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Original Article

A Genetic Basis for Improving the Reproductive Qualities and Productivity of South-Kazakh Merinoes

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Abstract

Food shortages may be among the most significant negative consequences of overpopulation. In order to meet the nutritional needs of livestock origin, the number of available animals cannot be increased; however, ways must be sought to increase production per livestock unit. Livestock breeding is the science and art of establishing genes that are effective in the economical production of livestock, which creates superior livestock and poultry. The quality of the main stock of animals, the characteristics of the initial population according to the main characteristics of breeding, biological and internal characteristics, biochemical parameters of sheep blood with different genotypes, and its economic efficiency have been studied to achieve the aim of the present study. The animal subjects in this study were the South Caucasian merino sheep (Group I) and the mixed breed sheep (male of Australian merino x female of South Kazakhstan merino) (Group II). The age-related changes in the body weight of the resulting offspring were studied by weighing them at birth and 4, 7, and 18 months of age. Moreover, external body mass measurements were taken from these animals at the same time. In addition, absolute, daily average, and relative increases in their live weight were determined based on the weighting data and the considered blood parameters. According to the results of the present investigation, relatively high values of variability coefficients of blood acid capacity, globulin content, aldolase activity, alkalinity, and acid phosphatase were reported. The levels of total protein, albumin, globulin, and haptoglobin of the second group were 7.42%, 27.64%, 12.9%, and 9.7%, respectively, which had a significant increase, compared to those in the first group (P<0.05). The scientific research data are reflected and proved in this paper, which can serve as a specific contribution to zootechnical science to use the breeding-tribal work in practice and conditions of different forms of ownership. Moreover, the results of this study can be useful in the improvement of breeding-tribal work and technology of high quality, compass well as competitive and ecologically clean sheep production in the conditions of maximum year-round seasonal use of foothill and foothill-steppe pastures in the south of Kazakhstan.

Keywords: Correlation, Erythrocytes, Genotypic variability, Heredity, Inbreed leukocytes, Selection, Wool cutting

1. Introduction

Food shortages may be one of the most significant negative consequences of overpopulation. In order to meet the nutritional needs of livestock origin, the number of available animals cannot be increased; however, ways must be sought to increase the production per livestock unit. On the other hand, wool production is one of the economic characteristics of sheep, and a part of the annual income is provided from sheep breeding (1). Therefore, considering wool production in sheep selection programs along with other production traits can be effective in changing its average and increasing income (2). Economic return is of great importance in determining the significance of

productive activities (3). Some studies indicate that production efficiency is low in the sheep breeding sector in Kazakhstan (4, 5), and numerous programs have been presented in different countries for sheep breeding (6-10).In Australia (11), Turkey (12), the United States (13), and some European countries (14), open breeding herds are run for different breeds of sheep. Examination of the results of these programs indicates that acceptable genetic progress has been made for the traits defined in the breeding target. The breeding targets and the appropriate selection index have been defined in these programs to achieve the objectives (15). Moreover, the examination of genetic and phenotypic trends of some breeding and reproductive traits of herds in these stations shows that the changes are minimal and negative for some traits (16, 17).

Sheep breeding is a strategic and traditional branch of livestock breeding of the Republic of Kazakhstan that plays an important role in meeting the needs of the national economy in specific raw materials and food products. The results in sheep breeding of the Zhambyl region in Kazakhstan cannot be recognized as high due to the insignificant specific weight of fine and equated wool, quality indicators, and wool cutting that vary significantly by year. The growth of modification variability of features does not allow a precise estimation of the genotype of animals by their phenotype, thereby decreasing the efficiency of selection work. The main reasons can be referred to as insufficient specificity of selected features on individual fine wool varieties, incomplete understanding of the gradation of wool length in individual parts of the animal body, undeveloped perfect genetic methods of breeding, and inadequate study of the peculiarities of variability, inheritance, and the relationship of selected features (18). Since the variability is the genetic basis of selection, investigating regularities of the variability in productive features of animals in the thin-wool sheep breed South-Kazakh merino populations is of fundamental importance for theoretical and practical purposes of selection.

