ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

Х А Б А Р Ш Ы С Ы

ВЕСТНИК

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

THE BULLETIN

OF THE NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN

1944 ЖЫЛДАН ШЫҒА БАСТАҒАН
ИЗДАЕТСЯ С 1944 ГОДА
PUBLISHED SINCE 1944

5

АЛМАТЫ
АЛМАТЫ
ALMATY

2018

SEPTEMBER
СЕНТЯБРЬ
ҚЫРКҮЙЕК

NAS RK is pleased to announce that Bulletin of NAS RK scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of Bulletin of NAS RK in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential multidiscipline content to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы "ҚР ҰҒА Хабаршысы" ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Web of Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабаршысының Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді мультидисциплинарлы контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Вестник НАН РК» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Вестника НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному мультидисциплинарному контенту для нашего сообщества.

«Қазақстан Республикасы Ұлттық ғылым академиясының Хабаршысы».
ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)
Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы»РҚБ (Алматы қ.)
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 01.06.2006 ж. берілген **№5551-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік

Мерзімділігі: жылына 6 рет.
Тиражы: 2000 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., 220, тел.: 272-13-19, 272-13-18,
www: nauka-nanrk.kz, bulletin-science.kz

Типографияның мекенжайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

«Вестник Национальной академии наук Республики Казахстан».
ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)
Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы)
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№5551-Ж**, выданное 01.06.2006 г.

Периодичность: 6 раз в год
Тираж: 2000 экземпляров

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219, 220, тел. 272-13-19, 272-13-18.
www: nauka-nanrk.kz, bulletin-science.kz

Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75

Bulletin of the National Academy of Sciences of the Republic of Kazakhstan.
ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)
The certificate of registration of a periodic printed publication in the Committee of Information and Archives of the Ministry of Culture and Information of the Republic of Kazakhstan N 5551-Ж, issued 01.06.2006

Periodicity: 6 times a year
Circulation: 2000 copies

Editorial address: 28, Shevchenko str., of. 219, 220, Almaty, 050010, tel. 272-13-19, 272-13-18,
http://nauka-nanrk.kz /, http://bulletin-science.kz

Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

BULLETIN OF NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN
ISSN 1991-3494 **https://doi.org/10.32014/2018.2518-1467.2**
Volume 5, Number 375 (2018), 12 – 29

UDC 636.08.003

A. S. Alentayev[1], D. A. Baimukanov[2], S. D. Smailov[3], V. G. Semenov[4], K. T. Abdrakhmanov[2], D. A. Begaliyeva[5], M. M. Omarov[6]

[1]Scientific and Innovative Center for Animal Breeding and Veterinary Medicine, Astana, Kazakhstan,
[2]Kazakh Scientific Research Institute of Animal Breeding and Fodder Production, Almaty, Kazakhstan,
[3]"Adal" agro-industrial company JSC, Enbekshikazakh district, Almaty region, Kazakhstan,
[4]Chuvash state agricultural academy,Cheboksary, Chuvash Republic, Russia,
[5]Kazakh National Agrarian University, Almaty, Kazakhstan,
[6]Innovative University of Eurasia, Pavlodar, Kazakhstan

EFFICIENCY OF BREEDING OF THE ALATAU BREED OF BROWN CATTLE IN THE "ADAL" AGRO-INDUSTRIAL COMPANY JSC

Abstract. Modernization of breeding and technical potential in dairy cattle breeding is a priority condition in increasing the economic efficiency of breeding of the Alatau cattle breed.

It is established that cows of the Alatau breed of the nuclear stock produce 7661±92.8 kg of milk, of the breeding group - 6761±71.3 kg. On average, the cows of the Alatau breed produced milk in the amount of 7268±75.9 kg, with a mass fraction of fat in milk 3.82±0.09%. The yield of milk fat was 277.6±3.2 kg for cows of the Alatau breed with an average live weight of 620±17.5 kg.

In the first lactation, the milk yield averaged 6604±81.4 kg with an average milk fat content of 3.81±0.07%. Cows reaching the third and subsequent lactation on average showed the milk yield of 8235±101.7 kg with a mass fraction of milk fat of 3.84±0.08%. According to the live weight, all the age groups of cows exceeded the requirements of the 1st quality class.

According to the Alatau breed of dairy cattle, there were used the bulls of the Swiss breed with the milk yield of M (mother) and MF (mother of the father) of 10,424-14,784 kg with a fat content of 3.57-3.68%.

During the research, it was found that the live weight increases from birth to 17-18 months of age more than 12-13 times, and the average daily gain from birth to 18 months of age is 700-800 g per day.

Based on the conducted studies in the period of 2015 - 2018, we believe that the aim of growing dairy heifers of the Alatau breed concludes: the age of the heifers at calving is 24 months; the live weight of heifers at calving is from 85% to 90% of the live weight of the adult animal; fatness of heifers at calving is 3 (1-5); age at insemination - 15 months; the live weight of heifers when inseminated is from 55% to 60% of the live weight of the adult animal; fatness of heifers during insemination - 3 (1-5). With the average daily weight gain of 750 g at the age of 2 months, the calves should have a live weight of 75 -90 kg, at a 6-month age - 180-220 kg, at 15-month age - 380-420 kg and at the age of 2 years - 580-620 kg. Heifers with a uniform gain in live weight in all age periods have a high fertility, and at the time of calving can produce offspring with a high live weight at birth, in addition, during the first lactation they produce high-quality milk in a greater volume.

Keywords: brown cattle, milk yield, fat, protein.

Relevance. The focal area in the agro-industrial complex of the Republic of Kazakhstan is livestock, namely dairy cattle. The effectiveness of livestock should not be based on quantity due to an increase in the number of cattle, but on quality, that is, the selection of highly productive herds, the formation criteria of which should be considered the resistance of animals to various diseases, adaptability to changes in conditions of maintenance and feeding. The role of competitive enterprises, resource-saving technologies, production of low-cost products is growing. In this connection, highly productive animals acquire special significance in cattle breeding.

Dairy cattle breeding cannot develop without solving the problems on the formation of an effective herd, taking into account the genetic potential of dairy productivity and reproductive qualities, equipping modern dairy farming technologies and a solid fodder base.

The large-scale use of high-value Holstein breed bulls has made it possible to create the outstanding herds in the Akmola and Almaty regions and other regions with the milking of cows from 6000 to 8,500 kg per year.

Despite the wide variety of milk types of breeds with the genetic potential of 5-6 thousand kg of milk from a cow, it should be noted that anyway, black and motley cattle have the highest genetic potential of productivity.

In the domestic dairy cattle industry, the actual task is to ensure further growth in the productivity of cows. An optimal indicator of the effect of selection for milk yield is 250-300 kilograms, that can provide an increase of 250,000 tons of milk per year.

In Kazakhstan, close attention is paid to improving the technology of growing heifers of highly productive dairy cattle [1]. It is connected with the fact that there have been significant changes in the intensity of the use of cows, when herds with milk yields of 8-10 thousand kg are completed in many farms in the Almaty region. Problems of the longevity of cows, reproduction in these herds and preservation of young animals are noted [2].There is a tendency when the cow uses 1.8 lactations, and therefore the yield from each cow averages 0.9 head of offspring [3]. Considering the natural mortality and culling, a serious problem of herd repair appears [4, 5]. There is a need for additional purchase of animals, which affects the profitability of milk production [4]. Consequently, the heifers' growing efficiency is directly related to the breeding of highly productive dairy cows and the profitability of milk production.

Growing calves and increasing business output is an important factor in the reproduction of dairy cattle, affecting the profitability of milk production [6, 7]. Despite this loss, there are many calves in dairy units [8, 9].

For the maintenance of calves, there are three principal methods:

1. Maintenance in livestock building with climate conditions appropriate to the season or in boxes with straw bedding with two areas for the regimen.

2. Maintenance in individual boxes with limited regimen capacity or yard for the regimen. These boxes are designed in such a way that they can be installed anywhere. Such boxes are used mainly during calves' feeding with colostrum.

3. Keeping in closed boxes. This type of maintenance is most often a whole complex.

The method of keeping calves depends not only on the size of the enterprise, but also on the technology of their feeding. Methods of keeping calves are planned in such a way 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 possibilities of equipment for ventilation of the premises and the reduction of microbial contamination [10, 11].

Crossing the animals of the Swiss breed with the local livestock and further breeding the obtained hybrids "in themselves" led to the creation of large amounts of brown cattle in different zones of the country, differing in terms of productivity and body build. This served as the basis for the separation of several zonal breeds from the common amount of brown cattle, which originate from the Swiss cattle. Five breeds were distinguished: Kostroma (1944), Alatau (1950), Lebedinskaya (1950), Caucasian Brown (1960), and Carpathian brown cattle (1973).

The Alatau brown breed of cattle was obtained as a result of crossing the animals of local breeds with the Swiss ones. Therefore, the use of the Swiss breed on the cattle of the Alatau breed helped to improve the morphological and physiological properties of the udders of cows. The hybrids had a need to improve the uniformity of development of udder shares, the size of the nipples and the rate of milk ejection.

