk production. Despite this, calf losses on dairy complexes are quite high [8, 9].

The calves management approach depends not only on the size of the enterprise, but also on the selected technology of their feeding. The ways of calves maintenance are planned in such a manner as to create comfortable conditions during all periods of growth and development, taking into account the natural and climatic features of the environment, as well as the capabilities of the equipment for ventilation of the premises and reduction of microbial dissemination [10, 11].

Crossing the animals of the Swiss breed with local cattle and further “inter se” breeding the crossbreeds led to the creation of large areas of brown cattle in various zones of the country, differing in productivity and body build. This was the basis for the isolation of several zonal breeds originating from Swiss cattle from the common brown cattle array. Thus, 5 breeds were emphasized: Kostroma, Alatau, Lebedin, Caucasian brown, and Brown Carpathian cattle [12].

Alatau brown cattle breed was obtained by crossing local animal breeds with Swiss breed. Therefore, the use of Swiss on cattle of Alatau breed contributed to the improvement of the morphological and physiological properties of the udder of cows. The crossbreeds needed to improve the uniform develop-

ment of udder fractions, the size of the nipples and milk flow rate. Alatau brown breed is less suitable for direct economic use in industrial complexes, but it serves as excellent breeding material for obtaining animals (at the industrial crossing with Swiss) [8].

The theoretical basis of modern breeding is population genetics, based on the combinational variability of characters and knowledge of the patterns of their inheritance. Over the past decades, considerable potential has been accumulated in this area, the use of which makes it possible to work in the right direction, to predict the effect of breeding programs, modeling them with an accurate calculation of the average for cows of the same age totally in the breed [5, 6].

Due to the significant variability of environmental conditions and nonadditive inheritance of milk production, according to some researchers, the productivity of ancestors is not a reliable criterion for the value of their offspring. One of the ways to improve the accuracy of cows estimation is to take into account the greatest possible number of environmental factors, fluctuations in dairy productivity by lactation, heritability, standard deviations, repeatability.

Therefore, the search for rational use of the gene pool of breed capable of improving the Alatau, Black-and-white and Red Steppe breed is currently relevant.

The aim of the research. Formation of the information base of initial data on dairy cattle populations from various regions of Kazakhstan with the determination of the population in each breed and productivity, analysis of the used bulls of the Swiss, Holstein, Danish Red and Angler breeds while improving the productive qualities of the Alatau, Black-and-white, and Red Steppe breeds.

Research methods. The objects of the research were breeding stocks, as well as servicing bulls of experimental farms in different regions of Kazakhstan. Materials for research were documents of primary zootechnic and breeding accounting (from the IAS system), as well as the results of experimental studies, visual assessment, measurements, and control milkings of animals. For the analysis of dairy productivity, live weight and genealogy, the data of breeding and zootechnic accounting of the farm were used. All cows were in the same feeding and maintenance conditions. Cows were fed with adopted in the farm fodder.

When breeding, it is important to know the general phenotypic variability of productive traits. It consists of genotypic and paratypic variability. From genotypic factors, we investigated the variability of productive indicators of the ancestors of the studied cows.

We have studied the following:

- dairy productivity - according to breeding records and control milkings;
- the nature of lactation curves was estimated by the coefficient of lactation constancy (CLC) - which is defined as the percentage ratio of the yield sum of 4–6 months to the amount of 1–3 months.

Digital material was processed by the methods of variation statistics proposed by G.F. Lakin [13] and D.A. Baimukanov et al. [14].

Research results. One of the reasons for the low efficiency of selection work with dairy cattle in Kazakhstan is the use of low-quality breeding material. Indeed, the absence of breeding material is a brake on the development of dairy cattle breeding. Farmers rarely use quality breeding material from leading manufacturers. The regulations adopted in Kazakhstan in recent years in the field of animal husbandry created real prerequisites for the preservation and increase of the livestock gene pool.

Monitoring of domestic and imported dairy cattle. Monitoring of dairy cattle of the Alatau breed was carried out in experimental farms of various regions of Kazakhstan.

The problem of domestic dairy cattle breeding is an outdated system of integrated assessment of animal breeding qualities. So far, in Kazakhstan, the methodology of integrated assessment is based on the obsolete principles of grade scaling of the phenotypic values of individual economic traits. As a result, it is not possible to objectively rank the animals for the main complex of economic traits, which, ultimately, violates the optimality of the formation of breeding animal groups and reduces the rate of genetic improvement of populations in general.

We have analyzed the genealogical affiliation of the studied animals (table 1) using the downloaded data from the IAS program.

As can be seen from the data of table 1, 10077 cows, daughters of 117 bulls belonging to 38 lines of 4 dairy breeds were monitored: Alatau, Holstein black-and-white, Black-and-white and Red Steppe. In terms of breeds, mothers of daughters of the Alatau breed selected bulls have had average productivity of

Table 1 – Productive indicators of experimental animals in the context of lines and breeds

Breed	Lines	Number of bulls-fathers	Number of their daughters	Milk yield of the fathers' mothers	Milk yield of the daughters' mothers
Holstein black-and-white	Adema 197	3	241	11596	19759±158
	Annas-Adema 30587	2	193	13327	5925±201
	Wis Ideal 933122	4	306	14811	7261±144
	Wis Back Ideal 1013415	5	320	12014	6999±99
Holstein black-and-white	Montvik Chieftain	5	334	12411	7201±185
	Master family group 106902	2	135	10168	6233±102
	Meridian f.g.	1	28	11785	5920±121
	West Lawn	2	428	12433	6935±155
	Reflection Sovereign 198998	5	398	12928	7299±117
	Sealing Trigun Rokit	2	211	11603	6457±112
	Wis ideal 933122	2	178	12841	8400±88
	HiltyesAdema	2	217	12173	6055±99
Total for the Holstein Black-and-white breed		35	2989	12341	7871±182
Alatau	Concentrate group	8	553	11109	5369±124
	Kylian 181455	2	56	10245	6016±89
	Course line 197970	2	150	11261	4811±158
	Meridian	8	361	10868	5283±142
	Oregon 86356	1	46	11192	5550±177
	Master group 106902	9	373	11318	6029±82
	Taddy 76BS9013	4	452	10147	5802±201
	West Lawn	11	646	11497	5757±141
	Hiltyes Adema	2	76	11217	5021±122
Total for the Alatau breed		47	2713	10984	5515±170
Black-and-white	Adema197	5	480	12583	5765±99
	Annas-Adema 30587	5	683	12242	5359±102
	Ansturm 53	1	79	9720	3720±158
	Wis Ideal 933122	4	747	11004	5493±144
	Wis Back Ideal 1013415	3	152	10355	6392±122
	Montvik Chieftain	2	93	8270	5095±98
	West Lawn group	2	270	11125	4815±102
	Reflection Sovereign 198998	2	177	10668	7785±148
	Sealing Trigun Rokit	2	333	9685	5350±162
	Wis ideal 933122	1	67	12412	6915±158
	Hiltyes Adema	4	292	12807	6478±112
Total for the Black-and-white breed		26	3373	10828	5741±149
Red Steppe	115 (by Angler)	1	52	6200	4005±111
	29 (Danish Red)	1	42	6575	3750±88
	98 (by SPE)	1	165	6780	3922±102
	Vala 4930	1	64	6450	3890±112
	Ogestida group	3	513	7220	3769±99
	Cavalier group 160273	2	166	7670	4170±101
Total for the Red Steppe		9	1002	6816	3917±104
For all breeds		117	10077	10706	6043±92

