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STUDY OF THE ADAPTATION CHARACTERISTICS OF YAKS AND CALVES RAISED IN LACHIN AND KALBAJAR REGIONS OF THE REPUBLIC OF AZERBAIJAN

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Abstract

Yaks possess a range of anatomical and physiological adaptations that enable them to thrive in high-altitude environments with low oxygen levels. Key features include a high metabolic rate, acute senses, and increased heart and lung capacities, which facilitate efficient respiration and extended foraging distances. This study examines the adaptation characteristics of yaks and calves in the Lachin and Kalbajar regions of Azerbaijan.

Keywords: yak, adaptation, biological features, body size, live mass.

INTRODUCTION

Animal husbandry, one of the primary sectors of agriculture, plays a vital role in meeting the population's demand for livestock products. A significant global challenge that has emerged in recent years, exacerbated by international tensions, is food security. It is increasingly recognized as a strategic priority for nation-states. To feed the world's growing population, which is projected to reach 9.3 billion by 2050, food production must increase by 70% compared to current levels.

In Azerbaijan, to address the population's demand for livestock products, various laws and regulations have been enacted. Currently, the country is 86% self-sufficient in meat and meat products. The annual meat demand per person is 78 kg, while in 2023, local production met only 43.5 kg per capita. Including imported meat, this figure rises to 48 kg, indicating that the demand for meat is still unmet.

To close this gap, it is essential to explore alternative breeding areas that suit the country's natural climatic conditions. One promising approach is the introduction of animal species capable of utilizing grasslands in mountainous areas, which have long been underused. In many other countries, yaks have been successfully introduced for this purpose.

In December 2022, 100 yaks were brought to Azerbaijan and placed in the mountainous regions of the Kalbajar-Lachin economic district. In 2024, additional 117 yaks were introduced, including 101 females with their offspring and 16 calves. These yaks are expected to contribute significantly to local livestock production, utilizing previously untapped mountain pastures.

The reason why the yaks brought to our republic are grown in the mountainous areas of the Kalbajar-Lachin economic district is that the mountainous terrain of Kyrgyzstan, the homeland of the yaks, is suitable for the climatic conditions (table 1; photo 1).

Table 1

Structure of the vessel

Gender composition and age groups	Current status by 2022
	Head count
Producing yaks	5
Mothers	95
Total:	100

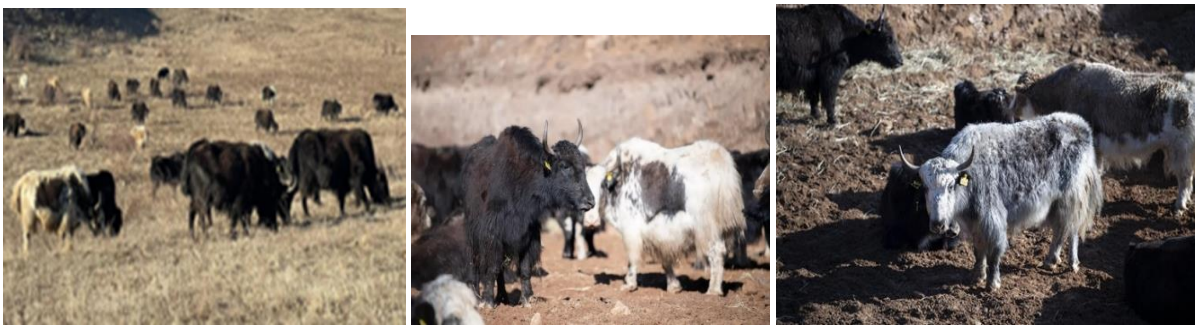

Photo 1. Yaks brought to Azerbaijan (https://report.az/ask/azerbaycana-qirgizistandan-damazliq-meqsedile-100-bas-yak-getirilib/)

The yak (Bos grunniens), a type of cattle, is well adapted to harsh environments and is less demanding in terms of food. Yaks primarily graze on pasture plants and possess a highly developed sense of smell, superior to that of other animals. Their flexible, thin lips allow them to forage effectively, even during the coldest winters, enabling them to find plants buried beneath 10-20 cm of snow.