The Alatau brown breed is less suitable for direct economic use in industrial complex conditions, but it serves as an excellent breeding material for the production of useful animals (at the industrial crossing with the Swiss).

In the developing process of a market economy in the Republic of Kazakhstan, the most valuable breeds of dairy cattle of domestic selection are transformed in accordance with the demands of the time. Breeds that do not meet the changing requirements, gradually lose their importance, for example, the

Aulieata breed of dairy cattle, or they are absorbed by other breeds. To replace them, new genotypes are created, with more pronounced useful traits.

It should be noted that the division of breeds into usable and tribal species is very conditional, since not every breed can be reasonably attributed to breeds of breeding or useful purpose. The majority of modern domestic breeds of cattle has both of those purposes.

The annual growth in dairy productivity of cows in many respects depends on the level of the breeding work carried out. At present, up to 40% of the increase in milk yield is due to the improvement of the genotype of the Alatau brown cattle breed, while the remaining 60% is due to the increase in the level and quality of feeding and the improvement of traditional maintenance technology.

In the conditions of the AIC "Adal" JSC of Enbekshikazakh district of the Almaty region for the last 18 years, a number of activities have been carried out, both structural and scientific and technological, for further development and improvement of breeding programs in the Alatau brown breed.

The identification and registration of animals, assessment of dairy productivity, assessment of breeding qualities of animals, development of programs for artificial insemination and embryo transplantation have been placed at a high level.

From 2012 to 2017, it was possible to achieve extremely high-quality standards of the Alatau brown breed that meet the international ISO requirements. Currently, both Alatau and black and motley breeds of cows are evaluated for fat and protein content, the number of somatic cells in milk, milk yield and some economically useful traits, such as consumption of concentrated fodder, easy calving, reproductive qualities and speed of milk ejection. This broadening of the range of animal productivity has led to the organization of breeding for improving the dairy productivity of cows.

The aim of the research. To study the efficiency of the Alatau cattle breeding, to determine the productive potential of the Alatau cows of different genotypes in the conditions of "Agro-industrial company "Adal" JSC of Enbekshikazakh district of the Almaty region.

On the basis of the aim, the objectives are set to study the current state of dairy cattle breeding in the AIC "Adal" JSC, to determine the potential of dairy cattle of the modern Alatau breed population and the results of using the bull seed - the leaders of the Swiss breed in selective work.

Material and methods of the research. The main research was carried out on purebred animals of the Alatau cattle breed as well as in different genotypes of the Alatau - Swiss breed in the conditions of the "Agro-industrial company "Adal" JSC of Enbekshikazakh district of the Almaty region.

The joint-stock company "Agro-industrial Company "Adal" was established in January 1999 and is an industrial complex of a full cycle of production, processing,and sale of dairy products.

In the studies, the principle of the pair - analogueswas applied. The productivity of animals was assessed by such indicators as lactation duration (d.), milk yield for lactation (kg), milk yield for 305 days of lactation (kg), fat mass fraction (FMF, %), milk fat yield (kg), protein mass fraction (PMF, %), milk yield for 100 days of lactation (kg), milk ejection rate (kg/min), lactation stability coefficient (%), live weight of cows (kg), service period (days).

When crossing cows of the Alatau breed with the bulls of the Swiss breed, groups with a blood content of 12.5 to 62.5% were formedaccording to the Swiss.

All studied animals were in the same conditions of maintenance and on a balanced diet of feeding.

Processing of the obtained data of dairy productivity of cows was carried out through the program "SELEKS - cows". Dairy production is studied by the following indicators: milk yield by the 1st, 3rd, and older lactations for 305 days, the content of the mass fraction of fat (%) and milk fat (kg), the mass fraction of protein (%).

We studied the live weight of calves from birth to the first calving, the indicators of the live weight of first lactation cows according to the zootechnical record of 2-MOL form tribal cards for each cow.

Indicators of the reproductive function of the bred heifers and first-calves were taken from the corresponding sources of primary zootechnical records and were calculated according to the generally accepted methods of zootechnics for the duration of fruit-bearing and the service period, the number of difficult calving, abortions, stillborn calves, the insemination index, and the quality of the offspring.

The account of the dairy productivity was conducted by the method of control milking every ten days [10]. The fat content in milk was determined once a month with the "Laktan-4" automatic device. The technological properties of the first-calves were evaluated by machine milking in terms of the speed of

milk ejection, the uniformity of the quater milking, the development of the udder by taking measurements (length, width, circumference, distance between the nipples, distance from the floor to the bottom of the udder), and visually at the 2-3 rd month of lactation

The received results of the scientific research have been processed by the method of the variational statistics, with the use of the Microsoft Excel 2007 standard package of the statistical analysis on the personal computer [12].

Results of the research. The design capacity of the complex is 100 tons of dairy products per day. Moreover, due to the performance of selective works since 2001, the average milk yield per cow has increased from 2,970 liters to 5,402 liters of milk per year.

As of December 2016, the population of the adult herd of the company was 895 heads, the offspring - 1 232 heads, also 42 horses on the balance sheet. In order to ensure independence from market conditions, the so-called full cycle was introduced in Adal. That is, the farm is provided with its own fodder from nearby fields, and the plant growing department receives fertilizers from the farm in excess.

The total area of the lands belonging to the company is more than 5 thousand hectares, of which 3 thousand are used as arable lands, 1.5 thousand hectares are allocated for pastures, 780 hectares are used for production needs.

AIC "Adal" JSC has the status of a breeding farm for breeding two breeds of cattle Alatau (Swiss) and black and motley (Holstein).

To improve the genetic potential of the herd of the Alatau cows from 2007 to the present time, bioproducts - the seed of the bulls - leaders of the Swiss breed are imported. In the AIC "Adal" JSC there is a large-scale selection both with the Black-Motley and the Alatau breed.

Consecutive intensification and increase in the efficiency of dairy cattle breeding is impossible without increasing the productivity of cows. In turn, the increase in productivity is impossible without special advisory work on improving the economic efficiency of cattle breeding of the Alatau breed.

Dairy productivity is the dominant feature in assessing the economic and useful traits of the Alatau cattle. Thanks to the purposeful breeding work with dairy cattle, the milk yield and the content of the fat mass fraction in milk have increased for the past 8-12 years. All this was achieved by increasing the efficiency of selection and breeding work in dairy cattle. The decisive role was played by the maximum implementation of elements of large-scale selection, a full assessment of the used servicing bulls by the quality of the offspring.Intensive use of bulls - improvers of the Swiss breed in 2008-2014 contributed fully to the manifestation of the effect of using the genetic resources of the Alatau cattle breed. In the following period of 2015 - 2018 Alatau - Swiss crossbred animals occupied a large proportion.

In conditions of AIC "Adal" JSC, the maintenance of animals is year-round stall-walking. It was found that the cows of the breeding core produce 7661±92.8 kg of milk, the selection group - 6761±71.3 kg (table 1).

Table 1 – Productivity of cows of the Alatau breed in AIC "Adal" JSC according to the data of 2016

N	Group	Heads	Milk yield, kg
1	Breeding core	31	7661±92.8
2	Selection group	140	6761±71.3

On average, the cows of the Alatau breed produced milk in the amount of 7268±75.9 kg, with the fat mass fraction in milk 3.82±0.09%. The yield of milk fat was 277.6±3.2 kg for cows of the Alatau breed with an average live weight of 620±17.5 kg (table 2).

Table 2 – Characteristics of the Alatau cows for dairy productivity and live weight for 305 days of the last finished lactation

Lactation	Total, heads	Milk yield, kg	Milk fat		Live weight, kg
			%	kg	
Total number of livestock	366	7268±75.9	3.82±0.09	277.6±3.2	620±17.5
1 lactaion	126	6604±81.4	3.81±0.07	253.0±2.9	608±31.2
3 lactation and further	68	8235±101.7	3.84±0.08	316.2±3.8	740±26.8

In the first lactation, the milk yield averaged 6604±81.4 kg with an average milk fat content of 3.81±0.07%. Cows on reaching third and subsequent lactations on average showed the milk yield of 8235±101.7 kg with the fat mass fraction in the milk of 3.84±0.08%. According to the live weight, all the age groups of cows exceeded the requirements of the 1st appraising class.

In recent decades, in various regions of the Republic of Kazakhstan, selective and breeding work has been purposefully carried out to create new types of brown cattle by crossing domestic breeds with the more specialized Swiss breed. The results of the research on the use of bulls-improvers of breeds in various regions of dairy cattle, due to natural climatic and fodder conditions, the genetic traits of individual herds are contradictory.In particular, the use of the Swiss breed as an improving one significantly changed the economic and biological traits of the improved breed (Alatau) and, as a result, led to a change in the genealogical structures of this unique domestic breed, influenced on their breeding, productive and technological value.

In dairy cattle breeding in the Almaty region, new highly productive types of brown cattle are widely used. Therefore, the study of genetic potential in the same environmental conditions is topical and has practical significance.

