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қауіпсіздігін қамтамасыз етуге бағытталған сыни бақылау нүктелері анықталып, НАССР жүйесін енгізу бойынша ұсынымдар жиынтығы әзірленетін болады.

### РЕЗЮМЕ

Анализируя современное состояние производства и переработки мяса птицы в странах мира, можно сказать, что мировой рынок птицеводства растет быстрыми темпами, а в будущем только расширяется. Продукция птицеводства в стране является частью мирового рынка, при этом развивая и ее внутренний рынок, за последние пять лет наблюдается рост отечественного производства мяса птицы на 18%. При реализации государственной политики в области здорового питания важна не только работа по увеличению объемов производства, но и обеспечение его безопасности при производстве продукции.

В статье отражены результаты проведенных исследований по оценке органолептических показателей и определению токсикологической, радиологической, микробиологической безопасности продукции производителей мяса птицы Западно-Казахстанской области. В целях проведения исследований использовались замороженные тушки птицы I-го сорта, полученные из местных сетевых супермаркетов и продуктовых магазинов. При проведении микробиологических исследований мяса птицы трех образцов установлено, что мезофильные аэробные и факультативные анаэробные микроорганизмы не превышали допустимое количество, патогенные микроорганизмы, в том числе сальмонеллы, листерии, не выявлены. По результатам органолептического анализа образцы №2 и №3 получили высокие баллы, поэтому были отнесены к категории свежей продукции, а образец №1 к категории продукции сомнительной свежести. По результатам определения токсичных элементов и радионуклидов установлено, что содержание ртути, кадмия, свинца, мышьяка, цезия и стронция в образцах не превышало предельно допустимых количеств. Исходя из полученных результатов исследований, в дальнейших исследованиях будут определены критические контрольные точки на предприятиях по переработке туш птицы, направленные на обеспечение качества и безопасности выпускаемой продукции, будет разработана рекомендация по внедрению системы НАССР.

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### HEMATOLOGICAL PARAMETERS AND THE STATE OF NATURAL RESISTANCE OF THE YOUNG OF THE THIRD GENERATION OF THE ABERDEEN-ANGUS BREED

#### ANNATATION

Blood in the body plays a very important role, since metabolism is carried out through it. Blood delivers nutrients and oxygen to the cells of the body, removing metabolic products and carbon dioxide. According to the biochemical parameters of the blood, the intensity of metabolic processes can be estimated. Blood enzymes, their activity, metabolic rate, as well as biochemical adaptation are

encoded in their genes, the biochemical composition of blood in these animals is associated with their breeding and productive properties.

The purpose of this study was to study the general indicators of the natural resistance of young Aberdeen-Angus breed to determine the body's high resistance to adverse environmental factors. For this purpose, a hematological analysis of the blood of bulls and heifers of Canadian and European breeding was carried out, hematological blood parameters were obtained.

The studies carried out to determine the hematological parameters and the state of natural resistance of the descendants of the third generation of the Canadian and European breeding of the Aberdeen-Angus breed were carried out according to the plan for 2018-2021 in the farm "Zholdasbai-Agro", located in the village of Kishkenekol, Ualikhan district, North Kazakhstan region. The research work was carried out within the framework of the project of the budget program 217 "Development of science", program 102 "Grant financing of scientific research" on the topic "Adaptation and productivity quality of the third generation of imported beef cattle in the conditions of the northern region of Kazakhstan" (state registration No. 0118RK00736).

**Key words:** *Aberdeen-Angus breed, hematological parameters, natural resistance*

**Introduction.** The current state of animal husbandry is characterized by the widespread use of breeding achievements of different countries. One of the breeding areas is the creation of breeds of farm animals with high productivity and adaptability, which makes it possible to use the produced livestock in different climatic conditions without a significant decrease in productivity. Livestock with high adaptability easily adapts to new environmental conditions. This makes it possible to successfully move breeding achievements to other regions of the country or to other continents. In this sense, along with the productivity of the animal, its adaptive capacity is also important, which is largely determined by natural resistance or non-specific immunity of the animal's body. In fact, the ability of animals to adapt is the result of the interaction of genotypic factors that arose when choosing a certain direction or line, and phenotypic factors associated with the interaction of the animal with the environment, therefore, a high productivity potential during breeding can be fully revealed only if the reaction of the animal's body to changes in the external environment. It should be noted that the adaptive potential is a very necessary characteristic of an animal, since it determines the possibility of realizing its production potential in new conditions. In this regard, it is widely believed that high indicators of animal productivity, including adaptive potential, are characteristic [1-5].