In the wild, yaks inhabit the Tibetan mountains, thriving at altitudes of 4,000-5,000 meters above sea level. Domesticated yaks, however, are more widely distributed, found in India, China, Altai, Buryat-Mongolia, Kazakhstan, Kyrgyzstan, Uzbekistan, and Tajikistan. Yaks can live up to 25 years and are capable of adapting to climates at altitudes as low as 1,500 meters above sea level.

Yaks have a distinctive body structure, characterized by a large, heavy head that hangs low, a short neck, a broad, deep chest, and straight, flat, well-hooved feet. Their lower body is covered in dense, long hair that forms a fringe, which protects them from the cold when lying on snow or frozen ground during winter [1; 2; 3].

Yaks are late bloomers, reaching sexual maturity at 1.5-2 years of age, with growth stopping around 6-7 years. Their coats come in various colors, with black yaks featuring a light stripe along the back being common, along with shades of brown. Whitish and completely white yaks are less frequent. Female yaks typically weigh between 350-400 kg, while males weigh 400-500 kg. The meat yield is 45-48% for both males and females, and up to 48-52% for fattened animals, depending on the level of fatness.

Each year, 3-4 kg of wool can be obtained from adult yaks, with more than half consisting of mohair. This wool is used to produce fabrics and other valuable products. Compared to cattle, yak skin is thicker and heavier but tends to be looser.

The quality indicators of yak meat surpass those of beef. For instance, yak meat contains 20 g of protein per 100 g, compared to 18.6 g in beef (see Table 1). Additionally, yak milk has a fat content ranging from 5.0% to 9%, which is on average 1.2-4.7% higher than cow's milk (table 2).

Table 2

Quality indicators of beef and yak meat, per 100 g

Meat quality indicators	Beef	Yak meat
Energy value, kcal	218	112
Protein, q	18,6	20
Oil, q	16	3,5
Water, q	64,5	75,3

Yak meat is richer in macro and micro elements than beef (table 3).

Table 3

The amount of mineral substances in beef and yak meat, per 100 g

Minerals	Beef	Yak meat
Potassium, mg	326	339
Calcium, mg	9	12
Phosphorus, mg	188	216
Iron, mg	2,7	3
Iodine, mcg	7	7

The amount of calcium and phosphorus in yak meat exceeds that in beef by 3 mg and 28 mg per 100 g of meat, respectively.

Each year, 3-4 kg of wool is harvested from adult yaks, with more than half consisting of mohair. This wool is used to create fabrics and other valuable products. Yak skin, in comparison to cattle, is heavier, thicker, and looser.

Courtship among yaks begins early in the fall, with the Bosphorus cycle lasting 257 days, or approximately 8.5 months. Calving occurs in the spring. Newborn yaks can stand shortly after birth and have until the cold weather arrives to gain strength and grow. During their first year, calves stay warm under their dam's long fur. At birth, a yak weighs between 13-15 kg, and by the end of its first year, its weight increases tenfold. The young yak is exclusively fed with its mother's milk for the first month, after which it gradually starts grazing.

Yak milk yield is generally low, averaging 500-600 kg annually. However, with optimal feeding and care, yields can reach 700-800 kg or more. The fat content of yak milk is around 9% [4; 5; 6; 7]

MATERIAL AND METHODOLOGY OF SCIENTIFIC RESEARCH WORK

The research was conducted following the methodology outlined by R. Sh. Ipgit and A. E. Lushenko in "Yak Breeding" (2021) [8]. The study took place at the Farm of the Northern Regional Office of "Azeragrar State Production and Processing Union" LLC. The research focused on three yak breed female animals kept in the Lachin and Kalbajar districts.

