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ИЗВЕСТИЯ

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Shamshidin A.S.¹, Bisembayev A.T.², Saginbayev A.K.³, Abylgazinova A.T.², Kozhahmetova A.N.¹

¹Zhangir Khan West Kazakhstan Agrarian and Technical University, Uralsk, Kazakhstan;

²Research and Production Center for Livestock and Veterinary Medicine LLP, Nur-Sultan, Kazakhstan;

³Republican Chamber of Dairy and Combined Cattle Breeds (Holstein, Black-and-White, Red Steppe, Kholmogorsk, Aulieata, Simmental, Alatau, Swiss, Bestuzhev, Montbéliarde), Nur-Sultan, Kazakhstan;

E-mail: 270180@mail.ru

DAIRY PRODUCTIVITY OF FIRST-CALF COWS AND THEIR AVERAGE AGE AT FIRST CALVING IN THE CONTEXT

Abstract. Based on downloaded data from the IAS system, the average milk yield of first-calf cows in populations of Alatau, Red steppe, Black-and-white, and Holstein black-and-white cattle was established. In 2020, the milk yield of the first heifers of the Alatau breed (n=449) amounted to 5176 kg of milk; 3.92% and 3.40% in terms of fat and protein content, respectively. In the black-and-white breed (n=210), the milk yield was at the level of 5761 kg, with a fat and protein content in milk of 3.85% and 3.33%, respectively. First-calf cows of the Holstein (n=1880) breed surpassed in milk yield the animals of the Alatau breed by 1958 kg and the black-and-white breed by 2373 kg. Average indicators of milk productivity of first-calf heifers of this breed were: milk yield - 7134 kg; fat content in milk - 3.60%; the protein content is 3.14%. Analysis of first-calf heifers over a three-year period showed that the age of animals at first calving varied within 28.7-29.2 months in Alatau, 28.2 in Red steppe, 28.0-28.5 in Black-and-white and 26.5-27.0 in Holstein Black-and-white breeds, this fact is evidence of an extensive system of rearing young stock. The average age of fruitful insemination of the Alatau breed heifers is 18-20 months, of the black-and-white breed heifers - 16-18 months, of the Holstein black-and-white breed heifers - 15-17 months, when the live weight reaches 350-430 kg of the corresponding breed. The calf yield per 100 cows in the Alatau breed averaged 94%, which is 4% more for black-and-white (90%) and 10% more for Holstein Black-and-white breeds.

Key words: milk yield, selection, breeding value.

1. Introduction. Currently, the main task of zootechnical science and practice is to further intensify the industry, aimed at increasing the genetic potential of the productive qualities of animals of domestic breeds and the degree of its implementation.

The use of modern computer programs for the analysis of breeding information has enriched the arsenal of means for studying biological patterns and managing the heredity of animals, breed-forming processes. [1].

The study and generalization of methods for creating outstanding animals in dairy cattle breeding will justify recommendations for their systematic production [2].

The increase in productivity is impossible without special developments of an advisory nature to increase the economic efficiency of dairy cattle breeding [3].

The world leading countries in the field of breeding (USA, Canada, Sweden, Holland, Germany and many others) have successfully used the principles of constructing, optimizing and solving equations of mixed models, known as the BLUP method (best linear unbiased prediction), in breeding practice to assess the breeding qualities of animals [4].

The success and sustainability of a breeding program that includes genomic information largely depend on the prediction accuracy [5, 6, 7, 8].

The use of genomic assessment in practical dairy cattle breeding gives a certain effect on the technology of reproduction [9, 10].

Thus, carrying out comprehensive research work on the development of breeding programs to improve the economic traits of cattle of domestic breeds using modern methods of selective and breeding work and the

development of a methodology for assessing animals based on the BLUP is extremely relevant for the agro-industrial complex of the Republic of Kazakhstan from both scientific and practical points of view.