According to the Alatau breed of dairy cattle, the bulls of the Swiss breed were used with the milk yield of M (mother) and MF (mother ofthe father) of 10,424-14,784 kg, with a fat content of 3.57-3.68%. The Davinci, the Escalibur bull along the Concentrate line (table 3).

Table 3 – Servicing bulls of the Swiss breed from 2007 to 2017

N	Name and number of the bull	Years
1	JAG-ET 76BS0907	2007
2	JACK 76BS0908	2007-2008
3	Fame76BS0909	2008
4	TREVER-ET 76BS0905	2008
5	Teddy 76BS0913	2008
6	Preference09363006	2009
7	Atway 10/0035033607	2009
8	Event 10/0034216002	2009
9	Alta Joel 011BS00644	2010-2011
10	Alta Persy 011BS00673	2011
11	Payout-DE 000939829089	2012
12	Alta Joel 011BS00644	2013
13	Jubs 10.352050	2014-2015
14	Davinci9695533. Concentrate line 106157	2016-2017
15	Escalibur 105117458. Concentrate line106157	2016-2017
16	Wander 151BS00224. Seed of the same sex.	2016-2017

Since July 2016 for insemination of heifers sexed seeds (same sex) are used. For Alatau breed - the Wander bull along the Prestige line.

In highly productive herds, the peculiarity of breeding work is in the difficulty of selecting animals in the population that meet the breeder's requirements simultaneously for the exterior, productivity and a number of other valuable traits.

The breeding and productive qualities of domestic brown cattle are improved by selection: intralinear, when a combination of different branches maintains a genetic similarity with the ancestor, relying on its tribal virtues; linear in complex inbreeding, when animals are selected that are related to each other not by one but by two or more ancestors from different lines and families, in order to secure successful crosses and saturation of genealogies with ancestors of high breeding value; cross line - the combination of a bull of one line with the cows of another line to consolidate and improve the hereditary qualities of the successors of the lines or to enrich them with new valuable qualities.

On the basis of research, we consider that in specialized dairy breeds, selection for milk yields has an advantage. However, the conditions and technology of keeping of animals leads to the stabilization of selection for this feature and orientation to others. The strategy for improving the new priority trait is also connected to related groups, since the indicators of many traits are highly inherited from the best dams. There are exclusively prepotent cows, male and female descendants of whom form a valuable consolidated group, not inferior to the best lines for the expressiveness of type, level of productivity.

In dairy cattle breeding of Kazakhstan, the peculiarity of working with lines is that the type and quality of the line is determined mainly by the quality of the dams. Selection of breeding stock is crucial for the development and improvement of the line. Selection in cattle breeding is carried out mainly through servicing bulls, among which a more rigorous selection is conducted, since from each of them a much larger number of descendants, in particular, heifers and cows are obtained. When using bulls-improvers, the genetic progress of milking in one generation can reach 12%, with the fat content of milk of 0.15%.

In the Republic of Kazakhstan, the traditional method of selecting potential mothers of bulls is the pedigree assessment of cows for the highest lactation, taking into account the productivity of mother and mother of father. In fact, such an evaluation is conducted according to the phenotype, which does not allow to reliably reveal the genotype, which is the basis of the breeding value of the animal. In recent years, in breeding practice, an index score is increasingly used, combining genetic information about the breeding value of the estimated cow (proband) and its parents.The introduction in Kazakhstan of an autonomous system of continuous multi-indicative genetic assessment based on the Animal Model procedure and animal genotyping at the loci of quantitative traits will make it possible to stand on a par with the world's leading selective countries in the short term.

The most accurate estimate of cows of native Alatau breed in terms of milk yield, fat and protein content in milk, the total amount of fat and protein can be obtained for the first three lactations or for the whole life. In earlier studies, we found that the average dairy productivity of cows for all lactations correlates well with milk yield for the highest lactation [1,2]. By the highest lactation, only full-aged cows can be evaluated.

Characteristics of the productive qualities of dairy cattle cannot be complete without determining the correlation between productivity indicators (table 4). In the economy, the selection for increasing the butterfat content was conducted for a certain time, and the protein content in milk was not given due attention, so a negative correlation was observed between the fat content of milk and milk yield for lactation, and the negative correlation of milk yield with the amount of protein in milk.It has been established that phenotypic correlations between the content of milk protein and milk yield for lactation are in most cases slightly negative. The exception was the correlation coefficients of daughters of Atway 10/0035033607, AltaPersy 011BS00673, Preference 09363006 Payout-DE 000939829089, in which they turned out to be more negative.

Table 4 – Coefficients of correlation of milk protein for lactation and fat content in milk in daughters of different bulls

Servicing bulls	Indicator	
	Milk yield for lactation, kg	Fat, %
JACK 76BS0908	-0.045*	0.331*
TREVER-ET 76BS0905	-0.077**	0.496*
Teddy 76BS0913	-0.069**	0.513**
Preference09363006	-0.191**	0.382*
Atway 10/0035033607	-0.227**	0.617*
Event 10/0034216002	-0.092**	0.475*
Alta Persy 011BS00673	-0.261**	0.582**
Payout-DE 000939829089	-0.186***	0.278***
Alta Joel 011BS00644	-0.293*	0.484**
P ≥ 0.95, **P ≥ 0.99, ***P ≥ 0.999.		

Thus, simultaneous selection in the direction of high milk yield and high butterfat had a positive effect on the correlation between these features. The coefficients of phenotypic correlations between protein and fat content in milk have average values and are positive, that suggests an increase in the content of milk protein during selection in the direction of increase in butterfat. And vice versa - when conducting selection for milk protein, the probability of increasing and content of protein in milk is high.

It is established that the daughters of the first generation Swiss producers outperformed the purebred herdmates of the Alatau brown breed by 12.8% (P<0.99) in terms of milk yield for 305 days of lactation. Further increase in bloodiness of the Swiss leads to a decrease in the level of productivity due to a mismatch in the feeding level of the genetic potential of cow productivity.The daughters of the Swiss producers of the second generation differed from herdmates in milk fat content by 0.02% (P<0.99), and from the purebred Alatau brown breed analogues by 0.05% (P>0.99). At the same time, the daughters of the Swiss bulls of different generations of butterfat content did not differ reliably between themselves (P<0.95).

The products of cattle breeding with high added value can practically be obtained at the feed of own production, without importing them from other regions of the Republic of Kazakhstan. Therefore, the "AIC "Adal" JSC created its solid fodder base.

Experiments have shown that differences in the productivity of cows at high and low levels of their feeding are significant. Thus, in cows with a "rich" genotype, in improved feeding conditions, the productivity increases by 70-80%, while in cows with a "poor" genotype it is insignificant by 10-15% or does not increase. This leads to the most important practical conclusion - favorable conditions of the external environment provide a full manifestation of hereditary deposits and an objective evaluation of the genotype.

Without using the achievements of genetics and selection in breeding work, in combination with traditional methods, it is impossible to provide the rates of genetic improvement necessary under the current conditions and, as a result, to increase the productive qualities and improve the economically useful traits of cattle.

The parameters of the air pool in the autumn and winter period in the maternity ward and the winter period in the dispensary were respectively the following: temperature - 15.4 °C and 15.8 °C, relative humidity 68.1% and 72.5%, air velocity 0.25 and 0.17 m/s, bacterial contamination - 30.0 and 23.0 thousand/m^3, ammonia content - 8.3 and 6.5 mg/m^3, hydrogen sulfide - 4.5 and 3.0 mg/m^3, carbon dioxide - 0.12 and 0.15%, no carbon monoxide was detected, dust - 2.5 and 1.1 mg/m^3.The luminous coefficient was 1:14 with the coefficient of natural illumination 0.74%. Zoohygienic standards for the main indicators of the microclimate in cowsheds and premises for growing calves were strictly observed (table 5).

Table 5 – Microclimate in the premises for animals

Indicator	Premise			
	cowshed	maternity ward	dispensary	calf-shed
T, °C	10.6±0.28	15.4±0.29	15.8±0.24	14.1±0.12
R, %	71.5±1.11	68.1±0.81	72.5±0.85	76.4±0.7
ν, m/s	0.35±0.03	0.25±0.02	0.17±0.02	0.22±0.01
LC	1:14	1:14	1:14	1:14
CNI, %	0.65±0.03	0.68±0.02	0.75±0.02	0.78±0.02
NH_3, mg/m^3	11.9±0.33	8.3±0.37	6.5±0.21	7.2±0.25
H_2S, mg/m^3	6.8±0.18	4.5±0.18	3.0±0.19	4.9±0.21
CO_2, %	0.18±0.01	0.12±0.01	0.15±0.01	0.19±0.01
BC, thous/m^3	37.4±1.17	30.0±0.97	23.0±0.83	31.8±0.81
Dust, mg/m^3	3.9±0.22	2.5±0.17	1.1±0.10	2.1±0.15

In the winter season of the year, the morphological composition of the blood of the Alatau brown breed was studied, depending on the bloodiness according to the Swiss (table 6). The first-calf heifers of the Alatau brown breed, various bloodiness by the Swiss, were involved in the research objects. Blood sampling was carried out for 2 days and examined on the automatic analyzer.