In our opinion, this approach is a combination of random factors, which in one case can contribute to the disclosure of the productive potential of animals, and in another, with a slight change in external factors, can lead to the impossibility of revealing the productive potential of the animal. This can destroy many breeding achievements and thus hinder the development of animal husbandry as a whole, therefore, the assessment of the adaptive abilities of animals should be carried out not post – factum – in terms of productivity, but through the analysis and assessment of the natural endurance of the organism, which correctly characterizes the adaptive potential of the animal. The natural endurance of the body is the ability to recognize and suppress the development of any pathogenic principles, regardless of its nature. Thanks to natural resistance, the body inhibits the development of microbes, viruses, various parasites, and also gets rid of its own cells that do not work properly. Natural resistance constitutes many factors. Unknown immunity is formed by macrophages, natural antibodies, humoral factors. For practical purposes, among the many factors that provide natural resistance, we chose three components: the bactericidal activity of the blood serum, the phagocytosis indicator and lysozyme [6-12].

At the same time, hematological blood indicators were determined in the course of determining the reason for the influence of imported animals on physiological indicators in a certain climatic environment in the third generations in the conditions of the North Kazakhstan region.

**Research material and methodology.** The study of hematological indicators began with the work of blood sampling. Blood sampling was carried out in the morning. The blood was taken in special test tubes in compliance with the requirements of asepsis and antiseptics. Blood was taken from the veins of cows. Before taking the blood, the vein was disinfected with alcohol. Then the blood was drawn with a quick pull of the syringe plunger or a vacutainer. For blood collection, disposable test tubes – vacutainer (Vacutainer) – a venous blood sample were used.

Hematological studies were carried out in the clinical and Diagnostic Laboratory of the veterinary clinic of Kazatu named after S. Seifullin and the Kazakh Scientific Research Institute of animal husbandry and feed production. Quantitative indicators of the target elements of blood – erythrocytes, lymphocytes and leukocytes, platelets were determined by the hematological assay of Micro CC-18 (USA), and erythrocyte sedimentation rate – by the Panchenkov devices.

Indicators of cellular factors of immunity – if the level of phagocytosis is based on a special technique, that is, the phenomenon of phagocytosis – the reaction of the body, expressed in the ability of phagocyte cells to capture and digest foreign microorganisms. Sterile centrifugal test tubes are filled with 0.5 ml of stabilized test blood and 0.5 ml of microbial culture *Staphylococcus*, the content of which is 0.5-1 billion in 1 ml. the microbial cell will be under the optical standard of turbidity. The prepared mixture is carefully whipped in a tube, placed in a thermostat at 30 °C for 37 minutes, shaking every 10 minutes. The resulting mixture is dripped onto the glass surface of the substance and mixed with alcohol, dried for 1 day and painted with Romanovsky-Gimza paint. Phagocytic activity was determined by examining the stained smear under a microscope, counting microbes sticking to eating neutrophils [13,14,15].

Lysozyme activity was determined by the nephelometric method by calorimetry of blood serum on the photoelectrocolorimeter instrument using the microbe *M. Lysodeikticus*. The obtained sample was kept in a thermostat at 37 degrees for 3 hours and calorimeters. Lysozyme activity was determined by constructing and the obtained numbers in the formula below:

$$L = \frac{(D0 - D1) * 100}{D0} - \frac{(Dbo - Db)}{Dbo}$$

where: L-lysis, %;

D0-optical density of the experimental sample before incubation;

D1-optical density of the experimental sample after incubation;

Dbo-pre-incubation control optical sample density;

Db - optical density of the control sample after incubation.

The bactericidal activity of blood serum was also determined by the nephelometric method, as was the determination of lysozyme activity. Only *E.coli* stick is using the. The resulting numbers written in the formula below:

$$BABS = \frac{100 - D \text{ exp. sample after 3 hours} - D \text{ exp. sample before incubation} * 100}{D \text{ control sample after 3 hours} - D \text{ control sample before incubation}}$$

**Research results.** "Zholdasbay-Agro" farm is engaged in general animal husbandry, including breeding cattle Aberdeen-Angus (1100 heads). In 2013, 393 Aberdeen Angus breeds were imported from Canada and Europe, including 377 female heads and 16 bulls.