The progress of each breed and the increase of its genetic value largely depend on the presence of animals of different intra-breed types with their eight distinctive and productive qualities, as well as biological features. The higher or lower levels of development of separate leading and useful economic features is undoubtedly connected with the biological features of animals, such as increased viability and efficiency of animals of distinct types (19). Breeding animals "in purity", first of all, requires studying the economic and biological features of the main structural units of the breed, which leads to the presence of intra-breed types, revealing the most desirable type among them and the development of scientifically based principles and methods of transformation of undesirable types. In this aspect, the study of the variability of selected features in new natural climatic and forage conditions for animals of different inbreed types of the given sheep breed in the conditions of "Batay-Shu" LLP in the Zhambyl region, Kazakhstan, is of scientific and practical interest that determines the urgency of this study. The objectives of the present research were to establish the regularities of intra-population correlated variability of the main economic characteristics for the development of genetic bases for improving reproductive qualities and increasing the productivity of South-Kazakh merinoses bred in the conditions of "Batay-Shu" LLP of Zhambyl region, Kazakhstan. The quality of the main stock of animals, the characteristics of the initial population according to the main characteristics of breeding, biological and internal characteristics, biochemical parameters of sheep blood with different genotypes, and its economic efficiency have been also studied to achieve the aim of the present study.

2. Materials and Methods

2.1. Terms and Conditions

In "Batay-Shu" LLP, as in the most farms of the Zhambyl region in Kazakhstan, sheep are kept on pasture during the year, and unlike some other farms, summer mountain pastures are used for sheep in the summer, and they are on the foothill pastures during the

year. In the winter and early spring periods, the grass on the pastures deteriorates sharply, and then it is necessary to feed the animals with hay and concentrate feed.

2.2. Animals and Study Design

The research and production experiment were conducted in "Batay-Shu" LLP, Shu District, Zhambyl region, Kazakhstan. The subjects of the research were the South Caucasian sheep merino (Group I) and the mixed sheep (♂Australian merino x ♀South Kazakhstan merino) (Group II). Age-related changes in body weight of the resulting offspring were studied by weighing them at birth and 4, 7, and 18 months of age. At the same time, external body mass measurements were taken from these animals.

Absolute, average daily, and relative increases in their live weight were determined based on the weighting data. Moreover, exterior physique features were studied based on the results of the main body measurements (height in the crest, height in the sacrum, oblique length of the body, chest depth, width in the breasts, chest girth, and pelvic girth), as well as according to the indices related to the physique (length, stretch, hip, pelvic, knee, massiveness, chest, and bone).

Some items, such as live weight, cut of unwashed wool and staple length, as well as wool samples for laboratory tests, were individually taken into account when deboning and shearing the test sheep. Moreover, fertility and the safety of young animals during chops were taken into account when studying the reproductive capacity of mothers. According to mating and calving data, the fertility and fecundity of rams were determined by the number of viable lambs received from every hundred mothers, and the survival rate of lambs from birth to chop was taken into account at the same time.

For biochemical studies of animal blood (types of transferrin and hemoglobin), the method of horizontal electrophoresis in the starch gel was used, followed by the coloring of gels using conventional methods. In addition, genetic analysis of the population was carried out using mathematical indicators, where the frequency of alleles and genotypes and the estimation of gene balance were determined following the Hardy-Weinberg law. Economic efficiency was calculated based on animal productivity indicators considering the cost of growing, the cost percent of growth (tenge), profits from the sale of meat, and young animals in live weight.

3. Results and Discussion

Theoretical concepts of correlative variability are the basis for many fundamental generalizations of modern biology and zootechnology. Since correlative variability is of general biological nature, the study of this phenomenon has always been promising in cognitive and applied terms. Therefore, the interest in the problem of correlative variability does not diminish in all periods of scientific development. The correlative variability of blood and productivity indices of South Caucasian sheep merino has been studied on 1.5-year-old lambs of "Batay-Shu" LLP. The productivity indices of sheep were determined for 6 features, and also blood was taken to study the hematological indices for 14 features. The results of the determination of average development level and indicators of the variability of these signs are presented in table 1.

As can be seen, the productivity of the test lambs was relatively high, and blood parameters were within physiological norms. Nevertheless, comparatively high values of variability coefficients of acid blood capacity, globulin content, aldolase activity, alkaline, and acid phosphatase should be noted. A similar pattern concerning the variation of interior and biochemical characteristics has been observed in previous studies on sheep and other animal species (20).