The aim and objectives of the research are to determine the breeding efficiency of the main dairy breeds of Kazakhstan based on the annual monitoring of dairy cattle.

The object of the research: cattle of milk and milk-and-meat productivity, bred in agricultural organizations with various forms of ownership of the Republic of Kazakhstan.

2. Materials and methods of the research. Research work was done using common methods of statistical data processing used in biological research.

The material of the research was the data on the phenotypic parameters of the dairy productivity traits of first-calf cows (the level of milk yield, fat and protein contents in milk, the yield of milk fat and protein) of the studied Alatau, Black-and-white and Holstein black-and-white breeds, obtained from the republican database of the information and analytical system. The calculation of the assessment of breeding qualities of service bulls was carried out using the BLUP methodology [4], and the complex class was established according to the "Instruction" in force in Kazakhstan [11]. The analysis of the research results was carried out with general methods of statistical processing of digital data used in biological research [12].

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3. Research results. According to statistics from the Ministry of Agriculture of the Republic of Kazakhstan, as of January 1, 2020, the number of breeding cattle in the Republic amounted to 824,532 animals, incl. 370,816 cows. Of the total number of breeding animals, 285 206 or 34.5% were milk and milk-and-meat livestock. The share of breeding livestock in the total number of cattle in the Republic (7,514.0 thousand heads as of 01.01.2020) is 10.9%, of which 3.8% are dairy and dairy-meat productivity.

Of the total number of breeding livestock (824 532 animals) in 2020 in the database of the information and analytical system of the Republic of Kazakhstan, the Alatau breed amounted to 77 343 animals, the Black-and-white - 62612, the Holstein black-and-white - 48743, which is more (except for the black-and-white (-9.1% in 2019 and -4.5% in 2018), respectively, by 7.3% and 21.1% than the livestock in 2019 and by 9.4% and 32.0% compared to 2018. Also, in 2020, there is an increase in the number of cows of the Alatau breed to 11.0%, Black-and-white to 13.7% and Holstein black-and-white to 29.6% than the number of cows in 2018 and 2019.

Since 2018, in the southern region of Kazakhstan, there has been an increase in the number of Alatau and Holstein black-and-white breeding cattle by 14.3% and 61.3% or by 9694 and 4954 animals, respectively. In the Black-and-white breed, the growth rate was only 0.6% or 154 animals.

To monitor dairy productivity indicators, determine the linear belonging of cows and the age of first calving of first-calf heifers of the Alatau, Black-and-White and Holstein Black-and-White breeds, data were downloaded from the republican IAS database for 2018-2020.

Based on downloaded data from the IAS system, the average milk yield of first-calf cows in populations of Alatau, Red steppe, Black-and-white and Holstein black-and-white cattle was established.

According to data, the average productivity of dairy cows of the republic of all types of farms in 2018 was 5039 kg. It was found that the highest productivity in cows of the Holstein breed (n=1989) is 7280 kg, the lowest in cows of the Red steppe breed (n=810) - 3518 kg [13].

The average milk yield of first-calf cows in the Alatau population (n=424) in 2019 was 5153 with a fat content of 3.77% and a protein content of 3.30%, for in Black-and-white breed (n=241) - 5338 kg, fat and protein contents in milk 3.70 and 3.25%, respectively. In 2019, the dairy productivity of Holstein black-and-white (n=830) cattle was at the level of 7111 kg, with a fat content of 3.45% and the protein content of 3.0%. In 2020, the milk yield of the first heifers of the Alatau breed (n=449) was 5176 kg of milk; 3.92% and 3.40% in terms of fat and protein in milk, respectively. In the Black-and-white breed (n=210), the milk yield was at the level of 5761 kg, with a fat and protein content in milk of 3.85% and 3.33%, respectively. First-calf cows of the Holstein (n=1880) breed surpassed in milk yield the animals of the Alatau breed by 1958 kg and the Black-and-white breed by 2373 kg. Average indicators of dairy productivity of first-calf heifers of this breed were: milk yield - 7134 kg; fat content in milk - 3.60%; protein content in milk - 3.14%.