The objective of this scientific research was to investigate the distribution of yaks in the mountainous areas of the Lachin and Kalbajar regions, their adaptation characteristics, phenotypic indicators of their offspring, and to monitor their developmental dynamics. The aim is to increase the yak population and meet the demand for meat. Additionally, the research seeks to explore the potential for developing new hybrids in the future [9; 10].

RESULTS AND ANALYSIS

Scientific research began in early 2023. The yaks and their offspring were weighed, and body measure-

ments were recorded (see Table 2; Photo 2). Hair samples were collected from various parts of their bodies to analyze the oiliness and composition of their fur coats in the laboratory. Additionally, the grasses available in the yaks' feeding areas were identified.

Two male cubs were born from the yaks. Both cubs are in excellent health, with their colors meeting the species' standards: their bodies are black, and their heads are also black.

- Dam yak No. KG 00045/2627 gave birth to calves weighing 15 kg on May 11, 2023.
- Dam yak No. KG 00045/2638 gave birth to calves weighing 12 kg on May 15, 2023.

At one month of age, the calves were weighed and measured (table 4; photo 2). The calf that weighed 15 kg at birth now weighs 28 kg, while the calf that weighed 12 kg at birth now weighs 17 kg.

Table 4

Characteristics of yaks

Indicators						
Inventory number KG 00045/2601, gender female, age 2.5, color black						
Live weight, kg	Straight length of the body, cm	Left length of the body, cm	chest, cm	Chest width, cm	Withers height, cm	The height of the ear, cm
150	124	122	143	26	104	103,5
Inventory number KG 00045/2627, gender female, age 3.5, color black						
190	148	145	160	34	105	109
Inventory number KG 00045/2638, gender female, age 3.0, color black						
165	134	130	150	29	105	109

Photo 2. Taking body measurements near the dam

In some male yaks, the height at the withers can reach up to 135 cm, while female yaks can be even taller (table 5; photo 3).

Table 5

Phenotypic indicators of yak cubs at 1 month of age

Indicators	**Yak with inventory number KG 00045/2627**	**Yak with inventory number KG 00045/2638**
Live weight, kg	28	17
Color	black ball	black ball
Straight length of the body, cm	72	63
My chest, cm	76	65
The length of the forehead, cm	20	12
Width of forehead, cm	12	10
Chest width, cm	15	12
Flank girth, cm	14	12
Left length of the body, cm	270	210
Wither’s height, cm	64	50
The height of the ear, cm	66	52
Back width, cm	20	15

Photo 3. Calves weighing and body measurements

In the next phase of the scientific research, the focus will be on studying the growth and development dynamics of the calves. Additionally, the chemical composition of the dams' milk and blood will be analyzed, and the degree of oiliness of the fur will be examined in the laboratory. The results will be compared with those of other cattle breeds.

Results

1. The age of the Yaks has been determined. Inventory No. KG 00045/2601 2.5, Inventory No. KG00045/2627 3.5, Inventory No. KG 00045/2638 are 3 years old.

2. The live weight of the mother with Inventory No. KG 00045/2601 was 150 kg, the live weight of the mother with Inventory No. KG00045/2627 was 190 kg, and the live weight of the mother with Inventory No. KG 00045/2638 was 165 kg.

3. The stock number KG 00045/2627 was 15 kg at birth and 28 kg at the age of 1 month. Daily weight gain is 433 g.

4. The stock number KG 00045/2638 was 12 kg at birth and 17 kg at the age of 1 month. Daily weight gain is 166 g.

5. The types of plants that the yaks use more for feeding have been determined. Among them, Gray meadow grass, Watermelon, Fodder grass, Garden leaf, Wild clover, Gangal, Nettle, Three-eared clover, Jil grass, Mountain grass, Uvulik, Amenkomenji, Chain grass, etc. can be shown.

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