5515±170 kg, of the Holstein black-and-white - 7871±182 kg, of the Black-and-white - 5741±149 kg and of the Red Steppe - 3917±104 kg.

During the monitoring of dairy breeds, we studied the productive indicators of cows of the basic farms breeding the Alatau breed.

In Adal AIC JSC, it is established that cows of the nuclear stock produce 7983.7±76.4 kg of milk, the selection group is 6847.1±84.5 kg (table 2).

Table 2 – Productivity of the Alatau breed cows in JSC Adal AIC

No	Group	Heads	Milk yield, kg
1	Nuclear stock	42	7983.7±76.4
2	Selective group	175	6847.1±84.5

On the average, in the herd, Alatau cows produced milk in the amount of 7457.9±75.9 kg, with a fat content of 3.83±0.07%.

Scientists [15, 16] found that the average dairy productivity of cows for all lactations correlates well with the milk yield for the highest lactation.

When estimating cows for productivity, they took into account the influence of environmental factors. This is due to the fact that heifers grown in unsatisfactory conditions will never become highly productive cows, even if they come from high-priced parents [19, 20].

Because of the lack of forage and its low quality, the genetic potential of animals is often realized in farms only by 40–80%. [17].

The number of livestock projects provides for the zero grazing of calves up to 3 months of age in individual narrow-sized cages. This method of keeping calves can significantly increase the density of animals [18].

Studies of cows in Tauelsizdik LLP and Adal AIC JSC were conducted in a herd, where the level of dairy productivity by the first lactation exceeded the I class standard on average on 1213 kg, or 47.6%, by the full age lactation - by 787 kg, or 23.3% (table 3).

Table 3 – Dairy productivity of cows in the experimental farms

Lactation by the order	Farms	Indicators				
		Milk yield, kg			Fat content, %	
		n	$X \pm m_x$	C_v	$X \pm m_x$	C_v
First	Tauelsizdik LLP	72	4430±60	9.5	3.99±0.01	5.9
	Adal APC LLP	82	4734±97	15.4	3.78±0.01	2.3
Third and older	Tauelsizdik LLP	83	4666±94	13.1	3.95±0.01	4.7
	Adal APC LLP	349	4996±81	21.7	3.79±0.03	1.9

In terms of dairy productivity, cows of all ages in the Adal AIC JSC (n=431) comply with the standard of the Alatau breed in the Republic of Kazakhstan. As for lactations: the first exceeds the breed standard on 534.4 kg, the second - on 246 kg and by the third lactation - at the level of the first-class standard. As for the fat content - 0.19% and the yield of milk fat - in the first lactation - on 28.75 kg, in the second - on 17.22 kg and in the third - on 8.67 kg. The average productivity of the herd of 431 cows was 4915 kg of milk and 3.79% of fat. When converting to the breed standard from 3.6% milk fat content, the dairy productivity of the herd of Adal LLP is 5175 kg of milk per cow. The same trend is observed in cows of Tauelsizdik LLP (n=155).

A comparative analysis of dairy productivity showed that the cows of Adal LLP significantly ($P>0.95$) exceeded the productivity of the cows of Tauelsizdik LLP in first-calf cows on 304 kg, and in full-aged - on 330 kg.

Lactation is a function of the entire organism. In ensuring the process of milk formation, systems (nervous, endocrine, digestive, circulatory, respiratory, and others) work. Their cooperation is based on

the principles of dynamic organization and is aimed at ensuring the full functioning of the breast (milk gland). Under normal conditions of feeding and maintenance of cows, as a rule, daily milk yield in the first time after calving tend to increase and reach a maximum by the middle of the second, at the end of the first month. For high-yielding cows, the period of time required to achieve maximum productivity is usually longer than for low-yielding ones.

We investigated the nature of lactation of cows in experimental farms in terms of the coefficient of lactation full value (table 4).

Table 4 – Lactation activity of first-calf cows

Indicator	Farms	
	Adal APC LLP	Tauelsizdik LLP
Number of heads	100	100
Milk yield for the first 100 days, kg	2525±102	2190±91
Milk yield for thefurther 100 days, kg	2020±89	1752±111
Milk yield for 305 days, kg	4734±97	4430±60

As established by the data in table 4, with a significant difference (P>0.95) of dairy productivity in the lactation segments, the CLC did not differ.

At the present stage of work, the realization of the high genetic potential of dairy cattle is crucial. To successfully accomplish this task, along with improving the feeding and maintenance conditions, it is necessary to provide a scientific justification for the degree of influence of genetic and phenotypic factors on the formation and realization of productive qualities. The leading place in selective programs is occupied by dairy productivity.

The level of dairy productivity depends on the hereditary traits and conditions under which the animals are. In cows with approximately the same heredity, under the influence of various environmental conditions, the formation of traits proceeds unequally, and vice versa, under the same external factors, animals with different genotypes differ in productive qualities.

We analyzed the yield and milk composition of domestic and imported dairy cattle breeds of the country based on the uploaded data on the productivity of cows who completed lactation in 2017 (table 5).

Table 5 – Indicators of dairy productivity of the first-calf cows (uploaded from the IAS)

Breeds	Heads	Milk yield, kg		Fat, %		Protein, %		Somatic cells, thousand	
		$X \pm m_x$	Cv	$X \pm m_x$	Cv	$X \pm m_x$	Cv	$X \pm m_x$	Cv
Alatau	2713	4844±62	66.7	3.74±0.04	8.6	3.19±0.03	8.6	542.2±57.2	83.1
Holsteinblack-and-white	2989	5280±67	69.4	3.73±0.02	14.9	3.18±0.02	13.5	302.2±7.3	65.2
Black-and-white	3373	4936±31	36.5	3.65±0.05	15.3	3.05±0.05	19.5	444.1±101.7	247.8
Red steppe	1002	3518±38	34.2	3.96±0.02	5.4	3.30±0.03	9.9	387.9±17.1	50.9
Total/at average	10077	5039±31	61.8	3.75±0.03	13.4	3.18±0.02	13.4	343.7±22.2	85.0

According to table 5 data, it can be seen that the average productivity of dairy cattle of the republic of all types of farms was 5039±31 kg. It has been established that the highest productivity in Holstein cows is 5280±67 kg, the lowest in cows of the Red Steppe breed - 3518±38 kg. The variability trait of the milk yield for lactation is rather high, especially in cows of the Holstein black-and-white and Alatau breeds (66.7–69.4). Apparently, this is due to the high intralinear variability of this trait.