In such a way, the analysis of the research results made it possible to establish that there is a dependence between the age of first calving and productivity. Earlier calving provided an increase in the productivity of cows up to 10-15% in comparison with their peers.

In the research, we calculated the regression coefficients of the estimated indicators of dairy productivity of first-calf cows at the age of first calving (table 1).

Table 1. Coefficients of regression of the main breeding traits of dairy productivity of cows at the age of first calving.

Indicator	Regression coefficient of the indicator by calving age, months		
	Alatau (n=449)	Black-and-white (n=210)	Holstein b-w (n=1880)
2020			
Milk yield, kg	-21.1	-32.5	-40.3
Fat content, %	-0.0025	-0.0015	-0.0033
Protein content, %	-0.002	-0.008	-0.0007
2019			
	(n=424)	(n=241)	(n=830)
Milk yield, kg	-12.1	-28.5	-44.4
Fat content, %	-0.0030	-0.0010	-0.0023
Protein content, %	-0.004	-0.0011	-0.0003
2018			
	(n=520)	(n=315)	(n=1989)
Milk yield, kg	-15.6	-25.8	-23.7
Fat content, %	-0.0020	-0.0012	-0.0017
Protein content, %	-0.002	-0.0008	-0.0005

The obtained values of the regression coefficients made it possible to establish that for all the compared breeds, the indicators of the milk yield of first-calf cows were quite high, in terms of the percentage of fat and protein in milk, they were low.

Along with monitoring the productive parameters of first-calf cows of the Alatau, Black-and-white and Holstein black-and-white breeds, an analysis of the productive indicators of cows (all lactations) of basic farms in the southern region of Kazakhstan was performed.

It was found that the average dairy productivity of cows in the republic in 2018 was 4050 kg, in 2019 it was 55 kg more than in the previous year, in 2020 the milk yield was at the level of 4288 kg. The highest productivity was found in cows of the Holstein breed - 7472 kg, the lowest productivity in the Alatau breed - 5472 kg. In terms of fat and protein content, high rates were observed in cows of the Alatau breed (4.10-4.15% and 3.65-3.68%, respectively). It was found that since 2018, the level of productivity of cows of the studied breeds has increased to 5.8%.

The research results showed that in the breeding farms of Almaty, Zhambyl, Turkestan and Kyzylorda regions, the average age of fruitful insemination of heifers of the Alatau breed is 18-20 months, heifers of the Black-and-white breed - 16-18 months, heifers of the Holstein black-and-white breed - 15-17 months when the live weight reaches 350-430 kg of the corresponding breed. The calf yield per 100 cows in the Alatau breed averaged 94%, which is 4% more than in Black-and-white (90%) and 10% more than in Holstein black-and-white breeds. An extended service period is observed in the Black-and-white and Holstein black-and-white breed. However, these indicators are typical for these breeds.

Monitoring of 10,077 cows, daughters of 117 bulls, belonging to 38 lines of 4 milk breeds: Alatau, Holstein black-and-white, Black-and-white and Red steppe, was carried out. In the context of breeds, mothers of daughters of selected Alatau breed bulls had average productivity of 5515±170 kg, Holstein black-and-white - 7871±182 kg, Black-and-white - 5741±149 kg, and Red steppe - 3917 ± 104 kg [13].

Similar studies to establish the genealogical structure of herds were carried out in 2019 and 2020, the results are shown in table 2.

Table 2. Genealogical structure of breeding stock in the context of lines and breeds 2019-2020.