Proceeding from general genetic concepts about interchromosomal interaction of genes and their inheritance and the theoretical premise of the genetic mechanism of supposed links between polymorphic blood systems and economically useful features of animals, some authors consider the pleiotropic effect,

when the gene of this blood group has a direct or indirect influence on the other feature; which is linked to the study of genes located in one chromosome as blood groups can be in the same chromosome with genes, which control the blood group.

Most scientists believe that the productive and breeding qualities and adaptive properties of animals are determined by the level of biochemical processes in the body (21). It was proved in many studies that in the selection, the use of polymorphism of proteins, including serum proteins, is possible.

In the present study, the authors investigated the genotypic features of serum proteins composition, the level of activity of aminotransferase enzymes, as well as their inheritance and relationship with the productivity of rams, South-Kazakh merino (Group I), and the mixed rams (♂Australian merino x ♀South Kazakhstan merino) (Group II).

Significant inter-breed differences in the content of total protein and its different fractions, as well as the value of albumin-globulin coefficient (A/G), have been revealed, as presented in table 2.

Table 1. Blood productivity and indices of 1.5-year-old lamb cubs

Symbol	n	$X \pm m_x$	σ	Cv
Dressing of unwashed wool, kg	50	6.81±0.053	0.81	12.1
Staple length, cm	50	9.36±0.059	0.90	9.6
Live weight, kg	50	54.0±2.784	4.26	7.9
Pure fiber output, %	50	39.5±0.390	5.07	12.9
Slicing of pure fiber, kg	50	2.68±0.034	0.44	16.4
Coefficient of woolliness, g	50	57.0±0.823	10.7	18.8
Erythrocytes, millions in 1 mm^3	50	8.99±0.048	0.66	7.4
Leukocytes, thousands in 1 mm^3	50	6.90±0.138	1.74	25.9
Hemoglobin, g%	50	8.85±0.174	2.48	27.9
Catalase, mg H_2O	50	2.16±0.039	0.55	25.9
Peroxidase	50	37.5±0.379	5.36	14.3
Acid capacity, mg%	50	35.6±11.39	161	45.2
Acid phosphatase, BE	50	1.01±0.030	0.40	39.8
Alkaline phosphatase, CU	50	9.29±0.368	4.98	53.7
AST, 1 mm^3 unit	50	50.9±0.412	5.44	10.7
Alt, 1 mm^3	50	28.4±0.171	2.23	7.8
Aldolase	50	2.73±0.125	1.43	52.4
Albumins, g	50	4.84±0.106	1.33	27.6
Globulins, g	50	2.04±0.089	1.11	54.5
Total protein, g%	50	6.88±0.046	0.58	8.4

Table 2. Content of total protein and its fractions, as well as immunoglobulin in blood serum of rams of different genotypes

Indicator	Group	
	I	II
Total protein, g%	7.28	7.42
Albumins, % prealbumin	2.43	2.24
Albumin, %	22.70	27.64
Postalbumin, %	6.25	8.80
Globulin, %	16.0	12.9
β	12.6	12.6
γ	19.1	14.6
Haptoglobin, %	7.8	9.7
Transferrin, %	5.9	4.9
Ceruloplasmine, %	8.4	7.8
Immunoglobulins, mg/ml	43.66±2.3	32.35±1.2

As shown in table 2, the most considerable content of total protein and its albuminous fraction is found in the animals of Group II.

Depending on the ratio of protein fractions, the A/G coefficients in the sheep of Groups I and II were equal to 0.66 and 0.96, respectively. The highest indices of globulin fraction in Group I was 47.7% compared to Group II 40.1%. It is known that gamma globulins participate in the development and maintenance of active and passive immunity in animals.

The authors also isolated transferrin, haptoglobin, and ceruloplasmin fractions. The amount of haptoglobin was found more significant in the sheep of Group II (9.7%), compared to that in Group I (7.8%).

As is known, the number of immunoglobulins in blood serum is an indicator of the protective properties of the animal's body. The present study has established that the largest and smallest numbers of immunoglobulins are contained in the blood serum of rams of Groups I and II, respectively. It should be noted that the level of this indicator of kneaded rams shows almost no difference from that in the rams of Group I, which indicates an adequate response of their bodies to the conditions of the environment. This was confirmed by the results of studies conducted by some scientists on the survival rate of young sheep and the conservation of adult sheep of different genotypes.