Table 6 – Morphological composition of the blood of cows of the Alatau brown breed in the winter season of the year

Morphological characteristics	Bloodiness by the S wiss, %			
	62.5	25.0	12.5	norm
n, heads	10	10	10	10
Leucocytes, $x10^9$/l	9.11±0.44	8.78±0.38	7.33±0.41	4.5-12.0
Lymphocytes, $x10^9$/l	4.69±0.31	4.91±0.35	4.46±0.31	4.0-6.5
Erythrocytes, $x10^{12}$/l	5.71±0.21	5.19±0.18	6.22±0.16	5.0-7.5
Hemoglobin, g/%	11.24±0.14	10.77±0.19	9.49±0.21	9.0-12.0
Hematocrit, %	38.88±0.64	42.63±0.52	39.91±0.36	35-45
Absolute thrombocyte level, cells/μL	331.8±21.6	405.5±17.4	539.2±25.6	260.0-700.0

The revealed changes in some blood parameters in the heifers of the Alatau brown breed are directly related to bloodiness by the Swiss. The results of the research in practical terms make it possible to determine the expediency of using the seed of the Swiss servicing bulls of foreign breeding in the foothill zone of the Almaty region.

The methodological essence of the research is that on the basis of a comparative study of the main indicators of the morphological composition of the blood, one can judge the conjugation of the organism of each individual and, on average, according to the sample for each group, and for each animal individually.

The results of the research showed that the morphological composition of the blood of the Alatau brown breed in the conditions of the Almaty region during the winter season of the year is within the limits of the physiological norms. The concentration of leukocytes was 7.33-9.11 $x10^9$/l (norm 4.5-12.0), lymphocytes 4.46-4.91 $x10^9$/l (norm 4.0-6.5), erythrocytes 5.19 -6.22 $x10^{12}$/l (norm 5.0-7.5), hemoglobin 9.49-11.24 g/% (norm 9.0-12.0), hematocrit 38.88-42.63% (norm 35-45), thrombocyte level 331.8-539.2 cells/μl (norm 260.0-700.0).

To improve the breeding efficiency of the Alatau breed and its hybrids from the Swiss breed, the diet was strictly regulated (tables 7, 8). This allowed to receive calves in the future with the given zootechnical productivity parameters (table 9). The studies were conducted with the aim of increasing the dairy cow's use in the herd by optimizing the duration of the breeding and reproduction cycles.

Table 7 – Rations for cows with a live weight of 650-700 kg

Indicators	Nonmilk. Cows	Cows with daily milk yield, kg			
		16	20	24	28
Bean hay, kg	7.0	6.0	6.0	6.0	6.0
Haylage, kg	10.0	12.0	10.0	10.0	9.0
Maizesilage, kg	15.0	10	13.0	16.0	18.0
Concentrates, kg	4.0	4.8	5.6	7.5	8.2
Including:					
Cattlecake, kg	1.5	–	–	1.0	2.0
Driedbeetchips,kg	1.2	2.0	2.5	3.0	3.0
Molasses, kg	1.2	0.8	1.0	1.2	1.5
Feedingbeet, kg		–	–	–	5
NaCl, g	70.0	89.0	105.0	132.0	143.0
Disodiumphosphate, g	130.0	40.0	50.0	90.0	110.0
The diet contains					
F.u.	15.51	15.30	16.67	19.80	21.52
Change/Energy, MJ	180.71	177.12	191.75	224.68	244.39
D/m, kg	20.00	19.58	20.74	23.79	25.31
Digest. protein, g	1611.61	1407.6	1528.2	2030.5	2387.4
Ca, g	173.91	191.76	201.90	229.14	231.7
F, g	111.88	104.72	116.97	152.14	166.84

Table 8 – Rations for cows with a live weight of 650-700kg

Indicators	Cows with daily milk yield, kg				
	12	28	32	36	40
Beanhay, kg	6.0	6.0	6.0	6.0	6.0
Haylage, kg	13.0	10.0	9.0	9.0	9.0
Maizesilage, kg	10.0	16.0	18.0	18.0	16.0
Concentrates, kg	3.0	7.5	8.2	9.5	11.5
Including:					
Cattlecake, kg	–	1.0	2.0	2.5	3.0
Driedbeetchips, kg	1.5	3.0	3.0	3.5	3.5
Molasses, kg	0.5	1.2	1.5	1.5	1.5
Feedingbeet, kg	–	–	5.0	8.0	10.0
NaCl, g	73.0	132.0	143.0	155.0	167.0
Disodiumphosphate, g	40.0	90.0	110.0	110.0	120.0
The diet contains:					
F.u.	13.20	23.62	25.46	28.02	29.48
Change/Energy, MJ	155.20	267.30	285.94	317.03	332.24
D/m, kg	1773.0	27.28	28.82	31.50	32.43
Digest. protein, g	1183.0	2689.0	3016.5	3467.5	3853.4
Ca, g	166.6	250.95	272.90	287.00	295.60
F, g	80.15	186.4	216.35	235.15	261.99

Table 9 – Analysis of directed heifers breeding for the reproduction of the main herd in the "AIC "Adal" JSC

Item	Years		
	2012	2013	2014
Average live weight of heifers at birth, kg	26.0±0.5	23.7 ±0.4	27.0±0.4
Age of heifers during first insemination, months	25.0±0.8	21.5±0.5	17.5±0.7
Live weight of heifers at the first insemination	355±26.2	370±19.5	373±22.6
Live weight of the heifers at calving, kg	514.2±31.6	508±29.3	560±24.1
Average live weight of the main herd cows, kg	498.6±17.9	498.4±22.6	513.5±12.4
Average live weight of heifers at birth, kg	28.2±0.5	36.8±0.6	38.7±0.4
Age of heifers during the first insemination, months	16.8±0.4	16.0±0.6	14.6±0.4
Live weight of heifers at first insemination, kg	386±18.5	395±21.6	410±27.8
Live weight of bred heifers, at calving, kg	569±18.9	569±27.2	558±27.3
The average live weight of cows of the main herd, kg	580±31.5	647±23.2	680±33.2

Based on the conducted research, summary of literature data and the practices of feeding cows, we have developed a system of feeding high-yielding cows, which includes requirements for the quality of feed, advanced feeding standards, rations, recipes for mixed fodders, and premixes, feeding characteristics for lactation phases, regimen and technique of feeding.Such a feeding system was introduced into practice in the AIC "Adal" JSC in 2014-2017. As a result, the productivity of cows has increased by 20-22%, while the feed consumption per unit of production has decreased by 5-7%, which indicates that proper feeding contributed to a greater disclosure of the genetic potential of the productivity of cows of the Alatau breed.

Feeding in the AIC "Adal" of Enbekshikazakh district of the Almaty region is mainly based on the production of own fodder.

Feeding base of livestock complexes is built in accordance with the general principles of intensive forage production. Its main feature is full compliance with the requirements of science-based feeding of animals.

At any type of feeding, dairy cows receive the necessary amount of energy, nutrients,and minerals according to their needs and physiological state in the optimal concentration and ratios. The higher the productivity of animals is, the more carefully the diets should be balanced with their needs.

Our experiment shows that the same feeds from different farms differ in their chemical composition, nutritional value, cost price. Therefore, the farms annually make analyses of harvested forages for a more accurate balance of animals feeding.

Feeding of animals corresponds to their potential capacities in each specific lactation period or during the interlactation period, that is, it is carried out in accordance with the nutritional requirements, depending on the physiological state.

Recipes of feed mixtures are different and depend on the milk yield of animals. It is compiled separately for nonmilking cows and cows in the maternity ward and highly productive cows. Improvement of the quality of fodders harvested in the farm is the main way to reduce the consumption of concentrates, improve the health and reproductive function of cows and, ultimately, improve the economic efficiency of dairy cattle.

One of the most important factors contributing to the full realization of the genetic potential of animal productivity is full, balanced feeding. In this process, the nutrients of the feeds affect the animal's organism not in isolation from each other, but in a complex.

Peculiarities of feeding animals in the farm arise taking into account the amount of harvested fodder and its nutritional value with a long enough housing season. In summer, the basis for feeding of milking cows is alfalfa and pasture grass. Good rotation pastures ensure the receipt of high yields with minimal additional feeding with other feeds. The green feed contains all the nutrients the animal needs.

The feeding, which provides good health to the animals, normal reproductive functions, high productivity and good product quality with the lowest feed costs, is considered full-fledged.

It has been established that the necessary condition for normalized feeding in keeping is the labeling of animals, which makes it possible to quickly find the necessary animals and transfer them from one group to another. In practical terms, the most optimal should be considered the division of animals into 6 groups. 1 - newly-calved group (up to 45 days of lactation), 2 - high-productive, 3 - medium-productive, 4 - low-productive, 5 - first 40 days of interlactation period, and 6 - the last 20 days of interlactation period. The distribution practice of animals by physiological groups, without taking into account the level of dairy productivity, is ineffective, due to large differences within the group, especially in young herds.