The difference between the productivity of Holstein and Alatau was 436 kg, with Black-and-white - 344 kg, with Red Steppe - 1762 kg (P>0.999). In terms of fat and protein, cows of the Red Steppe breed had the highest rates (3.96±0.02% and 3.30±0.03%, respectively).

In terms of fat content, cows of the Red Steppe breed prevail over the Alatau by 0.22% (P>0.999), over the Holstein - by 0.23% (P>0.999), over the Black-and-white - by 0.31% (P>0.999), the excess in protein content was: over the Alatau by 0.11% (P>0.99), over the Holstein - by 0.12% (P>0.99), over the

Black-and-white - by 0.25% (P>0.999). In terms of the number of somatic cells, the milk of all cows is within the norm.

The duration of the economic use of cows is one of the important indicators in the system of herd reproduction - a comprehensive production process, including a complex of organizational, economic, veterinarian, technological measures. Productivity and reproductive abilities of animals are primary components of economically useful traits, according to which the selection should be conducted. This issue is covered by the works of the scientists [19, 20].

We analyzed the data of dairy productivity of cows of the studied breeds depending on age.

Indicators of the dairy productivity of theAlatau breed are presented in table 6.

Table 6 – Indicators of the dairy productivity and milk composition of the Alatau breed

Age, in lactation	Number of heads	Milk yield, kg		Fat, %		Protein, %		Somatic cells, thous./cm^3	
		X ± m_x	Cv	X ± m_x	Cv	X ± m_x	Cv	X ± m_x	Cv
1 lactation	833	4844±61	36.3	3.74±0.04	8.6	3.19±0.03	8.6	542.2 ± 57	83.1
2 lactation	779	5679±59	29.0	3.77±0.04	8.5	3.22±0.03	8.1	490.6 ± 57	89.3
3 lactation	483	5458±67	27.0	3.76±0.04	6.8	3.22±0.04	7.3	802.0±155	116.2
4 lactation	457	4716±69	31.3	3.79±0.05	8.3	3.23±0.05	8.6	785.3±89	66.2
5 lactation	161	4017±120	37.9	3.93±0.11	10.0	3.29±0.10	10.3	673.6±181	93.2
On average	2713	5123±42	42.7	3.77±0.05	8.5	3.22±0.05	8.6	622.4±95	87.6

As can be seen from the data of table 6, the dairy productivityis characterized by growth (4844...5679...5458 kg) by the second or third lactation and a gradual decrease (4716...4017 kg) by the fifth one, i.e. this breed is characterized by a constant yield level, which confirms its high resistance to stress. On average, for all lactations, cows of this breed have given 5123±275.4 kg of milk.

Dairy cattle are distinguished by a sufficiently long duration of biologically possible longevity, but the biological potential of dairy cows is not always used. Therefore, the important assessment of the animals is the amount of products obtained during the period of their use. High lifetime productivity of cows is a consequence of the proper development and functioning of all organs and systems of the vital activity of the animal during the entire period of its use.

Somewhat different picture is observed in the study of dairy productivity in the context of lactation in Holstein cows (table 7).

Table 7 – Indicators of the dairy productivity and milk composition of the Holstein breed

Age, in lactation	Number of heads	Milk yield, kg		Fat, %		Protein, %		Somatic cells, thous./cm^3	
		X ±m_x	Cv	X±m_x	Cv	X±m_x	Cv	X±m_x	Cv
1 lactation	1130	5280±67.6	34.4	3.73±0.02	14.9	3.18±0.02	13.5	302.2±7.3	65.2
2 lactation	912	5502±85.4	37.5	3.78±0.02	11.6	3.22±0.02	12.5	274.2±5.3	47.0
3 lactation	557	5598±98.1	33.1	3.76±0.02	9.2	3.21±0.01	8.7	313.4±14.9	89.6
4 lactation	247	5650±159.3	35.4	3.74±0.04	12.6	3.21±0.03	11.7	297.2±16.4	69.3
5 lactation	143	6139±213.1	33.1	3.79±0.03	8.8	3.25±0.03	7.9	256.7±15.4	57.3
On average	2989	5479±93.3	35.1	3.75±0.02	12.3	3.20±0.02	11.8	293.0±9.5	63.7

As can be seen from the data of table 7, the dairy productivity of Holstein cows increases by the fifth lactation, without recessions, that is typical for this, the most milking, breed.

The nature of the dairy productivity of the Black-and-white cows (table 8) has a peculiar specificity.

So, starting from the first lactation, when there was a maximum milk yield (4936±231 kg), then there was a gradual decrease by the fifth lactation, where the lowest productivity was established, which confirms the increased reaction of this breed to stressful environmental factors. Nevertheless, the average milk yield for all lactations was 4671±190 kg, i.e. the potential of this breed could be seen, as evidenced by the variability of this selection trait (32.0–50.7%). When working with this breed, it is necessary to strengthen the selection according to the dairy production and milk composition.

Table 8 – Indicators of the dairy productivity and milk composition of the Red Steppe breed

Age, in lactation	Number of heads	Milk yield, kg		Fat, %		Protein, %		Somatic cells, thous./cm^3	
		$X \pm m_x$	Cv	$X \pm m_x$	Cv	$X \pm m_x$	Cv	$X \pm m_x$	Cv
1 lactation	843	4936±231	50.7	3.65±0.05	15.3	3.05 ± 0.05	19.5	444.1 ± 101.7	247.8
2 lactation	872	4692±191	44.9	3.77 ±0.03	9.5	2.97 ± 0.06	23.3	293.5 ± 26.6	99.9
3 lactation	778	4811±157	34.1	3.75 ±0.04	10.1	3.14 ± 0.05	18.0	408.1 ± 64.5	164.3
4 lactation	490	4493±174	32.0	3.81 ±0.03	6.4	2.97 ± 0.10	26.5	289.1 ± 27.2	77.7
5 lactation	390	3989±180	33.3	3.85 ±0.03	5.2	3.23 ± 0.04	8.8	241.7 ± 8.9	26.9
On average	3373	4671±190	40.6	3.75 ±0.04	10.1	3.06 ± 0.06	19.3	367.7 ± 62.1	141.7

We investigated the productive qualities and exterior indicators of cows of different genotypes of the Red Steppe breed in the experimental farm of Ulguli LLP (table 8).