No	Lines	Number of bull-fathers	Number of their daughters	Milk yield for 305 days, kg	Fat, %	Protein, %
Alatau						
1	Master 106902	5	205	5240±80	3.68±0.03	3.22±0.02
2	Jac 76И5908	6	198	4177±110	3.73±0.04	3.30±0.04
3	Concentrate 106157	6	160	5367±103	3.77±0.02	3.35±0.03
4	Trever 76B5905	12	280	5742±167	3.92±0.06	3.25±0.02

5	Teddy 76BS9013	9	374	5817±150	3.70±0.11	3.38±0.04
Total for Alatau breed		38	1217	5234±98	3.62±0.04	3.30±0.04
Black-and-white						
1	Annas-Adema 30587	6	205	5572±102	3.70±0.05	3.17±0.05
2	M Gladiator	4	112	4105±117	3.72±0.03	3.14±0.01
3	R.Sovering 198998	3	45	6494±122	3.87±0.03	3.20±0.05
4	M. Chieftain	1	12	5297±77	3.81±0.02	3.27±0.06
5	S.T. Rokit	2	60	7585±148	3.72±0.02	2.97±0.12
Total for Black-and-white breed		16	524	6527±205	3.80±0.03	3.24±0.05
Holstein black-and-white						
1	Adema 197	3	280	8762±155	3.68±0.02	3.22±0.03
2	Annas-Adema 30587	2	147	7427±182	3.71±0.04	3.23±0.01
3	Vis Ideal 933122	5	250	6982±164	3.57±0.03	3.14±0.03
4	Vis Beck Ideal 1013415	7	179	6752±102	3.67±0.02	3.40±0.03
5	Montwik Chieftain	8	390	7452±240	3.73±0.02	3.22±0.02
6	PR.Sovering 198998	3	320	6657±230	3.57±0.04	3.10±0.03
7	S.T.Rokit	1	224	8210±142	3.72±0.01	3.15±0.04
8	Wes Ideal 933122	5	630	8450±125	3.65±0.06	3.08±0.05
9	Arlinda Chief 1427381	2	327	6758±92	3.60±0.04	3.30±0.04
Total for Holstein black-and-white breed		35	2747	7580±354	3.70±0.07	3.20±0.03

Analysis of the genealogical affiliation of the breeding stock of the Alatau, Black-and-white and Holstein black-and-white breeds in the amount of 4488 cows, daughters of 89 servicing bulls belonging to 19 lines. In the section of breeds, the daughters of line bulls of the Alatau breed had an average productivity of 5234±98 kg, Black-and-white - 6527±205 kg and Holstein black-and-white - 7580±354 kg, respectively, with a fat content of 3.70%, 3.80%, 3.70% and protein content 3.30%, 3.24., and 3.20%.

It has been established that in the basic breeding farms for the breeding of the Alatau breed, servicing bulls of the following lines are mainly used: Master 106902; Jac 76I5908; Concentrate 106157; Trever 76B5905 and Teddy 76I50913. For Black-and-white and Holstein black-and-white breeds: R. Sovering 198998; Annas-Adema 30587; Wes Ideal 933122; Vis Beck Ideal 1013415; Montwik Chieftain and Arlinda Chief 1427381.

Conclusions. The highest dairy productivity was established in cows of the Holstein breed - 7472 kg, the lowest in the Alatau breed - 5472 kg. In terms of fat and protein content, high rates were observed in cows of the Alatau breed (4.10-4.15% and 3.65-3.68%, respectively).

The average age of fruitful insemination of heifers of the Alatau breed is 18-20 months, of heifers of the Black-and-white breed - 16-18 months, of heifers of the Holstein black-and-white breed - 15-17 months, when the live weight reaches 350-430 kg of the corresponding breed. The calf yield per 100 cows in the Alatau breed averaged 94%, which is 4% more than in Black-and-white (90%) and 10% more than Holstein black-and-white breeds.