It should be noted that growing of offspring is one of the most difficult tasks, in view of the problem of keeping calves [13, 14].

In many farms of the Almaty region, various technologies are being used to increase the rate of preservation of newborn animals and further growth of viable animals. The most common is the cold method of growing calves. However, in connection with the construction of the principal buildings with a regulated microclimate, there is a tendency to increase the air humidity and the content of harmful gases, the active development of microorganisms that leads to respiratory, gastrointestinal and other diseases of young animals and their significant mortalities.

The experience of many farms shows that calves can be successfully grown in portable light houses made of plywood or pressed wood boards installed under awnings or in an open area. The greatest effectiveness is achieved when keeping calves in individual cells in the light unheated premises. At the same time it should be noted that calves grow well and are not sick in "cold" conditions, but when they are transferred to a warm premise, they become ill with many diseases characteristic of infantile age.

Directional rearing of young cattle of dairy breeds is focused on the preparation of animals for long-term operation and milk production. With good indicators of the average daily gain in live weight, repair heifers by the first calving should reach 82-86% of the planned live weight of the adult.

At the age of 18 months, the live weight should increase in comparison with the live weight of calves at birth by 11-12 times. This is provided under the condition of the average daily increase from birth to 6 months of age of 650-750 g, from 6 months to 12 months of age of 550-650 g, from 13 months to 24 months of age of 450-550 g.

There are data on the provision of the average daily gain in live weight from birth to 9 months of age within 850-950g, from 9-12 months of age - 750-850g, from 13 months of age and over - 650-750g [25]. At the same time, a number of researchers recommend providing an average level of growth in the period

before puberty and accelerated growth after that, since accelerated growth after puberty has a positive effect on the future dairy productivity of the cow. The increase in live weight in heifers in the optimal regime promotes a clear manifestation of the signs of estrus and fertilization during the insemination period[26].

During the conducted studies it was found that the live weight increases from birth to 17-18 months of age by more than 12-13 times and the average daily gain from birth to 18 months of age is 700-800 g per day.

Modern technology of dairy cattle breeding is aimed at the creation of herds that meet the tough requirements of highly mechanized farms. In this regard, it is necessary to harden the requirements for the in-process sampling of cows for further breeding and selective work. The performance of this work is possible with a reliable assessment of cows by technological and morphofunctional parameters of the udder.

Up to this point, there is no single standard for the average daily live weight gain of heifers by growing periods. In the United Kingdom, heifers before calving should have a uniform increase in live weight up to 26 months of age. In the USA, it is recommended to achieve a live weight in calves by the end of the dairy period not less than 110 kg, and by the age of insemination (14-15 months) - not less than 400 kg.

In Germany it is recommended to achieve a live weight of calves at the age of 6 months - 180 kg, 12 months - 310 kg, 18 months - 420 kg and 24 months - 510 kg. The average daily gain is equal to 800, 700, 600 and 500 g respectively.

The Dutch growing system of repairing heifers provides for a low growth of live weight in the milking period - 620 g, then until the end of the first year of life - 880-900 g and a decrease in growth after insemination of calves in the second year of life up to 700-600 g.

It has been established that heifers with uniform live weight gain in all age periods have a high rate of fertilization, and at the time of calving can produce offspring with a high live weight at birth, in addition, during the first lactation they produce high-quality milk in a greater volume.

A number of researchers recommend providing an average level of growth in the period before puberty and accelerated growth after that, since accelerated growth after puberty has a positive impact on the future dairy productivity of the cow. The increase in live weight of heifers in the optimal regime promotes a clear manifestation of the signs of estrus and fertilization during the insemination period [25]. Thus, the review of the scientific literature and own data confirms the existence of different approaches to determine the most effective technologies for growing repair heifers, as well as determining the optimal rates of growth in different age periods.

Stably high dairy production can be achieved not only by the appropriate genetic material but also by the modern technology for the directed growth of young animals and the optimal way of keeping cows of dairy breeds. Therefore, the development of the scientifically based technology of the directed growth of young animals, the determination of optimal methods for keeping dairy cows is the right choice of the research directions

When assessing the cows for productivity, the influence of environmental factors was taken into account. This is due to the fact that heifers grown in unsatisfactory conditions will never become highly productive cows, even if they come from high-value parents [15-20]. Due to the lack of feed and its poor quality, the genetic potential of animals is often realized in farms only by 40-80% [21-30].

Growing with the moderately cold method can be appropriate only for healthy, well-developed calves. However, the incalvers were not well prepared for calving in the interlactation period, they were poorly fed and kept in bad conditions, then weak and underdeveloped calves are born from them. They are usually inactive, lie a lot, they hardly rise, a sucking reflex, and their appetite is weakly expressed. Such calves cannot be grown in a "cold" way and they need special care.

In a number of livestock projects, there is a provision for the zero pasture of calves till the age of 3 months in individual narrow-sized cages. This method of keeping calves allows to significantly increase the density of animals accommodation [4].

Thus, the practice of successful growing calves includes the organization of proper feeding, maintenance, sanitation, ventilation, prevention of diseases, constant monitoring of development. Based on the studies conducted in the period 2015 - 2018 we believe that the aim of growing dairy heifers is: the age of

heifers at calving is 24 months; live weight of heifers at calving is from 85% to 90% of the live weight of the adult animal; fatness of heifers at calving is 3 (1-5); age at insemination - 15 months; live weight of heifers when inseminated is from 55% to 60% of the live weight of the adult animal; fatness of heifers at insemination - 3 (1-5).

With the average daily weight gain of 750 g at the age of two months, the heifers should have a live weight of 75 -90 kg, at a six-month age - 180-220 kg, at a 15-month age - 380-420 kg and at the age of 2 years - 580-620 kg (table 10).

Table 10 – Recommended growth for the heifers. The incremental amount of 750 g/day (2017-2020)

Age, months	Live weight, kg
2	75-90
6	180 - 220
15	380 - 420
24	580 - 620

Continuation of table 10

Age, months	Note	Concentrate, kg	Crude protein in the dry matter of the diet, %
0 - 3	Calves - suckers	Plentyof	18-20
3 - 6	Growth of the udder	2.0 – 2.5	16 - 17
6 - 9	The growth of the udder	1.3 – 1.7	15 – 16
9 - 15	Limitedfeeding	1.0 – 1.5	14 – 15
15 - 24	Bredheifer	0.5 – 1.5	13 -14

The ratio of crude protein in the dry matter of the diet should be 18-20% for calves from birth to 3 months of age. For the replacement heifers it is required a maximum average daily gain in the first 6 months, bringing them up to 900 g/day, then in the period of 7-11 months - at a level of 750-800 g, increasing the nutritional value of the diet solely by introducing the main food in the diet. At the same time, the amount of mixed feed varies depending on the quality of the main feed. At the age of 12-15 months, the average daily gain is kept at a level of no higher than 700 g, carefully making sure that the heifers are not fattened.

Currently, the calves of Alatau brown breed show almost the same gain of live weight as young fattening. This phase of development largely determines the subsequent productivity of the heifers. Successful calf growing at an early age and healthy, with well-developed chewing functions, a more adult calf is a good starting point for growing a heifer. Till the age of three months, when feeding heifers, it is not worth saving on the quality and volume of concentrated food, it is given in plenty.The most problematic period in growing calves - the first months after calving, when they are particularly stress-susceptible when adapting to external conditions. In the first months of life, growth occurs due to enhanced protein synthesis and development of organs and muscle tissue. The rate of fat synthesis during this period is low and practically does not change, regardless of the conditions of feeding and maintenance. With an increase in body weight, the situation changes. The growth of adipose tissue increases. Animals grow quickly and reach the desired live weight.

It was established that the first weeks of calf life are crucial for the development of internal organs. During this period, there is an intensive increase in the number of cells, and their number eventually determines the working capacity of organs in the future by affecting the productivity of the female breast, blood supply and protective function of the liver. To achieve optimal results in growing, everything should be done to ensure that in the first months of life the calves are as intensively developed as possible according to table 9.

Based on the conducted investigations, it can be noted that the basis for the formation of a highly productive dairy herd of Alatau brown cattle breeds is optimally grown bred heifers and their timely

putting into service. With proper feeding and control over development, calving can be successfully performed already at the age of 24-25 months.

Herewith, obesity of the heifers should be avoided, as this leads to complex calving and the birth of non-viable calves.

Table 11 shows the in-process control of growth and development of replacement offspring.

When growing heifers, the main condition is the principle: at the age of 15 months all heifers should be fertilized. Those who are still not pregnant at the age of 18 months should be considered candidates for culling in accordance with the current economic situation (expensive feed and reasonable price of bred heifers).Those heifers who are easily fertilized theoretically have the best genetics in the herd and are almost never sold if they are pregnant. In the future, it is necessary to use the best bulls that they can afford for insemination taking into account the ease of calving their daughters. The availability of the effective breeding program for heifers and their calves at a young age will allow to maintain a smaller herd of heifers to provide repair, or enables the sale of the surplus of heifers.