"Zholdasbay-Agro" farm is engaged in breeding and fattening meat cattle. It works closely with scientists and professors from America, the Russian Federation and Kazakhstan.

"Zholdasbay-Agro" farm has created a solid stock of breeding animals in the farm, as a result of the use of mainly purebred bulls in herds, the breed composition of the herd in farm has been improved, which allows increasing the quality number and specific weight of purebred animals.

The breeding of imported cattle is primarily due to its ability to adapt to adverse climatic and biotic factors, while maintaining its breeding and productive qualities. Therefore, the effectiveness of the use of imported animals and their calves largely depends on their correct location in natural and climatic conditions corresponding to the biological characteristics of the imported livestock [16-20].

In order to study the indicators of adaptation of offspring of the Aberdeen-Angus breed of the III generation to the climatic and maintenance conditions of the North Kazakhstan region, blood samples were taken from their experimental groups and their phagocytic, bactericidal and lysozyme activity, which are indicators of hematological indicators and natural resistance, and relevant data were obtained. To determine and compare the indicators of adaptation of young animals, serum indicators of bulls and heifers of the third generation of the Aberdeen-Angus breed of Canadian and European selection were studied (Figure 1).



Figure 1 – Course of blood serum decoupling and determination of erythrocyte sedimentation rate

The obtained results of hemotological indicators of blood serum of heifers and bulls are presented in Table 1.

Table 1 – Hematological indicators of bulls and heifers of the third generation (n=10)

Groups	Erythrocyte deposition rate, mm/24h	Hemoglobin g/l	Erythrocyte, $10^{12}/l$	Leukocyte, $10^9/l$	Total protein, g/l
Bulls					
Canadian	4,2±0,31	103±0,42	6,2±0,36	9,7±0,43	71,5±0,39
European	4,1±0,28	107±0,43	6,5±0,46	9,5±0,37	70,7±0,42
Heifers					
Canadian	3,3±0,22	102±0,33	6,2±0,45	9,1±0,38	70,9±0,34
European	3,9±0,15	111±0,38*	6,9±0,32	9,3±0,46	70,5±0,43
Norma	-	99-129	5,0-7,5	4,5-12,0	70-85
Statistical truth difference between groups *p<0,05; **p <0,01; ***p<0,001					

According to table 1, it is observed that the main biochemical indicators of blood serum in young animals are within normal limits, which is a characteristic indicator for a healthy animal.

The intensity of blood respiratory function is largely determined by the level of hemoglobin in red blood cells. In our studies, the level of this main supplier to tissues and organs in the blood of bulls and heifers was normal.

Analysis of the quantitative composition of white blood cells did not reveal a difference in this indicator compared to the norm.

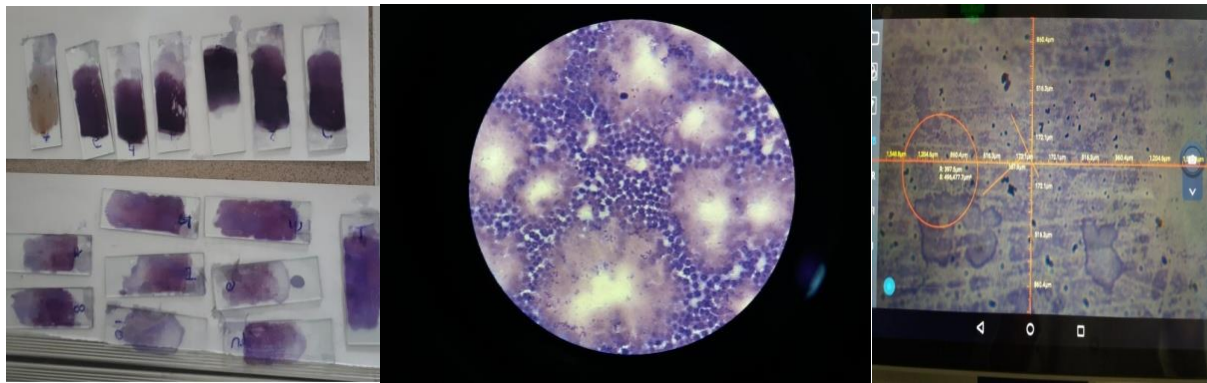


Figure 2 – Staining of blood infection by the Romanovsky-Gimza method in the process of determining natural resistance indicators and its appearance under a special microscope

The state of natural resistance of experimental animals. The bactericidal activity of the blood serum (BABS) is an integral indicator of the antimicrobial properties of the blood and the natural resistance of the body and represents the ability of the new blood serum to destroy the bacteria that enter it. The higher this indicator, the higher the nonspecific immunity of the animal.