Шәмшідін А.С.¹, Бисембаев А.Т.², Сагинбаев А.К.³, Абылгазинова А.Т.², Қожахметова А.Н.¹

¹ «Мал шаруашылығы және ветеринария ғылыми-өндірістік орталығы ЖШС» Нұр-Сұлтан, Қазақстан;

² «Жәңгір хан атындағы Батыс Қазақстан аграрлық-техникалық университеті» НАО Орал, Қазақстан;

³ ОЮР «Ірі қара малдың сүтті және аралас тұқымдарының республикалық палатасы (голштейндік, қара ала, қырдың қызыл сиыры, Холмогор, Әулиеата, симментал, Алатау, швицтік, бестужевск, монбельярда)», Нұр-Сұлтан, Қазақстан.

E-mail: 270180@mail.ru

ТҮМСА СИЫРЛАРДЫҢ СҮТ ӨНІМДІЛІГІ ЖӘНЕ ОЛАРДЫҢ ОРТАША ЖАСЫ

Андатпа. ААЖ жүйесінен деректерді түсіру негізінде алатаулық, қырдың қызыл сиыры, қара ала және голштейндік қара ала ірі қараның алғашқы сауылуының орташа деңгейі анықталды. 2020 жылы тұмсалардың Алатаулық тұқымының (n=449) алғашқы сауымы 5176 кг сүтті; сүттегі май мен ақуыз мөлшері сәйкесінше 3,92% және 3,40%-ды құрады. Қара ала тұқым бойынша (n=210) сүт өнімділігі 5761 кг деңгейінде болды, сүт құрамындағы май мен ақуыз сәйкесінше 3,85% және 3,33% құрайды.

Гольштейндік (n=1880) тұқымның алғашқы сауымдары 1958 жылы Алатаулық тұқымды және 2373 кг кара ала тұқымды малдардан артық болды. Бұл тұқымның тұмсаларының сүт өнімі бойынша орташа көрсеткіштері: сауын – 7134 кг; сүттегі май мөлшері – 3,60%; сүттегі ақуыз мөлшері – 3,14% құрады. Үш жылдық кезеңдегі алғашқы сауымды талдау көрсеткендей, бірінші бұзаулауда жануарлардың жасы орта есеппен Алатаулық тұқым бойынша 28,7-29,2 ай, қырдың қызыл сиырынікі 28,2 ай, кара ала және голштейндік кара ала тұқымдары бойынша 28,0-28,5 ай аралығында болды, бұл факт жас жануарларды өсірудің экстенсивті жүйесінің дәлелі болып табылады. Алатаулық тұқымды қашарлардың жемісті ұрықтануының орташа жасы 18-20 айды, кара ала тұқымды қашарлардың орташа жасы-16-18 айды құрайды, голштейндік кара ала тұқымының қашарлары-15-17 ай. тірі салмақ 350-430 кг сәйкес тұқымға жеткенде, Алатаулық тұқымдікі 100 сиырға шаққанда бұзаудың шығымы орта есеппен 94%-ды құрады, бұл 4%-ға кара ала (90%) және 10%-ға голштейндік кара ала тұқымнан артық деген сөз.

Түйін сөздер: сүт өнімділігі, селекция, іріктеу, таңдау, асыл тұқымды құндылық.

Шәмшидин А.С.¹, Бисембаев А.Т.², Сагинбаев А.К.³, Абылгазинова А.Т.², Кожахметова А.Н.¹

¹ТОО«Научно-производственный центр животноводства и ветеринарии» Нур-Султан, Казахстан;

²НАО «Западно-Казакхстанский аграрно-технический университет имени Жангир хана» Уральск, Казахстан;

³ОЮР «Республиканская палата молочных и комбинированных пород крупного рогатого скота (голландская, черно-пестрая, красная степная, холмогорская, аулиеатинская, симментальская, алатауская, швицкая, бестужевская, монбельярдская)», Нур-Султан, Казахстан
E-mail: 270180@mail.ru