Table 11 – In-process control of growth and development of replacement offspring

Groups	Key parameters
0-6 weeks	Health. Linear growth in weight gain. Maximum Energy and Protein Consumption.
6-12 weeks	Growth of weight gain. Maximum Starter Consumption.
3-9 weeks	Skeleton development. Measurement.
9-15 weeks	Gain in weight. Fatness.
15-23 weeks	Fatness.

In most regions of Russia, the predominant in terms of numbers of dairy cattle remains black and motley (55.7%), as the most highly productive with good product payment for fodder [31]. Mass breed of dairy cattle is also brown.As a result of selection, brown cattle, both in the Russian Federation and in the Republic of Kazakhstan, has acquired features inherent in the dairy type, but with good signs of meat, and has a great potential for productivity, which exceeds many of the breeds by zootechnical and economic indicators. The obtained data will serve as the basis for updating the breeding and selection program with domestic brown cattle, namely the Alatau breed of different genotypes.

Analysis of the economic situation in the farms of the AIC "Adal" JSC in terms of dairy cattle for the last period of 2014-2018 shows that the cost of repairing the herd, currently account for 16% to 23% of the total costs of the enterprise for milk production, ranking second after the cost of feed. When entering the heifers in the amount of 22-32% of the main herd, as a rule, in the household, there are still about 10% of the heifers. They can be used for sale and additional income.

In other farms of the Almaty region, the live weight of calves before calving is only 450-500 kg at a rate of 580-620 kg. It is inappropriate to grow such heifers - it is impossible to get a lot of milk from them. In most farms of the Almaty region, the average calving age of the calves is more than 30 months. As our observations showed, the delay in insemination is usually associated with a low live weight of heifers.The main reasons for this are: the use of all heifers for repairing the herd without proper selection and breeding work, the lack of starter mixed fodders; unbalanced diets; poor conditions of detention; non-compliance of microclimate parameters with veterinary requirements. Low average daily gain, late introduction of heifers into the herd - all this directly affects the profitability of milk production.

Discussion of the results of the research. As a result of selective and breeding work, improved herds of the Alatau brown cattle breed of different genotypes, differing in their level of productivity and fitness for industrial technology, have been formed in the AIC Adal JSC of Enbekshikazakh district of the Almaty region. In the development of the Alatau brown breed, the strategic direction is to obtain cows-champions, to create a large array of highly productive herds.Classical methods of selection - selection, assortment, breeding by lines and families, inbreeding, index selection, etc., - allow to assess the status of the main breeding features in herds, to conducts highly reliable genetic monitoring of breeding processes occurring in populations, and to develop methods for increasing selection efficiency as in individual herds, and in the breed as a whole.

The high genetic potential of the dairy productivity of the brown cattle in the conditions of the AIC "Adal" JSC was achieved as a result of breeding by two main features: milk yield taking into consideration the overall yield of milk fat and the type of body build, as well as intensive selection and use of bulls, preservation of health, longevity and reproductive capacity of valuable servicing bulls and high-yielding cows, intensive level of rejection of animals, evaluation of cows in terms of feeding speed and payment for their products, udder shape and milking speed, behavior pattern in the herd.

A decisive role in the improvement of brown cattle was played by a solid fodder base, abundant high-grade and highly concentrated type of dairy cattle feeding.

The peculiarity of breeding the Alatau brown cattle is the rapid change of generations. Lines in the herd exist as long as servicing bulls give offsprings that exceed the breeding value of descendants of bulls of other lines, bulls-leaders of the breed and are subordinated to the requirements of the economy of dairy cattle breeding. The main lines of brown cattle include the lines of Concentrate and Prestige.

In the creation and improvement of the Alatau brown breed, a certain value belongs to the families. When they were brought to the "AIC "Adal" JSC, the maximum use of eminent animals, using in a number of generations both crosses and intensive inbreeding. The results of crossing with brown Swiss cattle served as the basis for creating highly productive populations of the Adal domestic brown dairy cattle. The use of Swiss breed allowed for several years to achieve significant progress in dairy cattle breeding.

The results of crossing with the use of the Swiss bulls, conducted in the conditions of AIC "Adal" JSC of Enbekshikazakh district of the Almaty region, allow to consider this method effective for increasing the genetic potential of the Alatau breed.

Achievements in selection and breeding work with the Alatau breed of cattle using bulls evaluated on the quality of offspring, combined with extensive use of artificial insemination and new biotechnological methods in dairy cattle breeding, allowed to increase breeding qualities and genetic potential of livestock productivity. The special role of using the best world gene pool of the Swiss breed should be noted.

The experience gained over many years of crossing the Alatau and Swiss breeds has shown that with the increase of bloodiness in the Swiss breed, the milk of first-calves and full-aged cows increases, while the qualitative composition of milk, the reproductive capacity of cows deteriorate and the period of their economic use is shortened. The further use of the gene pool of the Swiss breed for the improvement of livestock should be strictly coordinated with a view to preserving the unique economically useful traits of the Alatau and Swiss breeds of brown cattle.

In breeding practice, the global gene pool is widely used to increase the abundance of cows of domestic breeds. The results of the conducted studies showed that an increase in the share of blood in the improving breed, in this case - the Swiss breed, leads to a population that is more demanding of the conditions of feeding and maintenance.

In the future, it is expected to optimize the breed composition of cattle in the Republic of Kazakhstan. However, optimizing the breed composition, we should not forget about the preservation of the gene pool of the most valuable local native breeds - the bearers of unique traits, which belong to the Alatau brown breed.

Breeding in each region of the Republic of Kazakhstan of several dairy breeds of livestock creates the need for their comparative evaluation and substantiation of a rational numerical ratio. Preservation of the genetic diversity of animals is a guarantee of the survival of the breeds, as well as their further progress. Preserved and improved genetic resources will be required both for breeding and for increasing the resistance of animals to extreme environmental conditions in the extreme continental climate of Kazakhstan.

Specificity of breeding work in cattle breeding is associated with relatively slow reproduction due to low fertility, while the number of calves (considering the waste) hardly provides extended, and sometimes simple reproduction of the herd, even with low intensity of selection (rejection) of replacement heifers.

In addition, cattle is late ripening. With a good organization of growing from the first-calf, products are obtained in the form of milk and litter after 27-28 months of life, and almost from this time it begins to pay back the funds spent on its growing process.

The results of the research showed that the morphological composition of the blood of the Alatau brown breed in the conditions of the Almaty region during the winter season is within the limits of the physiological norm. The concentration of leukocytes was 7.33-9.11 $x10^9$/l (norm 4.5-12.0), lymphocytes 4.46-4.91 $x10^9$/l (norm 4.0-6.5), erythrocytes 5.19-6.22 $x10^{12}$/l (norm 5.0-7.5), hemoglobin 9.49-

11.24 g/% (norm 9.0-12.0), hematocrit 38.88-42.63% (norm 35-45), thrombocyte 331.8-539.2 cells/μl (norm - 260.0-700.0).

Highly productive cows of the Alatau brown breed react more not to low temperatures, but to a combination of cold and high humidity. Excess of solar radiation and cold rainy weather reduce the milk yield by 8-10%.

The optimal way to maintain in-calf nonmilking cows in winter is primarily to keep in warm, light, dry, well-ventilated drafts, with enough dry bedding. The optimal parameters of the microclimate in the room are the following: air temperature - 10-15^{0}C, relative humidity - 55-70%, air exchange for 1 centner of live weight - 17 m^3/h, air speed - 0.5 m/s. When the temperature in the room is lowered, the water heating-up to 20-25^0 C is provided.

In winter, the temperature in the cowsheds is 8-10 °C, in the maternity ward - 16 °C. Relative humidity in the premises is 70%. The speed of air movement is 0.3-1.0 m/s. The concentration of ammonia is 20 mg/m³. Concentration of hydrogen sulfide is 10 mg/m³. The dust content is 1-2 mg/m³. natural light factor is 0.4 W/m². The coefficient of artificial illumination is 4.5 W/m². The luminous coefficient is 1:10. The area for keeping one cow is 1.2-1.8 m². In the maternity ward - 1.2-2.0 m².

In-calf nonmilking cows should be kept in separate groups with the number of 15-20 heads, but not more than 25 heads, which are formed depending on the expected calving time. With an increase in the number of animals in groups, they relax less and spend more time eating food. The floor area per head should be at least 5 m^2.

It has been established that in the case of yard housing of cows, sterile cows gain better weight due to more intensive development of the fetus, in comparison with the in-calf cows with a tie-up content.

Long-term stay of in-calf animals in unfavorable micro-climatic conditions in winter (low temperature and high air humidity, lack of light, excessive concentration of harmful gases, dustiness, poor premise ventilation, drafts, etc.), repetitive other stressful stresses can lead to a breakdown in their physiological processes.

A positive effect of the active regimen of the in-calf cows on the growth of the fetal tissues was established. Training helps to strengthen the health of cows and fetus, increase metabolism, facilitate calving. Cows are much less likely to have ancestral and postpartum complications.

