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## COMPARATIVE GENETIC STUDY OF LOCAL AND INTRODUCED CATTLE BREEDS OF KHIZI DISTRICT (AZERBAIJAN)

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## СРАВНИТЕЛЬНОЕ ГЕНЕТИЧЕСКОЕ ИЗУЧЕНИЕ МЕСТНЫХ И ИНТРОДУЦИРОВАННЫХ ПОРОД КРУПНОГО РОГАТОГО СКОТА ХЫЗИНСКОГО РАЙОНА (АЗЕРБАЙДЖАН)

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*Abstract.* A comparative genetic study of local and introduced breeds of cattle in the farms of the Khizi district was carried out. Cattle of various breeds are kept on the territory of the region at enterprises of legal entities and individuals, in farms belonging to individual owners. Introduced breeds of cattle, beef and dairy cattle make up 0.0029% of the total livestock. Simmental (25%), Holstein-Frisian (27%), Brown Swiss (12%) and Aberdeen-Angus (7%) breeds are derived from introduced beef and dairy cattle. For a comparative study of the genomes of local and introduced breeds of cattle, blood samples were taken, DNA was obtained and prepared for further analysis.

*Аннотация.* Проведено сравнительно-генетическое исследование местных и интродуцированных пород крупного рогатого скота в хозяйствах Хызинского района. Крупный рогатый скот разных пород содержится на территории области на предприятиях юридических и физических лиц, в хозяйствах, принадлежащих отдельным владельцам. Интродуцированных пород крупного рогатого скота мясной и молочный скот составляет 0,0029% от общего поголовья. Симментальская (25%), голштино-фризская (27%), швицкая (12%) и абердин-ангусская (7%) породы выводятся из интродуцированного мясного и молочного скота. Для сравнительного изучения геномов местных и интродуцированных пород крупного рогатого скота были взяты образцы крови, получена ДНК и подготовлена для дальнейшего анализа.

*Keywords:* aborigines, introduction, dairy breeds, meat breeds, local breeds, blood sample, DNA.

*Ключевые слова:* аборигены, интродукция, молочные породы, мясные породы, местные породы, образец крови, ДНК.

*Introduction.* Food products of animal origin occupy an important place in meeting the demand for food products of the population in Azerbaijan [1].

Development of animal husbandry, including breeding of cattle, improvement of their breed composition is an important component of the State's policy in the agricultural sector. In recent years, livestock breeding in the agricultural sector has been continuously developed in the republic, and the material and technical base of livestock farms has been strengthened. In order to sustainably satisfy the population's demand for meat and dairy products, productive cattle are imported into the country by entrepreneurs. The development of animal husbandry plays an important role in meeting

the demand for meat and dairy products of the country's population, in addition to increasing the employment level of the population in the field of animal husbandry in the villages, and creates conditions for the elimination of the country's dependence on imports. These successes are possible as a result of the breeding and selection measures based on international practices of the quantitative and qualitative indicators of the productivity of agricultural animals at the expense of productive breed animals in the current conditions. The consideration of increasing meat and milk production in meeting the population's demand for food products in the relevant State programs shows that it is a priority. In order to meet the population's demand for meat and dairy products, in addition to bringing breeding animals from different countries to our republic for the purpose of creating cattle and small cattle breeding farms, as well as to achieve an increase in the productivity of local breeding animals at the expense of introduced breeding animals, scientific-theoretical and practical research works makes it necessary to carry out (<https://lsl.su/MvRP>).

The research was conducted in livestock farms of Khizi administrative district of Absheron [2] economic-geographical region. The climate of Khizin, one of the mountain regions closest to Baku, is mild and dry. A large part of its territory is covered with forest, it joins the Caspian Sea from the east. 6% of the region's territory has an extreme biodiversity, landscape and ecosystem diversity, there are forest, forest-steppe, steppe (steppe), gray mountains, steppe mountains, subalpine, alpine ecosystems. Its geographical location creates conditions for the existence of rich plant flora and animal fauna. The basis of its economy is animal husbandry and crop farming. In the territory of the region, different types of agricultural animals are bred according to the relevant tradition. The head number of agricultural animals in Khizi region is given in Figure 1.