In modern selection strategy, the development of theoretical bases of gene pool conservation and improvement of local breeds of domestic animals is a fundamental problem of biological science. Breeding-tribal work with animals based on the main economically valuable features directly or indirectly leads to changes in the gene pool of animals and the structure of the herd (22). Moreover, the preservation of an optimal level of genetic variability and heterozygosity in animal populations is connected with the adaptive abilities of animals to changing environmental conditions. In addition, without genetic diversity in the population, animals lose their evolutionary adaptability and stability, which leads to significant economic damage (23, 24).

In the practice of zootechnics, genetic diversity in animal populations is usually determined by the genealogical structure of the breed or its structural units. According to scientists (25, 26), for differential analysis of genetic variability, it is necessary to have a method that would simultaneously evaluate the variability of specific structural genes and provide information about the variability of discrete genes that are part of an integrated phenotype. Such methods include the analysis of genetic markers.

In the last decades, the method of estimation of the genetic structure of animal populations was often supplemented by the analysis of peculiarities of investigated population ns by polymorphic proteins of animal blood. According to the results of studying the transferrin's and hemoglobin's genetic polymorphism in the blood serum South Caucasian merino sheep, it was determined that in breeding flocks at the selection of lambs for cultivation, it is necessary to give preference to animals with types of transferrin's AA, SS, AV, AL, CE, and BC. Moreover, it was concluded that at the selection from a group of repair lambs, it is necessary to give preference to animals with types AA, BC, AL, and CE. The reason for this preference is that these types have the best indicators of breeding and productive qualities. According to scientists, this method allows the selection of genetically-determined and highly productive animals for cultivation at an early stage of their development (27, 28).

The immunogenic methods used in genetically-determined animals, codominant inherited and unchangeable types of polymorphic proteins and enzymes in postnatal ontogenesis, make it possible to use them for solving problems of monitoring the breeding processes in populations. The polymorphic proteins of biological fluids do not change in ontogenesis; however, they are easily determined at the

early stages of animal development, and as a rule, have a codominant type of inheritance. Therefore, they are ideal genetic markers and are extensively used in the study of genetic structures of populations and the development of methods to control breeding and genetic processes (29).

The control of genetic variability is of great interest because line breeding, blood refreshing, and inbreeding can change the homogeneity and heterozygosity of a breed. In this regard, a genetic analysis of the structure of the South Caucasian merino sheep herd was carried out, and it was discovered that five allelic systems of transferrin A, B, C, D, and E, which in combination can give 15 phenotypes, were found in the tests of the sheep of both inbreed types.

Moreover, 14 phenotypes of AA, BB, SS, DD, AV, AS, AD, AE, BC, VD, SD, CE, and EE were detected, and no Tf EE type was discovered.

The frequency of distribution of phenotypes varies considerably depending on the sheep genotypes. In terms of gender and age groups, transferrin types significantly differ in frequency of distribution; however, the general trend remains in the direction of the highest concentration in sheep of four types Tf AB (5.5%), BC (32.0%), AC (35.5%), and AD (4.2%), the share of which in the population is equal to 77.2%, and the smallest distribution was observed for types AE, EE, and BE (2.3%).

Moreover, Tf BC and AS types had the highest prevalence in all age and gender groups (67.5%). In the ewes of the second group, the tendency remains toward the highest concentration of the four types Tf AA BB, SS, and AS, the share of which in the population is 66%. The smallest distribution was observed for the AD, VD, and SD types (19.3%), and Tf SS and AC types had the highest prevalence in all age and gender groups. It is concluded from the mentioned data that in terms of distribution frequencies of Tf types, the population of Group I is close to the population of Group II.

Approximately 6.2% superiority of heterozygous types over homozygous types in the studied population of Group I sheep and 13% superiority in Group II characterizes the level of transferrin polymorphisms locus of both breeds. The absence transferrin polymorphisms in the adult sheep of Group I consisting of elite animals and poor concentration in other age groups of Tf AA, DD, EE, EE, EE, and CE types, as well as in adult sheep of Group II with Tf DD, CE, and EE types that indicates the less selective significance of animals with the listed types.

The synthesis of hemoglobin types in South Caucasian merino sheep of both groups is controlled by two codominant alleles, namely Hv B and Hv A. The HBB and AB types differ the most in the distribution of the entire population, as well as individual age and gender groups that vary from 52.3 to 63.0 as well as from 23.3 to 37.3, respectively (table 3).