In winter, the in-calf cows and bred heifers are released for walks in accordance with the optimal mode of maintenance and the activity is achieved without compulsion by mechanical devices or whips. Walking cease 10 days before calving. In walking cows the disease of calves is 8-15 times less than in young animals obtained from dams without the use of regimen.

Therefore, it is necessary to ensure the optimal temperature regime in all objects where animals are kept.

REFERENCES

[1] Alentaev A.S., Ombaev A.M., Baimukanov D.A. Patent of the Republic of Kazakhstan No. 30902 for the invention // Method of selection of dairy cattle for breeding according to the cytogenetic status. Publications, February 15, 2016, bullet number 2. Astana, 2016. 5 p. (in Russ.).

[2] Alentaev A.S., Ombaev A.M., Baimukanov D.A., Smailov S.D., Abdrakhmanov K.T. Patent of the Republic of Kazakhstan № 32232 for the invention // Method of selection of cattle of black - motley breed for breeding. Publ., May 15, 2017, Bulletin No 5. Astana, 2017. 5 p. (in Russ.).

[3] Beguchev A.P. Cattle breeding. Growth and development. M.: Kolos, 1984. 519 p. (in Russ.).

[4] Vasilenko S.V. Productivity and adaptation of heifers purchased from the population and heifers of imported breeding when kept in rooms of light type in the conditions of the Central Chernozem Zone // Abstract of diss. for the academic degree of cand. agricultural. sc. Belgorod, 2013. 19 p. (in Russ.).

[5] Volkov G.K. Zoohygienic standards for livestock facilities. M.: Agropromizdat, 1986. 303 p. (in Russ.).

[6] Frolov A.I. Influence of different methods of keeping calves in the dairy period on their subsequent growth and development // The dissertation author's abstract on the scientific degree of the candidate of agricultural sciences. Dubrovitsy: VIZh, 1979. 20 p. (in Russ.).

[7] Gagarina O.Yu., Moshkina S.V. Proper cultivation of young dairy cattle is the guarantee of productive longevity of animals // Ways of prolonging the productive life of dairy cows on the basis of optimization of breeding, technologies of keeping

and feeding animals: materials of the international. scientific-practical. conf., (May 28-29, Dubrovitsy settlement). Dubrovitsy: VIZhim. L.K. Ernst, 2015. P. 12 -15 (in Russ.).

[8] Vilver D.S. Interrelation of economic-useful traits of cows of different genotypes // Achievements of science and technology of agroindustrial complex. 2015. N 4. P. 41-43.

[9] Kartashova A.P., Firsova E.V. The influence of genealogical groups on the life expectancy of cows // Ways of prolonging the productive life of dairy cows on the basis of optimization of breeding, technologies for keeping and feeding animals: materials of the international. scientific-practical. Conf., (May 28-29, Dubrovitsy settlement). Dubrovitsy: VIZh. L.K. Ernst, 2015. P. 34 -38 (in Russ.).

[10] Baimukanov D.A., Rodionov G.V., YuldashbaevYu.A., Alentaev A.S., Doshanov D.A. Technology of keeping dairy cattle and milk production: Textbook. (ISBN 978-601-310-197-2). Almaty: Evero, 2016. 252 p. (in Russ.).

[11] Baimukanov D. Dairy cattle breeding: integration of science and practice // Agricultural magazine "Agro Alem" from 15.09.2014. P. 3-4 (in Russ.).

[12] Baimukanov D.A., Tarchokov T.T., Alentaev A.S., Yuldashbaev Yu.A., Doshanov D.A. Fundamentals of genetics and biometrics (compilers Baimukanov D.A., Tarchokov T.T., Alentaev A.S., Yuldashbaev Yu.A., Doshanov D.A.) / Study Guide (ISBN 978-601-310-078-4). Almaty: Evero, 2016. 128 p. (in Russ.).

[13] Seltsov V.I., Sermyagin A.A., Tokhov M.Kh. New zootechnical criterion for the production evaluation of the dairy cows use period in the herd // Achievements of science and technology of agroindustrial complex. 2012. N 8. P. 72-74 (in Russ.).

[14] Getokov O., Kaziev A. Influence of the genotype of bulls on the growth and milk productivity of Simmental-Holstein hybrids // Molochnoe and Meat Cattle. 2012. N 5. P. 9-10 (in Russ.).

[15] Vostroilov A.V., Lobodin K.A. Reproductive capacity of red-motley cows of the Voronezh type // Zootechnics. 2012. N 9. P. 30-31 (in Russ.).

[16] Gukezhev V., Gabaev M., Batyrova O. Selection of the main directions of breeding and technology of keeping dairy cattle in the North Caucasus Federal District // Dairy and meat cattle. 2012. N 6. P. 11-13 (in Russ.).

[17] Koval L. Profitable cow without problems // Livestock of Russia. 2012. N 6. P. 38-39 (in Russ.).

[18] Lebedko E. Accelerated evaluation of first-calves // Livestock of Russia. 2012. N 8. P. 57-59 (in Russ.).

[19] Svjazhenina M.A. Evaluation of the effectiveness of the use of different breeds of livestock for milk production // Achievements of science and technology of agroindustrial complex. 2012. N 7. P. 70-72 (in Russ.).

[20] Chetshenikhina O.S. Influence of the rate of growth of young cows on further dairy productivity and exteriors // Zootechny. 2012. N 9. P. 17-18 (in Russ.).

[21] Likasova N.I. Dairy productivity, composition and properties of milk of cows of different genotypes: the author's abstract of the dissertation ... cand. agricul. sciences: specialty 06.02.04; [Ural. state. inst. veterinarian medicine]. Troitsk (Chelyabinsk region), 1999. 21 p. (in Russ.).

[22] Mitjukov A.S. Perfection of methods of an estimation and increase of efficiency of stock breeding in dairy cattle breeding: the author's abstract of ... d-r. sciences: specialty 06.02.04; [S.-Petersburg. state. agrarian. un t]. SPt.; Pushkin, 1996. 40 p.(in Russ.).

[23] Botasheva L.Kh. Increasing the efficiency of milk production on the basis of improving stock breeding in cattle breeding. M.: FGU RCSK, 2006. 199 p.

[24] Zelenkov P.I., Baranikov A.I., Zelenkov A.P. Cattle breeding. Rostov-na-Donu: Phoenix, 2006. 571 p. (in Russ.).

[25] Kozankov A.G., Pereverzev D.B., Dunin I.M. Fundamentals of intensification of breeding and use of dairy cattle breeds in Russia. M., 2002. 352 p. (in Russ.).

[26] Kostomakhin N.M. Cattle breeding: a textbook. SPt.: Lan, 2007. 432 p.(in Russ.).

[27] Stepanov D. Fecundity of hybrid cows // Livestock of Russia. 2010. N 1. P. 43-44 (in Russ.).

[28] Chekushkina A. Dairy productivity of cows of different related groups // Dairy and meat cattle breeding. 2011. N 2. P. 8-9 (in Russ.).

[29] Yanchukov I., Matveeva E., Lavrukhina A. Horizons in selection of dairy cattle / I. Yanchukov // Dairy and meat cattle breeding. 2011. N 1. P. 10-11 (in Russ.).

[30] Kostomakhin N.M. Reproduction of the herd and the growing of replacement offspring in cattle breeding: a training manual. M.: Colossus, 2009. 109 p. (in Russ.).

[31] Baimukanov D.A., Semenov V.G., Mudarisov R.M., Kulmakova N.I., Nikitin D.A. Realization of meat qualities of bull-calves of black-and-motley breed by complex biological preparations // J. Agrarian science. M., 2017. N 11-12. P. 44 -46 (in Russ.).

А. С. Әлентаев[1], Д. А. Баймұқанов[2], С. Д. Смаилов[3], В. Г. Семенов[4], К. Т. Абдрахманов[3], Д. А. Бегалиева[5], М. М. Омаров[6]

[1]Мал шаруашылығы және ветеринария ғылыми-инновациялық орталығы, Астана, Қазақстан,
[2]Қазақ мал шаруашылығы және жемшөп өндірісі ғылыми-зерттеу институты, Алматы, Қазақстан,
[3]«Адал» агроөнеркәсіптік компаниясы» акционерлік қоғамы,
Алматы облысы, Еңбекшіқазақ ауданы, Қазақстан,
[4]«Чуваш мемлекеттік ауыл шаруашылығы академиясы», Чебоксары, Чуваш республикасы, Ресей,
[5]Қазақ ұлттық аграрлық университеті, Алматы, Қазақстан,
[6]Инновациялық Еуразия университетінің, Павлодар, Қазақстан

АЛАТАУ ТҰҚЫМЫ ҚОҢЫР МАЛЫН «АДАЛ» АГРОӨНЕРКӘСІПТІК КОМПАНИЯСЫ» АКЦИОНЕРЛІК ҚОҒАМЫНДА ӨСІРУДІҢ ТИІМДІЛІГІ

Мазмұндама. Сүтті ірі қара мал шаруашылығының селекциялық техникалық әлеуетін жаңарту - ірі қара малдың алатау тұқымын өсірудің экономикалық тиімділігін арттыруда басты шарт болып табылады.