Characteristic feature of natural resistance traits is their high variability, which provides a wide adaptive capacity of the animal's body, Table 2.

Table 2 – Indicators of natural resistance of calves of the third generation (n=10)

Indications	Groups							
	Canadian selection				European selection			
	Spring	Summer	Autumn	Winter	Winter	Summer	Autumn	Winter
<b>Bulls</b>								
Lysozyme, mg/ml	19,95±0,28	19,53±0,33	19,84±0,25	19,69±0,23	19,83±0,30	19,40±0,39	19,35±0,43	19,80±0,40
BABS, %	48,42±0,12	48,58±0,23	49,90±0,34	48,62±0,36	46,99±0,37	47,07±0,34	48,84±0,48	48,70±0,42
Phagocytic activity	34,58±0,58	33,96±0,45	34,70±0,40	34,10±0,33	32,09±0,27	31,60±0,25	32,25±0,30	32,56±0,27
Number of phagocytes	4,28±0,32	4,08±0,40	4,16±0,37	4,09±0,42	3,93±0,33	3,76±0,38	3,77±0,27	3,99±0,35
Phagocyte index	4,66±0,41	4,73±0,38	4,48±0,45	4,50±0,38	4,42±0,35	4,36±0,43	4,18±0,40	4,46±0,33
<b>Heifers</b>								
Lysozyme, mg/ml	19,10±0,30	18,93±0,27	19,06±0,35	19,36±0,42	19,62±0,33	19,00±0,37	19,50±0,35	19,28±0,41
BABS, %	52,39±0,19	50,29±0,25	53,82±0,38	52,74±0,35	50,93±0,20	49,46±0,25	51,85±0,23	51,44±0,28
Phagocytic activity	33,89±0,47	32,00±0,42	34,22±0,23	34,46±0,30	32,73±0,43	31,72±0,41	31,67±0,54	32,64±0,47
Number of phagocytes	4,25±0,40	3,91±0,38	4,10±0,45	3,95±0,29	3,93±0,34	3,70±0,36	3,91±0,34	3,63±0,34
Phagocyte index	4,42±0,35	4,42±0,41	4,39±0,52	4,46±0,40	4,41±0,39	4,31±0,30	4,30±0,28	4,51±0,31
Statistical reliability value between groups *p<0,05; **p<0,01; ***p<0,001								

Analysis of the data of table 2 shows that the indicators of lysozyme, bactericidal and phagocytic activity of blood serum are within the physiological norm. These indicators of activity of both heifers and bulls predominated in Canadian breeding for both groups. According to the phagocytic indicator, in heifers of Canadian selection, the lower limit was observed in the summer time of 32.00±0.42, in heifers of European selection-in the autumn time of 31.67±0.54. The value of statistical reality between groups p <0.01.

Bactericidal and lysozyme activity of blood serum, indicators of phagocytic blood count testify to the activation of natural resistance factors of the organism of offspring of Aberdeen-Angus cattle imported from foreign countries to the Republic of Kazakhstan.

The analysis of the results shows the ability of meat cattle for well adapting and its certain adaptability to the conditions of the sharply continental climate of the Republic of Kazakhstan.

**Conclusion.** These hematological indicators indicate that the indicators of lysozyme, bactericidal and phagocytic activity of blood serum are also within the physiological norm, if they are within the physiological norm in animals of both breeding. Only these indicators of activity of both heifers and bulls prevailed in Canadian breeding. According to the phagocytic indicator, in heifers of Canadian selection, the lower limit was observed in the summer period, while in heifers of European selection-in the autumn period.

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## ТҮЙІН

Денедегі қан өте маңызды рөл атқарады, өйткені ол арқылы метаболизм жүзеге асырылады. Қан дененің жасушаларына метаболизм өнімдері мен көмірқышқыл газын алып тастап, қоректік заттар мен оттегіні жеткізеді. Қанның биохимиялық көрсеткіштеріне сәйкес метаболиттік процестердің қарқындылығын бағалауға болады. Қанның ферменттері, олардың белсенділігі, метаболизм деңгейі, сондай-ақ биохимиялық бейімделу олардың гендерінде кодталған, бұл жануарлардағы қанның биохимиялық құрамы олардың асыл тұқымдық және өнімділік қасиеттерімен байланысты.