Table 3. Distribution of sheep by type Tf

Tf	Group I		Group II		Total for the Household	
					Actual	
	n	%	n	%	n	%
AA	7	6.3	7.3	5.5	14.3	5.9
BB	6	3.2	5	3.4	11	3.1
SS	9	7.8	11	8.6	20	8.0
AV	6	5.5	5	4.2	11	4.3
AC	43	35.5	49	36.7	92	36.4
AD	5	4.2	6	4.3	11	4.3
SUN	39	32.0	46	34.7	85	33.6
VD	3	2.1	2	1.7	5	2.0
SD	4	3.3	1.2	0.1	4	1.6
∑	121	100	132	100	253	100
Group I	22	17.4	24	18.2	45	17.8
Group II	100	82.6	108	81.2	208	82.2
		χ^2				58.1

The value of χ 2 at the transferrin locus in ewes is equal to 58.1%, which indicates a reliable difference between the empirical and theoretical frequencies of genotypes. This means that the population uses a rather intensive selection that disturbed the genetic balance in both populations at the transferrin locus. The value of χ 2 at the hemoglobin locus is 0.06.

The genetic equilibrium in the hemoglobin locus is maintained probably due to the low polymorphism. The low polymorphism of the hemoglobin locus slightly reduces the selective significance of this indicator. According to data in the present study, the superiority of heterozygotes is 3.6% in the transferrin locus of South Caucasian merino sheep, and in hemoglobin, the ratio of these genotypes is almost the same; accordingly, the degree of homozygosity is higher (Ca=3.01) than that in the transferrin locus (0.72). The increase in the degree of homozygosity (Ca) is observed in both loci and is accompanied by a decrease in the number of active alleles. Therefore, the increase in its value leads to a decrease in genetic and phenotypic diversity and exacerbates the homogeneity of the population, which is undesirable in the breeding process.

The low polymorphism level of Na (0.24) indicates that the number of active alleles of the population for the Hv locus is lower than possible for the Tf locus (1.7). The indicator of the state of the population is the coefficient V, which is the degree of realization of the possible variability, and its value is lower than the desired value in both populations. In general, tribal animals are selected at an early age based on phenotypic indicators of origin, and early forecasting of the animal productivity is essential for an intensification industry.

In the present study, the live weight indices of South Caucasian merino sheep of Group I differed depending on the type of transferrin. These indices vary from 60.4 kg (Tf CC) to 35.0 kg (Tf BB) for the group of adult mothers. The difference is 25.4 kg (P>0.99) for the group of lambs; moreover, the maximum and minimum weights of 55.3 kg and 36.4 kg, respectively, can be traced in animals with Tf BB type (the difference is 18.9 kg) (P>0.99).

The difference between the maximum (47.8 kg with TfC) and minimum (31.0 kg with TfB) indicators was equal to 16.8 kg (P>0.99) for the group of yards. It is noteworthy that for all age and gender groups, there is a tendency of higher live weight in animals with types of transferrin CC, AC, and BC, specific weights of which in the groups are 65.0%, 64.7%, and 61.0%, respectively.

The live-weight indices of intra-breed type II depending on the type of transferrin were in the range of 64.8 kg (Tf S) to 59.8 kg (Tf AC) for the group of adult sheepdogs. The maximum weight was observed for animals with Tf VD types (61.4 kg), and minimum weight was shown for animals with Tf AV type (56.3 kg).

The trend of the best live weight is observed in animals with types of transferrin CC, AC, and VD, specific gravity of which in the groups are 59.0% and 60.0%, respectively. The analysis of wool productivity of sheep in Group I depending on the types of transferrin demonstrates that animals with Tf SS, AS, BC, and VD types were the best performers.

In Group II sheep, the best performance was observed in animals with Tf BC, AD, and VD types, the specific gravity of which was equal to 52.0% (30).

The reliability of the obtained indicators can be linked to a small quantity of investigated animals that has entailed weak variability of a sign and a low level of used polymorphic systems. It should also be noted that animals of both intra-breed types with transferrin SS, AC, BC, and VD had advantages of both live weight wool cutting, which justifies the possibility of using polymorphic systems as markers for the best productivity of South Kazakh merino sheep. The study of protein content in blood serum has indicated that sheep-producers, sheep-breeders, annual vivid, newborn sheep-breeders, as well as vultures of Group I are inferior in terms of this indicator, compared to their

counterparts of Group II, by 0.56%, 1.45%, 4.44%, 10.1%, and 9.98%, respectively.