The productivity of the Red Steppe cows of different genotypes averaged - 3904 kg of milk yield, fat content - 3.77%, and live weight - 487 kg.

The yield of crossbred cows is higher than that of purebred Red Steppe by - 280-365 kg (table 9).

Table 9 – Ethological indicators of the first-calf cows of different genotypes, (M±m)

Indicator, min.	Purebred Red Steppe		Red Steppe X Angler		Red Steppe X Danish Red		Red Steppe X Holstein Red-and-white	
	day	night	day	night	day	night	day	night
Number of heads	3	3	3	3	3	3	3	3
Standing, total:	486.3±0.6	260.2±0.5	470.2±1.5	240.3±1.7	468.8±7.8	251.4±	457.2±2.4	247.2±0.7
Including without action	88.4 ±0.5	70.2±0.6	80.1±1.6	69.2±0.9	89.0±0.25	69.0±0.4	88.6±0.6	66.7±0.5
Feed intake	238.6±0.5	75.1±0.2	240.4±0.3	75.8±0.7	242.6±0.3	86.1±0.3	245.7±0.4	89.6±0.5
Water intake	11.4±3.4	4.6±2.9	11.9±1.5	4.8±3.5	12.0±4.3	5.0±1.7	13.4±2.3	6.8±2.6
Merycisin, total	147.9±0.6	270.6±0.3	148.8±0.5	272.4±0.4	148.6±0.2	281.6±0.6	150.1±0.4	296.0±1.0
Including lying	84.3±0.8	72.1±0.8	85.1±0.7	73.1±1.5	94.2±0.74	73.9±0.8	98.1±2.9	75.1±0.42
standing	60.7±0.6	11.6±9.8	204.2±1.51	6.91±2.3	61.3±1.7	206.2±1.2	62.4±0.4	215.6±
Comfortable standing movements	10.6±4.1	6.07±4.4	11.4±3.83	7.2±3.64	11.2±15.2	7.0±5.1	12.7±2.8	14.2±1.6
Lying, total:	114.8±0.74	300.1±0.3	115.4±0.2	306.3±0.1	116.4±1.2	310.4±0.1	131.4±0.9	430.1±0.2
Including without action	40.2±0.06	102.4±0.08	42.4±0.21	102.8±0.24	45.8±0.31	104.6±0.4	47.6±0.24	108.8±0.4
Sleep	7.8±3.4	80.7±0.7	6.7±0.74	88.6±0.31	6.0±1.7	96.4±0.5	6.9±0.92	99.7±0.4
Comfortable lying movements	3.2±3.1	6.4±3.4	4.6±1.1	6.9±2.6	4.8±2.81	6.0±4.3	4.6±3.4	5.0±5.3
Milking	7.8±3.4		8.0±0.7		9.1±1.03		8.2±0.7	
Walking	86.1±0.6	24.0±1.6	84.2±1.0	25.1±11.2	82.7±1.1	16.0±0.6	68.0±0.7	16.8±4.3
Defecation	6.0±1.7	7.6±2.4	6.2±0.8	7.8±2.3	6.6±0.7	7.8±2.3	7.1±0.1	8.0±0.03
Urination	7.4±0.7	6.9±0.2	7.2±0.5	7.6±2.9	7.0±1.2	7.8±2.3	7.2±3.1	7.6±4.3

For the study of the dairy productivity after calving, the analysis of the lactation activity of heifers of the Red Steppe and Black-and-white breeds of different genotypes was carried out, the lactation activity was studied (table 10).

Table 10 – Lactation activity of first-calf cows in Ulguli LLP

Indicators	Purebred Red Steppe	Crossbred Red	Crossbred withHolstein Red-and-white
Number of heads	20	20	20
Milk yield for the first 100 days, kg	1338	1378	1372
Milk yield for thefurther 100 days, kg	1336	1313	1161
Milk yield for 305 days, kg	3669	4049	4173

CFL in the Red Steppe cows of different genotypes is in the range of 63.77-69.83%, in the Black-and-white cows - 69.17%, IFL - in the range of 83.7-93.6% and 94.97%. The animals had a steady curve by the months of lactation.

Ethological studies were conducted on cows of different genotypes of the Red Steppe and Black-and-white breeds (table 11). During the ethological studies, it was established that experimental animals differed in certain regularities of the daily regime. During the daytime, the crossbred first-calf cows with the blood of the Red-and-white Holsteins, spent 30% more time to feed intake, 17.5% more time to water intake and they had a significant superiority over mates of the Red Steppe breed.

Table 11 – Udder measurements of the experimental first-calf cows

Indicator, cm	Ulguli LLP					
	Purebred Red Steppe		Crossbred Red		Crossbred with Holstein Red-and-white	
	before milking	after milking	before milking	after milking	before milking	after milking
Length	34.4±0.06	32.5±0.08	36.3±0.02	32.6±0.09	37.4±0.03	31.6±0.04
Width	24.9±0.1	21.7±0.07	33.1±0.06	29.3±0.04	34.3±0.06	30.7±0.07
Girth	109.8±0.03	104.3±0.15	117.6±0.11	109.9±0.12	119.3±0.04	108.3±0.06
Depth	30.0±0.08	28.7±0.09	41.2±0.17	44.6±0.08	43.1±0.06	44.8±0.12
Nipples length	6.6±0.23	–	6.2±0.16	–	6.4±0.07	–
Nipples diameter	2.7±0.07	–	2.9±0.21	–	3.0±0.07	–
Distance between the front nipples	12.9±0.05	–	13.1±0.05	–	13.9±0.03	–
Distance between the rear nipples	8.6±0.02	–	12.6±0.08	–	11.8±0.02	–
Distance between the front and rear nipples	13.1±0.07	–	12.6±0.08	–	12.2±0.09	–
Uddercapacity, dm^3	34.7±0.09	–	35.8±0.11	–	36.4±0.11	–
milk flow rate, kg/min	1.64±0.36		1.78±0.21		1.89±0.07	
Udderindex, %	48.6		49.2		50.4	

The first-calf Danish Red cows spent more time on merycisin by 4.1%, the Holstein Red-and-white breeds - by 9.4%, including lying - 11.7% and 16.4%, respectively. On the rest, crossbred first-calf cows of Holstein red-and-white breed spent more time by 14.6-43.3%. Danish Red crossbred first-calf cows spent more time on sleeping by 19.4%, the Holstein red-and-white cows - by 23.5%, respectively, with a significant difference.