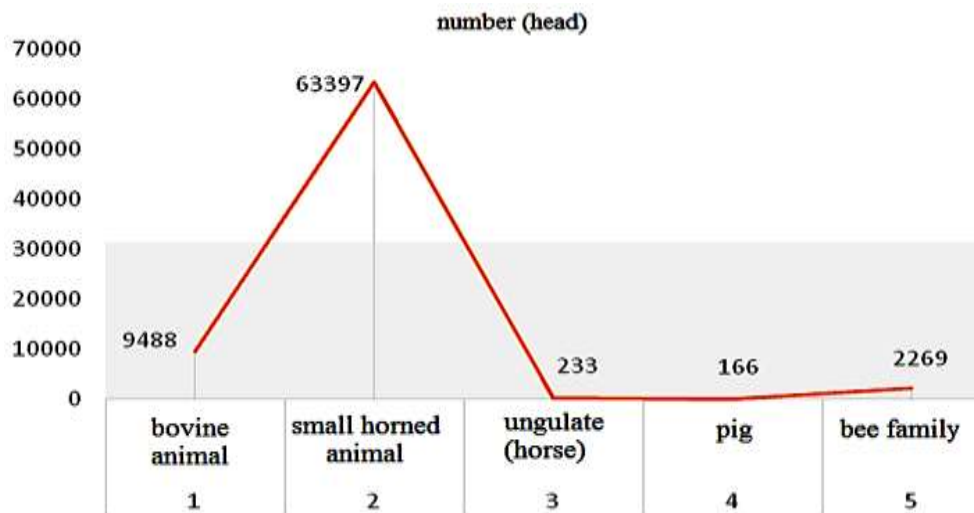


Figure 1. Head number of agricultural animals in Khizi region (2020)

The comparative study of the genome of local and introduced breeds of animals is of scientific theoretical and practical importance. With the introduction of new farming models, the improvement of the local breed composition due to high productivity characteristics, the achievement of productivity in accordance with the genetic potential in animal husbandry and the sustainable development of animal husbandry, the satisfaction of the country's population's demand for animal products mainly at the expense of local animals, the reduction of the country's dependence on imports and the creation of export opportunities, as well as application of the results of fundamental scientific research in production is one of the most important directions in terms of stimulating the development of animal husbandry. Genetically comparative study of local and

introduced animal breeds in terms of creating specialized productive livestock farms is one of the topical issues in the agricultural field (<https://lyl.su/gkWF>).

Development of cattle plays an important role in satisfying the population's demand for meat and dairy products as one of the main activities in the field of animal husbandry of the region.

The Red Caucasian and Red Desert local breeds of cattle, which are distributed in the territory of the Republic of Azerbaijan, are also bred in the territory of Khizi region. In fact, these local breeds are not purely aboriginal, that is, they have been obtained through selection from the mating of local aboriginal breeds with introduced breeds over time, and they have high productivity indicators. However, the comparative characterization of the genetic characteristics of these breeds with the introduced breeds is of scientific theoretical importance.

Gonur Caucasian breed - obtained from the mating of local Caucasian cattle with bulls of the Swiss breed, using the blood of the Azerbaijani zebu. The constitution is strong, and in most cases it adapts gracefully, which indicates that its milk quality is strongly developed (<https://lyl.su/SX5c>). The color is light and dark brown. The special features of the Swiss breed (a narrow stripe on the back, a white border on the corner of the mouth) are also preserved in the Red Caucasian breed. The head is of medium length, the horns are dark gray in color, the tips are black, the jaw is not high, the back and waist are straight, the muscles are slightly underdeveloped. These animals are selected for their suitability to local conditions. At present, the live weight of these animals varies between 400-450 kg, they give an average of 2000-2500 kg of milk with a fat content of 3.8-3.9% during the year. The meat yield is around 50-55%.