Therefore, the study of polymorphic systems of blood serum proteins of South Kazakhstan merino sheep of both groups in terms of age and gender revealed the presence of certain allele combinations and the ratio of transferrin and hemoglobin genotypes. It was also indicated that these animals had their specific spectrum of alleles and combinations of genotypes (31).

In addition, according to the obtained results, the possibility of using genetic markers of blood was determined in the early evaluation of productive qualities of animals. The interrelation of biochemical indices with the main selected features of rams depending on their breed affiliation was studied, and the data demonstrated a closer relationship between live weight and biochemical indicators of experimental animals. In the considered groups of animals, a positive relationship of the average value (rs=0.35-0.51) was revealed with the content of total protein and live weight. In addition, in terms of the correlation coefficients of biochemical blood indices with the productivity of sheep-producers, a similar connection of this index with wool cutting was found only in the mixed sheep of Group II (rs=0.38) that was not present in the animals of Groups I and II. A high positive correlation between live weight and AST activity was observed in Group II animals (rs=0.62), while Groups I and II animals had almost the same average correlation coefficients (rs=0.54-0.51).

The authors determined the degree of heredity of aminotransferases enzymes' activity by the dispersion method. As a rule, the inheritance of polymorphic proteins and enzymes is controlled by the some-dominant alleles. In this case, the phenotype is the same as the genotype, and polymorphic structures do not change during individual life and are preserved in animals in the set in which they are received from parents with genetic information. The studied feature (AST) was found to be highly hereditable (h^2=0.62-0.68), and its degree of inheritance was much higher than that of AST.

The calculation of the economic efficiency of the study was based on the determination of the difference between the total actual revenue from the sale of sheep's meat and wool minus the cost per animal. The predatory live weight of sheep in "Batay-Shu" LLP turned out to be higher, and carcass weight was 31.5 kg. Moreover, the average revenue from wool sales in the experimental group was 268 tenge, while for the farm, it was equal to 220 tenge table 4.

When comparing the productivity of the breeding groups of sheep with the average herd, the average additional income per sheep was 3,857 and 2,282 tenge in Groups I and II, respectively. These differences are based on the fact that the selling price of products was 28002.5 and 25123.0 tenge in Groups I and II, respectively. Moreover, high profits from the sales of lamb and wool were obtained to be 29,991 and 26,264 tenge at a level of profitability of 38.25% and 26.85% in the experimental Groups I and II, respectively. Moreover, the levels of profitability on farms are 20.43% and 15.83% for Groups I and II, respectively.

Table 4. Cost-effectiveness of the present study

Indicator	Batay Shu LLP	
	Management team 1	Management team 2
Predwarping live weight, kg	61.2	56.3
Carcass weight, kg	31.5	27.7
Produced wool, kg	5.9	5.2
Realization price of 1 kg of lamb, tenge	900	900
Realization price 1 kg of wool, tenge	268	220
Total costs, tenge	21650	21650
Products sold in total, tenge	29931	26074
Cost of young growth, kg	21650	21650
Profit, tenge	8281	4424
Profitability, %	38.25	20.43

The study of polymorphic systems of the sheep's blood serum proteins of different intra-breed types in terms of gender and age groups revealed the presence of certain allele combinations and the ratio of transferrin and hemoglobin genotypes. It was found that these animals had their specific spectrum of alleles and combinations of genotypes. According to the obtained results, the possibility of using genetic markers of blood in the early evaluation of productive qualities of animals was established (32). When breeding South-Kazakhstan merino in their distribution zone, it is recommended to use Australian merino meat to increase productivity because kneaded animals give 8%-10% more cutting of wool in washed fibers and have 10%-15% more live weight, compared to that of purebred animals.

Authors' Contribution

Study concept and design: E. I. I.
Acquisition of data: E. I. I.
Analysis and interpretation of data: G. A. K.
Drafting of the manuscript: B. T. K.
Critical revision of the manuscript for important intellectual content: E. I. I. and A. I. Z.
Statistical analysis: G. A. K
Administrative, technical, and material support: E. I. I. and G. A. K.

Ethics

All the procedures were approved by the Ethics Committee at the Kazakh National Agrarian University, Almaty, Kazakhstan.

Conflict of Interest

The authors declare that they have no conflict of interest.

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