Зерттеу жұмысының мақсаты ағзаның қоршаған ортаның қолайсыз факторларына жоғары төзімділігін анықтау үшін aberdin-angus тұқымы төлдерінің табиғи резистенттілігінің жалпы көрсеткіштерін зерттеу болды. Ол үшін канадалық және еуропалық селекция бұқашықтары мен тайыншаларының қанынан сынама алынып, қанының гематологиялық көрсеткіштері анықталды.

Абердин-ангус тұқымының канадалық және еуропалық селекциясының үшінші генерация ұрпақтарының гематологиялық көрсеткіштері мен табиғи резистенттілік жағдайын анықтау бойынша жүргізілген зерттеу жұмыстары Солтүстік Қазақстан облысы, Уалихан ауданы, Кішкенекөл ауылында орналасқан «Жолдасбай-Агро» ФШ-да 2018-2021 жылдар аралығында атқарылды. Зерттеу жұмысы 217 "Ғылымды дамыту" бюджеттік бағдарлама жобасының аясында, 102 "Ғылыми зерттеулерді гранттық қаржыландыру" бағдарламасы шеңберінде "Қазақстанның солтүстік өңірі жағдайында импортталған етті малдың үшінші генерациясының бейімделуі және өнімділік сапасы" тақырыбы бойынша жүргізілді (мем.тіркеу №0118PK00736).

## РЕЗЮМЕ

Кровь в организме играет очень важную роль, так как через нее осуществляется обмен веществ. Кровь доставляет питательные вещества и кислород к клеткам организма, удаляя продукты метаболизма и углекислый газ. По биохимическим показателям крови можно оценить интенсивность обменных процессов. Ферменты крови, их активность, уровень метаболизма, а также биохимическая адаптация кодируются в их генах, биохимический состав крови у этих животных связан с их племенными и продуктивными свойствами.

Целью данного исследования было изучение общих показателей естественной резистентности молодняка абердин-ангусской породы для определения высокой устойчивости организма к неблагоприятным факторам окружающей среды. Для этого был проведен гематологический анализ крови бычков и телок канадской и европейской селекции, получены гематологические показатели крови.

Исследования, проведенные по определению гематологических показателей и состояния естественной резистентности потомков третьей генерации канадской и европейской селекции Абердин-ангусской породы, проводились по плану на 2018-2021 годы в ФХ «Жолдасбай-Агро», расположенном в селе Кишкенеколь, Уалиханского района, Северо-Казахстанской области. Исследовательская работа проводилась в рамках проекта бюджетной программы 217 "Развитие науки", программы 102 "Грантовое финансирование научных исследований" по теме "Адаптация и качество продуктивности третьей генерации импортированного мясного скота в условиях северного региона Казахстана" (гос.регистрационный №0118PK00736).

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## **GENETIC TESTING OF SHEEP BY THE ALPHA-CASEIN DAIRY GENE (CSN1S)**

### **ANNOTATION**

The protein composition of sheep's milk has not been studied sufficiently or is even less represented than the milk content. There are only general reports on the content of complex proteins in sheep milk, such as total protein, casein and whey protein, as well as on the genetic polymorphism of some protein fractions.

Modern breeding methods are aimed at searching for molecular genetic markers that interact with economically useful traits. One of the main characteristics of markers is polymorphism, which represents a change in the nucleotide sequence in a DNA molecule caused by various mutations. Its manifestation is the allelic spectrum. The PCR-PDRF method is considered a standard analysis of point mutations for the diagnosis of allelic polymorphism of candidate genes. One of the promising genes considered markers of sheep productivity is the  $\alpha$ -casein gene (CSN1S).

Genetic structure of the studied groups of sheep according to the  $\alpha$ -casein gene (CSN1S1). Casein is the main protein in all mammalian milk. It belongs to a group of proteins called phosphoproteins). The alpha-casein group is 43-55%, beta-casein 24-35%, kappa-casein 8-15%, gamma-casein group 3-7%. As a result of the study by PCR-RFLP, the breed characteristics of the polymorphism of the allelic spectrum of the genes, CSN1S1, of sheep of the Texel, Prekos, and Karakul breeds were established. The data obtained can be used as a genetic characteristic of the population of sheep of this breed, as well as find application in breeding work aimed at preserving genetic diversity.

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