МОЛОЧНАЯ ПРОДУКТИВНОСТЬ КОРОВ-ПЕРВОТЁЛОК И ИХ СРЕДНИЙ ВОЗРАСТ ПРИ ПЕРВОМ ОТЁЛЕ

Аннотация. На основании выгрузки данных из системы ИАС установлен средний уровень удоя коров-первотёлок в популяции алатауского, красно степного, чёрно-пёстрого и голштинского чёрно-пёстрого скота. В 2020 году удой первотёлок алатауской породы (n=449) составил 5176 кг молока; 3,92% и 3,40% по содержанию жира и белка в молоке соответственно. По черно-пёстрой породе (n=210) уровень удоя оказался на уровне 5761 кг, с содержанием жира и белка в молоке 3,85% и 3,33% соответственно. Коровы-первотёлки голштинской (n=1880) породы превосходили по удою животных алатауской породы на 1958 кг и черно-пёстрой породы на 2373 кг. Средние показатели по молочной продуктивности первотёлок этой породы составили: удой – 7134 кг; содержание жира в молоке – 3,60%; содержание белка в молоке – 3,14%. Анализ первотёлок за трёхлетний период показал, что возраст животных при первом отеле в среднем варьировал в пределах 28,7-29,2 месяцев по алатауской, 28,2 по красной степной, 28,0-28,5 по черно-пёстрой и 26,5-27,0 по голштинской черно-пёстрой породам. Данный факт является свидетельством экстенсивной системы выращивания молодняка. Средний возраст плодотворного осеменения тёлков алатауской породы составляет 18-20 месяцев, тёлков черно-пёстрой породы – 16-18 мес., тёлков голштинской черно-пёстрой породы – 15-17 мес. при достижении живой массы 350-430 кг соответствующей породе. Выход телят на 100 коров по алатауской породе в среднем составил 94%, что больше на 4% черно-пёстрой (90%) и на 10% голштинской черно-пёстрой пород.

Ключевые слова: молочная продуктивность, селекция, отбор, подбор, племенная ценность.

Information about the authors:

Alzhan Smailuly Shamshidin, Candidate of Sciences in Agriculture, Vice-Rector for Research, Zhangir Khan West Kazakhstan Agrarian - Technical University, 51, Zhangir khan, Uralsk, 090009, Republic of Kazakhstan, E-mail: 270180@mail.ru, ORCID: <https://orcid.org/0000-0001-5457-1720>;

Bissembayev Anuarbek Temirbekovich, Candidate of Sciences in Agriculture, Director of Research and Production Center for Livestock and Veterinary Medicine Limited Liability Company, office 1505, 40, Kenesary street, Nur-Sultan, 010000 (Z10P6B8), Republic of Kazakhstan, E-mail: anuar_bat@mail.ru, ORCID: <https://orcid.org/0000-0001-8795-0700>;

Saginbayev Azamat Kuandikovich, Candidate of Sciences in Agriculture, Director's advisor, Republican Chamber of Dairy and Combined Cattle Breeds, office 1205, 40, Kenesary street, Nur-Sultan, 010000

(Z10P6B8), Republic of Kazakhstan, E-mail: azamat.s@list.ru, ORCID: <https://orcid.org/0000-0003-1566-1285>;

Abylgazinova Aizhan Tleuzhanovna, Candidate of Sciences in Agriculture, head of the department of animal husbandry and veterinary medicine, Research and Production Center for Livestock and Veterinary Medicine Limited Liability Company, 010000 (Z10P6B8), office 1505, 40, Kenesary street, Nur-Sultan, 010000 (Z10P6B8), Republic of Kazakhstan, E-mail: oiga80@mail.ru, <https://orcid.org/0000-0003-3665-6442>;

Kozhahmetova Ainat Nasipkalievna – Master of Animal Science, Senior Lecturer, Vice-Rector for Research, Zhangir Khan West Kazakhstan Agrarian - Technical University, 51, Zhangir khan, Uralsk, 090009, Republic of Kazakhstan, E-mail: ORCID: <https://orcid.org/0000-0002-0792-3567>

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