Especially important is the assessment of cows for the quality of the udder and suitability for machine milking [9, 10].

It is necessary to scrutinize more deeply the morphological and functional properties of the udder [11].

The morphological and functional properties of the udder of the Red Steppe breed cows of different genotypes were studied (table 12).

Table 12 – Distribution of the first-calf cows in Ulguli LLP by the shape of the udder, %

Udder shape								
	Purebred Red Steppe		Angler		Danish Red		Holstein red-and-white	
	heads	%	heads	%	heads	%	heads	%
Number of heads	20		20		20		20	
Bath-shaped	–	–	3	15.0	3	15.0	2	10.0
Cup-shaped	5	25	12	60.0	10	50.0	13	65.0
Koundshape	12	60	5	25.0	7	35.0	5	25.0
Goat-shaped	3	15	–	–	–	–	–	–

As can be seen from the data of table 12, the largest number of cows with a bath-shaped udder was for 15% of the Angler cows and 15% of the Danish Red and 30% for the crossbred Holstein red-and-white breed. With the cup-shaped udder, the crossbred Holstein red-and-white cows were 65%, the Angler - 60%, and the Danish Red - 50%. The smallest number of cows with the cup-shaped form was in the Red Steppe purebred - 25%.

Studies have been conducted on the incidence of cows with mastitis depending on the season of the year (table 13). The greatest number of sick cows was in winter, which coincided with calving. Highly productive crossbred cows of the Red Steppe breed of different genotypes are most susceptible to diseases of mastitis, including its clinical form. The crossbred cows in Holstein Red-and-white breed in the winter period had more udder diseases with the clinical form of mastitis by 9.5%.

Table 13 – Incidence of cows with mastitis, depending on the season

Group	Survey edheads	Survey season	Revealed diseases			
			Total		Clinical for mofmastitis	
			heads	%	heads	%
Ulguli LLP						
I (purebred Red Steppe)	57	winter spring	126	21.0 10.5	84	66.7 7.1
II (Red)	145	winter spring	4418	30.3 12.4	197	43.2 38.8
III (Holstein Red-and-white)	35	winter spring	2114	60.0 40.0	169	76.2 64.3

The difficulties of breeding both for milk yield and the main component of milk are related to the fact that these traits, as a rule, have a negative relationship. At present, not only a quantitative increase in dairy productivity but also an improvement in its quality is of great importance [27, 28].

The chemical composition of milk and the yield of its main components for 305 days of lactation were studied (tables 14, 15).

Table 14 – Output and the ratio of the main components of milk for the lactation

Indicator	Ulguli LLP	
	Purebred Red Steppe	Crossbred
Milk yield, kg	3260	3896
Fat	124.2	151.2
Protein	99.8	129.7
Casein	88.7	114.2
Wheyproteins	12.7	17.9
Lactose	159.7	189.7
Dry matter	418.3	513.5
Mineralsubstanceы	23.8	29.6
Nonfatmilksolids	282.6	353.4
Fat-Protein	1.24	1.17
Fat-Nonfatmilksolids	0.44	0.43
Protein-Nonfatmilksolids	0.35	0.37

Table 15 – The chemical composition of milk of cows of different genotypes

Indicators, %	Ulguli LLP	
	Purebred Red Steppe	Crossbred
Numberofsamples	20	20
Milk yield, kg	3641	4027
Fat	3.86	3.90
Protein	3.22	3.35
Casein	2.68	2.83
Wheyproteins	0.39	0.45
Lactose	4.88	4.85
Dry matter	12.76	13.02
Ash	0.74	0.78
Nonfatmilksolids	8.72	9.04
Energy nutritional value of 1 kg of milk, J	2857.2	2952.4
Of the Total milk yield, KJ	10938.3	11921.5

The milk chemical composition of cows of different genotypes had certain diversities. So in the milk of crossbred animals of the Red Steppe breed, the fat content was higher by 0.09%, protein - by 0.96%, casein - by 0.94%, dry matter - by 0.01%, nonfat milk solids - by 0.3%, respectively. The lactose content in purebred Red Steppe cows milk in comparison with crossbred animals was higher by 0.01%.

The exterior assessment allows to characterize the existing body type of the animals and to identify trends in its changes [21, 22].

When conducting a linear assessment of cows of different genotypes, the harmony in body build established in crossbred animals of different genotypes was higher. The height at the withers in the Red Steppe crossbred cows was 4.6–5.3% higher than their mates, 2.0–6.3% greater in the chest measurements, 3.3% greater in the oblique body length, and 1.7-3.2% greater in the pelvis measurements. Crossbred cows are distinguished by a strong constitution and skeleton, they are more wide-bodied and stretched, with better development of the breast and pelvis (table 16).

Table 16 – Exterior features of experimental full-aged cows

Indicator, cm	Purebred Red Steppe	Crossbred	
		Red	Holstein Red-and-white
Ulguli LLP			
Number of heads	20	20	20
Height at the withers	127.4±0.03	133.0±0.06	134.2±0.03
Chestdepth	69.8±0.06	72.2±0.06	72.6±0.06
Chestcircumference	71.8±0.11	73.2±0.07	76.3±0.01
Chestbreadth	39.2±0.09	40.3±0.16	42.0±0.06
Oblique body length	152.9±0.08	158.0±0.03	159.1±0.02
Widthintuberishiis	46.4±0.59	47.2±0.32	47.9±0.11
Widthinhookbones	52.1±0.06	52.9±0.12	53.1±0.09
Width at the hip joints	46.0±0.04	47.2±0.04	46.7±0.08
Metacarpusgirth	18.5±0.14	18.8±0.13	18.1±0.11
Highfoot	46.9	45.7	45.9
Extension	116.4	118.7	118.5
Pelvicthoracic	75.2	76.2	79.1
Thoracic	56.2	55.8	57.8
Blockiness	46.9	46.3	47.9
Massiveness	54.6	55.0	56.8
Narrowquarters	89.1	89.2	90.2
Boniness	14.1	14.1	13.5

There was made the estimation of the influence of servicing bulls on the economic traits of daughters at Ulguli LLP (table 17).