The Red Desert breed was obtained through selection in past centuries from the mating of local Ukrainian goods with goods imported from Russia in the 18th century. Later, the blood of Wilstermarsh, Angler and Red Danish cows was used to improve the quality and quantity of the breed. The main feature of this breed is the ability to easily adapt to different natural climatic conditions. Thanks to this, the red desert breed has spread over large areas of the Kuban, North Caucasus, Central Asia and Western Siberia. Milk production depends on the climatic breeding zone. Red desert cows can produce more than 5,000 liters of milk per lactation on a rich meat diet. However, average indicators are 4-5 tons of milk during the lactation period.

State support for the development of animal husbandry in our country provides ample opportunities for the creation of new large and modern complex farms. However, in order to satisfy the population's demand for livestock food products, it is of scientific theoretical and practical importance to compare the quantitative and qualitative indicators of the products of productive breeds with the indicators of local breeds. Therefore, research in this field is planned to be conducted in farms of Khizi region.

A number of beef and dairy cattle breeds introduced from foreign countries are bred on the territory of Azerbaijan. Among them, the characterization of the genetic characteristics of the following Simmental, Swiss and Holstein-Friesian breeds bred in the territory of Khizi region is as follows:

Simmental is a beef and dairy cattle. The origin of the breed is still disputed. Historical records show that this breed was formed as a result of the crossbreeding of the German breed with the Swiss domestic breed. The name Simmental is derived from the name of the area where the cattle were first bred — the Simme Valley in the Bernese Oberland of Switzerland. The most important feature of Simmental cattle is the ability to give good milk, as well as high indicators in the direction of meat. In total, there are 40 - 60 million in the world, and in Europe it is about half of all cattle. The characteristic features of the goods are the change in color from gold to red and the presence of white spots on it (<https://lyl.su/Px9B>).

Swiss, perhaps the oldest of all dairy breeds, the Brown Swiss, according to some historians, B.C. It was formed in the valleys and mountain slopes of Switzerland in the 4000s. This breed, which is mainly bred in the dairy direction, is also used in the meat direction.

Holstein - Friesian is distinguished from other breeds in the world due to its ability to give high milk. They are known as the world's highest producing milk animals. The Holstein-Friesian is one of the most widespread cattle breeds in the world, present in more than 150 countries. In Europe, the breed is used for milk in the north and meat in the south. Since 1945, European national development has led to the increasing regionalization of livestock and dairy production. In Azerbaijan, this breed occupies an important place among the breeds bred in the dairy sector.

#### *Material and methodology*

Regardless of the form of ownership in Khizi district, local and introduced cattle breeding farms are included in the research. For genetic research, blood is taken from a blood vessel in the upper third of the bovine animal's neck by a competent veterinary specialist in accordance with zootechnical regulations. When taking blood, the stress state of the animal is taken into account, it is determined accordingly, sterility is observed, 5-7 ml of blood sample is taken from each animal. Bleeding is performed using a vacuum system, samples are sealed in a thermostat and sent to the laboratory for analysis. It is stored in a special freezer. It is involved in the initial work to be examined at the genome level, to obtain DNA.

#### *Results and their discussion*

The development of cattle, which play an important role in meeting the population's demand for meat and dairy products, is one of the important production areas of agriculture in the livestock sector of Khizi region. Taking into account that the cattle breeding enterprise, which has the largest number of introduced cattle in Khizi region and has the most variety in terms of species, belongs to Azeri LLC, the research was carried out in the aforementioned facility and the research of local cattle was carried out in the backyards of individual owners.

58 out of 220 head of cattle bred in the complex livestock farm owned by Azeri LLC and 25 head of domestic cattle from private farms were involved in the research. The indicators of the researched animals by gender are given in the following diagrams (Figure 2).