Алатау тұқымының асыл тұқымды аналық малының, яғни сиырларының сүт өнімділігінің көрсеткіші 6761±71,3 кг болатын селекциялық топта 7661±92,8 кг екені анықталған. Алатау тұқымы сиырларының табын бойынша сүт өнімділігінің орташа көрсеткіші 7268+-75,9 кг, сүттегі майдың массалық үлесі 3,82±0,09 %. Орташа салмағы 620+-17,5 кг болатын алатау тұқымы сиырларының сүт майының шығымы 277,6±3,2 кг.

Үшінші және одан кейінгі лактациядағы сиырлардың орташа сүт сауымының деңгейі 8235±101,7 кг, ал сүт майының үлесі 3,84±0,08 %. Әр жастағы сиырлар тобының тірілей салмағының көрсеткіші бонитировкада көрсетілген бірінші кластың талаптарымен салыстырғанда анағұрлым жоғары екені дәлелденген.

Сүтті ірі қара малдың алатау тұқымында шешесінің және әкесінің шешесінің сүт өнімділігі 10424-14784 кг, сүт майлылығы 3,57-3,68 % болатын швиц тұқымы бұқаларының ұрығы пайданалынды.

Атқарылған зерттеулер негізінде төлдердің тірілей салмақ көрсеткіші туғаннан бастап 17-18 айлық жасқа дейін 12-13 рет өсетіні, ал осы мерзім ішінде тәуліктік салмақ қосуы 700-800 г болатыны анықталды.

2015-2018 жылдары атқарылған зерттеулер барысында алатау тұқымының сүт өнімділікті қашарларын өсіріп-бағуда анықталған негізгі мақсаттар: төлдеген кезіндегі қашарлардың жасы 24 ай, ал тірі салмағы ересек малдың салмағының 85-90 пайызы болу керек, төлдеген уақыттағы қашарлардың қоңдылығы -3 (1,5), ұрықтанған кезіндегі жасы – 15 ай, қашарлардың ұрықтандыру кезіндегі тірі салмағы ересек малдың салмағының 55-60 пайызын құрап, қоңдылығы - 3 (1,5) болуы тиіс. Ұрғашы бұзаулардың екі айлық жасындағы салмағы, тәуліктік салмақ қосуы 750 г болған жағдайда, 75-90 кг, алты айлығында 180-220 кг, 15 айлығында 380-420 кг және екі жасында 580-620 кг болуы қажет. Қашарлар біркелкі салмақ қосу негізінде жоғары ұрықтану көрсеткішіне жетеді, ал одан туатын төлдің салмағы жоғары болып, бірінші сауым маусымында сапалы сүт беріп, сүт өнімділігі артады.

Түйін сөздер: қоңыр мал, сүт сауымы, сүт майы, белок (ақуыз).

А. С. Алентаев[1], Д. А. Баймуканов[2], С. Д. Смаилов[3], В. Г. Семенов[4], К. Т. Абдрахманов[2], Д. А. Бегалиева[5], М. М. Омаров[6]

[1]Научно-инновационный центр животноводства и ветеринарии, Астана, Казахстан,
[2]Казахский научно-исследовательский институт животноводства и кормопроизводства, Алматы, Казахстан,
[3]АО Агропромышленная компания «Адал», Енбекшиказахский район, Алматинская область, Казахстан,
[4]Чувашская государственная сельскохозяйственная академия, Чебоксары, Чувашская Республика, Россия,
[5]Казахский национальный аграрный университет, Алматы, Казахстан,
[6]Инновационный Евразийский университет, Павлодар, Казахстан

ЭФФЕКТИВНОСТЬ РАЗВЕДЕНИЯ АЛАТАУСКОЙ ПОРОДЫ БУРОГО СКОТАВ АО АПК «АГРОПРОМЫШЛЕННАЯ КОМПАНИЯ «АДАЛ»

Аннотация. Модернизация селекционного и технического потенциала в молочном скотоводстве является приоритетным условием в повышении экономической эффективности разведения крупного рогатого скота алатауской породы.

Установлено, что коровы алатауской породы племенного ядра продуцируют 7661±92,8 кг молока, селекционной группы 6761±71,3 кг. В среднем по стаду коровы алатауской породы продуцировали молоко в

количестве 7268±75,9 кг, с массовой долей жира в молоке 3,82±0,09%. Выход молочного жира составил у коров алатауской породы 277,6±3,2 кг при средней живой массе 620±17,5 кг.

В первую лактацию удой в среднем составил 6604±81,4 кг при средней жирности молока 3,81 ±0,07%. Коровы при достижении третей и последующей лактации в среднем показали удой молока на уровне 8235±101,7 кг при массовой доле жира в молоке 3,84 ±0,08%. По живой массе все возрастные группы коров превосходили требования I бонитировочного класса.

По алатауской породе молочного скота использовали семя быков швицкой породы с удоем М (матери) и МО (мать отца) 10424-14784 кг, с жирностью 3,57-3,68%.

В проведенных исследованиях установлено, что живая масса увеличивается от рождения до 17-18 месячном возрасте более чем в 12-13 раз, а средний суточный прирост от рождения до 18 месячного возраста составляет 700-800 г в с утки.

На основании проведенных исследований в период 2015-2018 гг. считаем, что цель при выращивании молочных телок алатауской породы это: возраст телок при отеле - 24 мес; живая масса телок при отеле от 85% до 90% от живой массы взрослого животного; упитанность телок при отеле 3 (1-5); возраст при осеменении - 15 мес.; живая масса телок при осеменении от 55% до 60% от живой массы взрослого животного; упитанность телок при осеменении - 3 (1-5). При среднесуточном приросте живой массы 750 г в двухмесячном возрасте телочки должны иметь живую массу 75-90 кг, в шестимесячном возрасте 180-220 кг, в 15 месячном возрасте 380-420 кг и в двухлетнем возрасте 580-620 кг. Телки с равномерным приростом живой массы во все возрастные периоды имеют высокую оплодотворяемость, а в момент отела способны давать потомство с высокой живой массой при рождении, кроме того в период первой лактации продуцируют молоко высокого качества и в большем объеме.

Ключевые слова: бурый скот, удой молока, жир, белок.

About the authors:

Alentayev Aleydar Saldarovich – corresponding member of the Kazakh Academy of Agricultural Sciences, Doctor of Agricultural Sciences, Chief researcher of the Livestock and Veterinary Department,Scientific and Innovative Center for Animal Breeding and Veterinary Medicine, Astana, Republic of Kazakhstan, E-mail: alentaev55@mail.ru

Baimukanov Dastanbek Asylbekovich – Doctor of Agricultural Sciences, Professor, Corresponding Member of the National Academy of Sciences of the Republic of Kazakhstan, Chief Researcher of the Department of Breeding and Selection of Dairy Cattle, Limited Liability Partnership “Kazakh Scientific Research Institute of Animal Breeding and Fodder Production”, E-mail: dbaimukanov@mail.ru; https://orcid.org/0000-0002-4684-7114

Smailov Serik Dzholdasbekovich – General Director of JSC "Agro-industrial company "Adal", Enbekshikazakh district of the Almaty region, Republic of Kazakhstan

Semenov Vladimir Grigorievich – Doctor of Biological Sciences, Professor, Honored Scientist of the Chuvash Republic, Professor of the Department of Morphology, Obstetrics and Therapy, State Federal-Funded Educational Institution of Higher Professional Training “Chuvash State Agricultural Academy, e-mail: semenov_v.g@list.ru; https://orcid.org/0000-0002-0349-5825

Abdrakhmanov Kerimtay Tanatarovich – Advisor to the General Director for Livestock and Fodder Production of JSC "Agroindustrial Company "Adal", Enbekshikazakh district of the Almaty region, Republic of Kazakhstan

Begalieva Dinara Asylbekovna – PhD student of the department "Technology of production of livestock products" of the non-commercial joint-stock company "Kazakh National Agrarian University", Almaty, Kazakhstan. E-mail: adek.90@mail.ru

Omarov Marat Magzievich – Candidate of Agricultural Sciences, Associate Professor of the Chair of «Applied Biotechnology» at Innovative University of Eurasia, Kazakhstan, Pavlodar, e-mail: marat-bura@bk.ru

Publication Ethics and Publication Malpractice
in the journals of the National Academy of Sciences of the Republic of Kazakhstan

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see http://www.elsevier.com/postingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service http://www.elsevier.com/editors/plagdetect.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайте:

www:nauka-nanrk.kz

ISSN 2518-1467 (Online), ISSN 1991-3494 (Print)

http://www.bulletin-science.kz/index.php/ru/

Редакторы *М. С. Ахметова, Т. М. Апендиев, Д. С. Аленов*
Верстка на компьютере *Д. Н. Калкабековой*

Подписано в печать 10.10.2018.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
11,2 п.л. Тираж 500. Заказ 5.

Национальная академия наук РК
050010, Алматы, ул. Шевченко, 28, т. 272-13-18, 272-13-19