Table 17 – Estimation of bulls on the quality of the offspring

Individual No, nickname	Breed	n	Daughters productivity		
			milk yield, kg	fat, %	live weight
Obryv 1569	Estonian Red	7	3331.1±94.7	3.8±0.1	451.2±7.8
Iman 314	Purebred Red Steppe	8	3453.4±80.8	3.7±0.1	440.5±4.7
Graf 56733	Holstein Red-and-white	10	3683.6±53.0	3.8±0.3	448.0±8.4
Grozny 38056	Holstein Red-and-white	19	3811.3±144.0	3.8±0.1	443.7±8.3
Erlauhts6103	Angler	99	4008.8±33.0	3.7±0.2	443.8±7.5
Wetzel 8804	Holstein Red-and-white	16	4254.8±200.0	3.7±0.2	476.0±8.8
Maket 9214	Holstein Red-and-white	25	4023.0±207.5	3.7±0.1	442.3±7.8
Evnuh 7024	Purebred Red Steppe	27	4064.0±177.0	3.7±0.1	485.0±9.6
Rytsar 234	Danish Red	14	4091.1±276.0	3.7±0.2	484.6±9.8

Table 18 – Dynamics of live weight of experimental cows (n=120) of different genotypes, kg

Age, months	Ulguli LLP			
	Groups			
	I purebred Red Steppe	Crossbred		
		II of Angler breed	III of Danish Red	IV of Holstein Red-and-white
At birth	29.1±0.12	30.4±0.11	30.9±0.26	32.0±0.18
3	85.2±0.07	86.6±0.06	85.4±0.06	90.6±0.08
6	137.2±0.20	139.8±0.05	140.1±0.05	144.2±0.04
9	189.4±0.05	190.2±0.06	191.3±0.05	195.8±0.06
12	229.3±0.08	230.3±0.05	231.4±0.05	234.2±0.06
15	264.2±0.05	268.6±0.06	271.3±0.05	277.6±0.10
18	298.3±0.08	302.4±0.05	307.1±0.10	336.1±0.06
± to the breed standard, kg, %	-1.7-	+2.4; 100.8	+7.1; 102.4	+36.1; 112.3

The estimation of bulls showed that they are prepotenton the basis of milking capacity (table 18).

Also, there was conducted the evaluation of the breeding value of cows of different genotypes in Ulguli LLP (table 19).

To the breeding core of the herd of Ulguli LLP, 320 heads were selected with the average productivity of 4503 kg of milk with the fat content of 3.7%. The foundation cows of families in the number of 11 heads of each were selected, with the average productivity of the Red Steppe cows of different genotypes - 5682 kg, with the fat content of 3.7%.

There was determined the growth rate of replacement heifers of different genotypes in Ulguli LLP at different periods of growth from birth to 3 months, 3-6 months, 6-9 months, 9-12 months, 12-15 months, 15-18 months, 0-12 months., 0-18 months.

The comparative description of average daily gains of heifers (replacement) of different genotypes in Ulguli LLP was carried out (table 20).

In the period from birth to 3 months the greatest average daily gain - 676.9 g was obtained from the crossbred of the Holstein Red-and-white animals, later (with the exception of the 3 to 6 months of age period) - this advantage was preserved up to 18 months of age.

For the period from birth to 12 months and up to 18 months of age, the superiority was for crossbred Holstein Red-and-white replacement heaifers. For the period from birth to 18 months of age, the average

Table 19 – Breeding value of cows in Ulguli LLP

Statements	Indicators	
Number of cows, heads	320	
By exterior, points		
Forbody type	83.8	
Forudder	58.1	
Forlimbs	72.5	
Overall score for the exterior	71.4	
Class of cows on the exterior, heads		
Excellent	1	
Good with a plus	4	
Good	29	
Satisfactory	69	
Bad	17	
Exterior Index, %	95.9	
Byproductivity		
Population difference	heads	Milk yield, kg (±)
	55	+762.6
	65	–646.2
Index for milk yield, %	99.6	

Table 20 – Growth rate of replacement heifers of different genotypes, ($X \pm m_x$)

Growth rate for the period, months	Ulguli LLP			
	Group			
	I	II	III	IV
Averagedailygain, g				
0-3	616.5	617.6	599.0	676.9
3-6	568.3	581.4	597.8	586.0
6-9	580.0	560.0	568.9	573.3
9-12	448.3	450.6	450.6	431.5
12-15	387.7	425.5	443.3	482.2
15-18	374.7	371.4	642.9	423.1
0-12	548.5	547.7	549.3	554.0
0-18	491.5	496.8	504.5	555.4
Relativegain, %				
0-3	98.2	96.1	93.7	95.6
3-6	46.8	47.0	48.5	43.1
6-9	32.0	30.5	30.9	30.3
9-12	19.1	19.1	19.0	17.9
12-15	14.1	15.4	15.9	17.0
15-18	12.1	11.8	12.4	19.1
0-12	154.9	153.4	152.9	151.9
0-18	164.4	166.1	163.4	165.2

daily gain in Holsteinized Red-Steppe cows was higher on 64 g. The relative gain in crossbred of the Red Steppe breed was higher by - 0.8% than in purebred mates (0-18 months period).

Therefore, the analysis of data on the live weight of experimental animals of all breed groups throughout the entire period of breeding shows that crossbred heifers grew and developed better, especially the Red-and-white holsteinized ones. The growth rate of experimental heifers by growing periods can also be judged by the change in average daily gain. The relative growth rate from birth to 18 months of age was high in Holstein crossbreds. Crossbred offspring consumed summer pasture feed better, because their gains during this period were higher than those of purebred Red-Steppe mates.

To characterize the physical features of the experimental heifers, we calculated the indices expressing the ratio of anatomically related items (table 21).

Table 21 – Body build indices of replacement heifers of different genotypes

Body build indices, %	Age, 18 months			
	Group			
	I	II	III	IV
Extension	119.9	120.4	119.3	119.7
Blockiness	118.1	116.1	117.9	116.3
Highfoot	50.8	48.7	49.4	49.6
Thoracic	68.1	56.8	59.3	59.7
Massiveness	118.1	139.7	140.7	140.8
Pelvicthoracic	81.8	83.3	81.7	80.4
Narrow quarters	37.1	37.4	35.1	34.6
Boniness	15.2	15.0	14.7	14.7

Slightly higher body build indices were in crossbred replacement heifers. Further, it is apparent that all the heifers are quite proportionally developed. Body indices characterize them as animals of the dairy direction of productivity. Crossbred heifers, obtained from crossing Red Steppe cows with bulls of related Red breeds and Holstein Red-and-white in the same feeding and maintenance conditions, had a greater growth rate, exceeded in live weight. They are leggy, extended, having higher pelvic-thoracic and thoracic indices.

Currently, in countries with developed dairy cattle breeding, livestock assessment is carried out by identifying breeding values by genetic characteristics, eliminating the influence of paratypical factors using mathematical calculations with the best linear unbiased prediction (BLUP), based on the construction and solution of the mixed model equations developed by C.R. Henderson [23].

In Europe and North America, one of the main elements of the breeding work in improving dairy and dairy-meat breeds of livestock is the assessment of servicing bulls by the quality of offspring using various mathematical methods of genetic evaluation (BLUP, Animal model, Sire model, ssBLUP, G BLUP). The principle of evaluating bulls for the quality of offspring is to compare the breeding value of the daughters of the estimated bulls and mates, originating from other producers grown in different feeding, maintenance and care conditions.