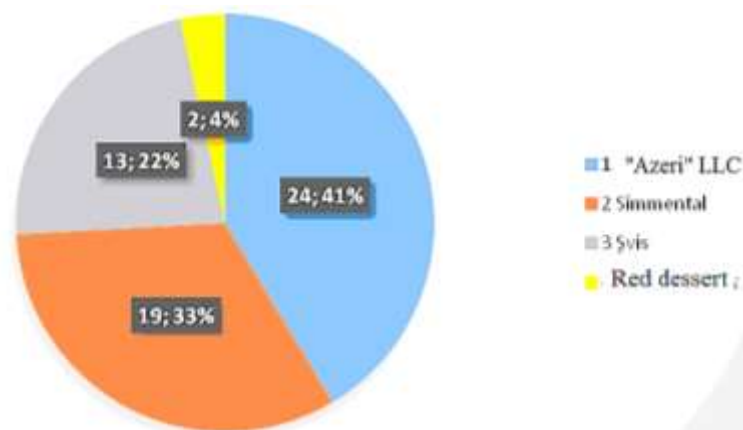


Figure 2. Indicators of head number of bovine animals involved in the study

As shown in Charts 1 and 2, Simmental (19.33%), Swiss (13.22%), Holstein-Friesian (24.41%) breeds of cattle (220 head in total) were introduced in the farm owned by "Azeri" LLC. and in 4 farms owned by individuals, a total of 140 cattle breeds (Gonur Caucasian and Red Desert)

are kept. Blood samples were taken from 83 cattle involved in the study. DNA was extracted from the blood samples and stored in a refrigerator (Figure 3) (<https://ljl.su/debY>).

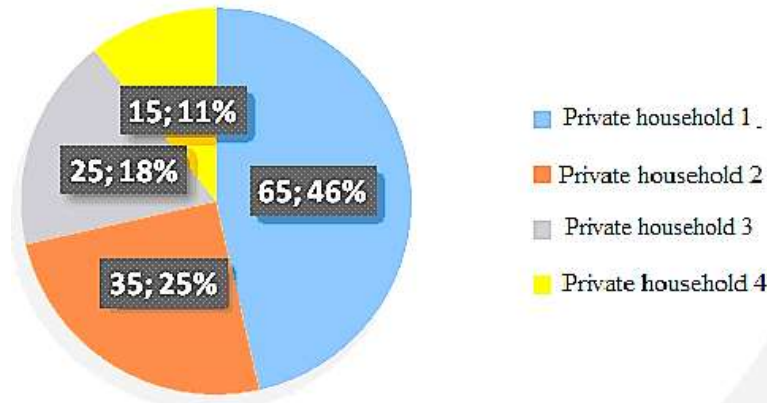


Figure 3. Head number of Caucasian cattle on private farms

The bovine animals from which blood samples were taken and their productive parameters are given in the Table 2.

Table 2  
 INDICATORS OF BOVINE ANIMALS FROM WHICH BLOOD SAMPLES WERE TAKEN

The genus of bovine animal	Head count	Farm address	Conditional number of the individual farm	In one head, the milk is expressed daily		Additional note
				liter	Oiliness %	
Holstein-Friesian	24	Azeri LLC		15	3.3	
Simmental	19	Azeri LLC		18	3.5	
Şvis	13	Azeri LLC		20	4	
Red Desert	2	Azeri LLC		13	3.7-3.9	
Black Caucasus	14	Private household	1	12	3.77	
Native Angus	1	Private household	1	10	2-2.5	Without pairing with the Konur Caucasian breed received.
Native Holstein-Friesian	1	Private household	1	14	3	Without pairing with the Konur Caucasian breed received.
Pure blood is the Red Caucasus	3	Private household	2	12	3.7	
Black Caucasus	4	Private household	3	13	3.7	
Black Caucasus	1	Private household	4	13	3.7	
Red Desert	1	Private household	4	12	3.8	

As can be seen from Table 2, the Swiss breed differs according to the amount of milk milked during the day (20 liters) and milk fat content (4%). The fat content of the Red Sahara and Red Caucasian breeds was 3.7-3.9% and 3.7%, respectively, and the daily milk yield was 13 and 12-13 liters. In Simmental and Holstein-Friesian breeds, the fat percentage was low compared to other

breeds, 3.5 and 3.3, respectively, but the daily milk yield was high, 18 and 15 liters, respectively. despite the fact that the milk yield was the least (12 liters) in the cows, the fat content of the milk was high, 3.77% and 3.8%, respectively. Characterization of quantitative and qualitative indicators of productivity according to the results of DNA analysis will be carried out at the end of the study.

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