Such a way of assessing the breeding value of bulls allows to obtain comparable results, i.e. to identify exactly the genotypic, hereditary capabilities of related animals and to use in further work to improve the animals of dairy, dairy and meat breed, true improvers. The advantage of this method lies in the fact that it allows to use to the full all available information about the animal being assessed, where the breeding value is calculated from the average value of the population.

Taking into account the aforementioned and modern approaches to assessing the breeding value of dairy cattle, studies have been conducted to assess the breeding value of dairy, dairy and meat breeds of the Republic of Kazakhstan on the dairy productivity of daughters, using information from the IAS database in the republican system.

At the initial stage of the research, the data of pedigree and zootechnic registration was downloaded from the IAS database of the Republic of Kazakhstan on 4 dairy and dairy and meat breeds of productivity

for 2804 first-calf cows, daughters of 478 servicing bulls. The experimental stock of first-calf cows is presented as follows: Holstein black-and-white and Black-and-white - 2437 heads from 390 servicing bulls, Alatau - 262 heads from 20 servicing bulls, Red Steppe - 105 heads from 10 servicing bulls. The obtained data were corrected and prepared for further calculation of the index estimate of the breeding value of the experimental population (table 22).

Table 22 – Information about the daughters of the estimated servicing bulls of dairy, dairy and meat breeds

Breed	Number of bulls	Number of daughters	Number of farms
Holstein b/wand r/w	374	2365	21
Black-and-white			14
Alatau	21	246	6
Red Steppe	9	75	4
Total	404	2686	45

From the data of Table 22, it can be seen that after processing and correction of the IAS data, of 3,686 selected heifers to further calculate their breeding value, 3,514 heads remained, originating from 482 dairy and dairy-meat breed servicing bulls. Of the entire array of selected heifers, 172 heads were not included in the assessment of breeding value.

Conclusions:

1) 10077 heads of cows, daughters of 117 bulls belonging to 38 lines of 4 dairy breeds: Alatau, Holstein Black-and-white, Black-and-white and Red Steppe were monitored. In terms of breeds, mothers of daughters of the selected Alatau bulls have had an average productivity of 5515±170 kg, the Holstein black-and-white - 7871±182 kg, Black-and-white - 5741±149 kg and the Red Steppe - 3917±104 kg.

2) In terms of dairy productivity, cows of all ages in JSC Adal AIC (n = 431) comply with the Alatau breed standard in the Republic of Kazakhstan. By lactation: the first lactation exceeds the breed standard by 534.4 kg, the second one - by 246 kg, and the third lactation - at the level of the first class standard. According to the fat content - by 0.19% and milk fat yield - in the first lactation - by 28.75 kg, in the second - by 17.22 kg, and in the third - by 8.67 kg. The average productivity of the herd of 431 cows was 4915 kg of milk and 3.79% of fatness. The same trend is observed in the cows of Tauelsizdik LLP (n=155).

3) It was established that the average productivity of dairy cows of the republic of all types of farms was 5039±31 kg. The highest productivity is for the Holstein cows - 5280±67 kg, the lowest — for the Red Steppe breed cows - 3518±38 kg. The variability of the milk yield for lactation is rather high, especially in cows of the Holstein black-and-white and Alatau breeds (66.7... 69.4). The difference between the productivity of Holstein and Alatau was 436 kg, with Black-and-white - 344 kg, with the Red Steppe - 1762 kg (P>0.999). The fat and protein content is the highest in cows of the Red Steppe breed (3.96±0.02% and 3.30±0.03%, respectively).In terms of the fat content, cows of the Red Steppe breed prevail over the Alatau breed by 0.22% (P>0.999), over the Holstein - by 0.23% (P>0.999), over the Black-and-white - by 0.31% (P>0.999), the excess in protein content was: over Alatau breed - by 0.11% (P>0.99), over Holstein - by 0.12% (P>0.99), over Black-and-white - by 0.25% (P>0.999). By the number of somatic cells, the milk of all cows is within the norm.

4) In the age aspect, it was found that dairy productivity is characterized by growth (4844...5679...5458 kg) by the second or third lactations and a gradual decrease (4716...4017 kg) by the fifth, i.e. this breed is characterized by a constant yield level, which confirms its high resistance to stress. On average, for all the lactations, cows of this breed produced 5123±275.4 kg of milk. The dairy productivity of Holstein cows increases to the sixth lactation, without recessions, which is typical for this, the most dairy breed. The nature of the dairy productivity flow of the Black-and-white cows has a peculiar specificity. So, starting from the first lactation, when there was a maximum milk yield (4936±231 kg), then there was a gradual decrease by the fifth lactation, where the lowest productivity was established. Nevertheless, the average milk yield for all lactations was 4671±190 kg, i.e. the potential of this breed is available, as evidenced by the variability of this breeding trait (32.0–50.7%).

5) The productivity of the Red Steppe breed cows of different genotypes averaged - 3904 kg of milk, 3.77% of fatness, and 487 kg of live weight. The milk yield of crossbred cows is higher by - 280-365 kg than that of purebred Red Steppe. CFL in the Red Steppe cows of different genotypes is in the range of 63.77-69.83%, in the Black-and-white cows - 69.17%, IFL - in the range of 83.7-93.6% and 94.97%. The animals had a steady curve by the months of lactation. The greatest number of cows with a bath-shaped udder was in 15% of the Angler type and 15% of the Danish Red crossbreds and 30% of the Holstein red-and-white breed. With the cup-shaped udder, there were 65% of the crossbred Holstein red-and-white cows, 60% of the Angler cows, 50% - the Danish Red cows. The smallest share of cows with the cup-shaped form was in the Red Steppe purebred - 25%.All the indicators characterizing the harmony of body build in the crossbred animals of different genotypes were higher. The height at the withers in the Red Steppe crossbred cows was 4.6–5.3% higher than their mates, 2.0–6.3% greater in the chest measurements, 3.3% greater in the oblique body length, and 1.7-3.2% greater in the pelvis measurements. Crossbred cows are distinguished by a strong constitution and skeleton, they are more wide-bodied and stretched, with better development of the breast and pelvis

6) The information database of used bulls of the Swiss, Holstein, Danish Red and Angler breeds in selection work with the improvement of the productive qualities of the Alatau, Black-and-White, and Red Steppe breeds was created. After processing and correcting the IAS data, of 3,686 selected heifers to further calculate their breeding value, 3,514 heads remained, originating from 482 dairy and dairy-meat breed servicing bulls. Of the entire array of selected heifers, 172 heads were not included in the assessment of breeding value.

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ҚАЗАҚСТАН РЕСПУБЛИКСЫНДАҒЫ АСЫЛ ТҰҚЫМДЫ СҮТТІ ІРІ ҚАРА МАЛ САЛАСЫНДАҒЫ АСЫЛДАНДЫРУДЫҢ ТИІМДІ ӘДІСТЕРІ

Аннотация. 10077 сиыр тұқымдарының 38 сортына жататын 117 бұқаның қыздары бақыланды: алатау, голштен қара-ала, қара-ала және қырдың қызыл сиыры. Ана тұқымдары бойынша таңдап алынған Алатау бұқалары орташа өнімділігі 5 515 ± 170 кг, голштен қара және сұр - 7871 ± 182 кг, қара және сұр - 5741 ± 149 кг және қызыл дала - 3917 ± 104 кг болды. Республиканың сүт сиырларының барлық түрлерінің орташа өнімділігі 5039 ± 31 кг құрады. Голштен сиырларының ең жоғары өнімділігі - 5280 ± 67 кг, ең кіші - қызыл дала тәрізді сиырлар - 3518 ± 38 кг. Голштин мен алатаудың өнімділігі арасындағы айырмашылық 436 кг құрады, қара және сұр - 344 кг, қызыл дала - 1762 кг (P> 0.999). Майдың және ақуыздың құрамы қызыл дала тұқымдарының сиыр арасында ең жоғары болып табылады (тиісінше 3,96 ± 0,02% және 3,30 ± 0,03%). Майлы құрғақшылық жағдайында алатау тұқымында 0,2% -ға (P> 0,999), голштен - 0,23% -ға (P> 0,999), қара-ақ түсті - 0,31% -ға (P> 0,999) басым, ақуыздың артық құрамы: Алатау бойынша 0,11% (P> 0,99), голштен - 0,12% (P> 0,99), қара-ақ түсті - 0,25% (P> 0,999) құрады.

Жас ерекшелігі бойынша, сүт өнімділігінің өсуі (4844 ... 5679 ... 5458 кг) екіншісіне немесе үшінші лактациясына және біртіндеп төмендеуге (4716 ... 4017 кг) бесінші, яғни біртіндеп сипатталады. Бұл тұқым тұрақты сүт өнімділігі деңгейімен сипатталады. Орташа алғанда, барлық лактациялар үшін осы тұқымның сиырлары 5123 ± 275,4 кг-ға дейін жеткізілді. Ақ-қара түсті сиыр сиырларының сүт өнімділігінің сипаты ерекше ерекшелікке ие. Осылайша, алғашқы сауын мерзімі бастап, ең көп сүт өнімділігі (4936 ± 231 кг) болған кезде, ең төменгі өнімділік орнатылған бесінші лактацияға біртіндеп төмендеу байқалды. Дегенмен, орташа алғанда барлық лактация үшін сүт өнімі 4671 ± 190 кг құрады, яғни, осы тұқымның әлеуеті бар, бұл өсімдік ерекшелігінің өзгермелілігі (32.0...50.7%).Қызыл түсті дала тәрізді сиырлардың өнімділігі орта есеппен 3904 кг, майы - 3,77%, ал тірі салмағы - 487 кг. Аралас сиырлардың өнімділігі - 280-365 кг-нан асты таза сары түсті даладан жоғары. Қызыл даладағы КПЛ әр түрлі генотиптерде 6377-69,83%, қара-ақ 69,17%, 83,7-93,6% және 94,97% ауқымында IPL шегінде орналасқан.

Түйін сөздер: селекция, сұрыптау, жұп таңдау, тұқымдық сиыр құндылығы, экстерьерді сызықтық бағалау, сауын, сүт құрамы.

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ЭФФЕКТИВНЫЕ МЕТОДЫ СЕЛЕКЦИИ В ПЛЕМЕННОМ МОЛОЧНОМ СКОТОВОДСТВЕ РЕСПУБЛИКИ КАЗАХСТАН

Аннотация. Проведен мониторинг 10 077 голов коров, дочерей 117 быков, относящихся к 38 линиям 4 молочных пород: алатауской, голштинской черно-пестрой, черно-пестрой и красной степной. В разрезе пород матери дочерей отобранных быков алатауской породы имели продуктивность в среднем 5515±170 кг, голштинской черно-пестрой - 7871±182 кг, черно-пестрой - 5741±149 кг и красной степной - 3917±104 кг. Установлено, что средняя продуктивность молочных коров республики всех типов хозяйств составила 5039±31 кг. Наивысшая продуктивность у коров голштинской породы - 5280±67 кг, наименьшая – у коров красной степной породы - 3518±38 кг. Разница между продуктивностью голштинской и алатауской составила 436 кг, с черно-пестрой – 344 кг, с красной степной – 1762 кг (P>0,999). По содержанию жира и белка самые высокие показатели у коров красной степной породы (3,96±0,02% и 3,30±0,03%, соответственно). По содержанию жира коровы красной степной породы превалируют над алатауской на 0,22% (P>0,999), голштинской – на 0,23% (P>0,999), черно-пестрой – на 0,31% (P>0,999), по содержанию белка превышение составило: над алатауской на 0,11% (P>0,99), голштинской – на 0,12% (P>0,99), черно-пестрой – на 0,25% (P>0,999).

В возрастном аспекте установлено, что молочная продуктивность характеризуется ростом (4844…5679…5458 кг) до второй-третьей лактациям и постепенным снижением (4716…4017 кг) к пятой, т.е. для данной породы характерно постоянство уровня удоев. В среднем за все лактации коровы этой породы надоили 5123±275,4 кг. Характер течения молочной продуктивности коров черно-пестрой породы имеет своеобразную специфику. Так, начиная с первой лактации, когда был максимум удоев (4936±231 кг), затем идет постепенное снижение к пятой лактации, где установлена самая низкая продуктивность. Но тем не менее, в среднем за все лактации удой составил 4671±190 кг, т.е. потенциал данной породы имеется, о чем свидетельствует вариабельность данного селекционного признака (32,0…50,7%). Продуктивность коров красной степной породы разных генотипов в среднем составила – 3904 кг молока, жирностью – 3,77 %, живой массой – 487 кг. Удой помесных коров выше, чем у чистопородных красных степных на – 280-365 кг. Коэффициент полноценности лактации у красных степных разных генотипов находится в пределах 63,77-69,83 %, черно-пестрых 69,17 %, индекс полноценности лактации в пределах 83,7-93,6 % и 94,97 %.

Ключевые слова: селекция, отбор, подбор, племенная ценность коров, линейная оценка экстерьера, удой, состав молока.

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