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MAKTABGACHA  
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**2025**

- 13.00.00 Pedagogika fanlari
- 13.00.01 Pedagogika nazariyasi. Pedagogik ta'limotlar tarixi
- 13.00.02 Ta'lim va tarbiya nazariyasi va metodikasi (sohalar bo'yicha)
- 13.00.03 Maxsus pedagogika
- 13.00.04 Jismoniy tarbiya va sport mashg'ulotlari nazariyasi va metodikasi
- 13.00.05 Kasb-hunar ta'limi nazariyasi va metodikasi
- 13.00.06 Elektron ta'lim nazariyasi va metodikasi (ta'lim sohaları va bosqichlari bo'yicha)
- 13.00.07 Ta'limda menejment
- 13.00.08 Maktabgacha ta'lim va tarbiya nazariyasi va metodikasi
- 13.00.09 Ijtimoiy pedagogika
- 07.00.00 Tarix fanlari
- 19.00.00 Psixologiya fanlari
- 01.00.00 Fizika-matematika fanlari
- 02.00.00 Kimyo fanlari
- 03.00.00 Biologiya fanlari
- 09.00.00 Falsafa fanlari
- 10.00.00 Filologiya fanlari
- 11.00.00 Geografiya fanlari

# M

# AKTABGACHA VA AKTAB TA'LIMI

Pedagogika, psixologiya fanlariga ixtisoslashgan ilmiy jurnal



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# CHANGES IN MILK PRODUCTION AND QUALITY INDICATORS OF MILK FLOW (GOATS) IN ACCORDANCE WITH THEIR ORIGIN AND FEEDING



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**Abstract:** The article entitled "Changes in Milk Production and Quality Indicators of Goat Milk in Accordance with Their Origin and Feeding" presents the results of experiments aimed at studying the influence of different feeding and maintenance methods during lactation on milk productivity and the physicochemical properties of goat milk from various breeds. The study found that local goats (mixed breeds) demonstrated superior performance in terms of milk yield, fat content, and certain milk components compared to imported breeds, and were therefore recommended for breeding in farms. To enhance the productivity of foreign goats, it is advisable to organize additional feeding to compensate for the nutritional deficiencies under year-round grazing conditions. At the same time, local goats proved to be more adaptive and productive in the same environment.

**Key words:** goat milk, breed, Russian White, Zaanen, aboriginal, dietary products, medicine, ecology, nutrition, dry matter, titratable acidity, fat, nitrogen-free compounds, physicochemical properties.

**Annotatsiya:** "Echkilar zotiga va ularning oziqlanishiga qarab sut ishlab chiqarish va sifat ko'rsatkichlarining o'zgarishi" mavzusidagi ushbu maqolada laktatsiya davrida har xil oziqlantirish va saqlash usullarining sut mahsuldorligi hamda echki suti tarkibidagi fizik-kimyoviy xossalarga ta'siri o'rganilgan. Tadqiqot davomida aniqlanishicha, mahalliy zotli (aralash zotli) echkilar sut miqdori, yog' miqdori va ba'zi sut komponentlari bo'yicha xorijiy zotli echkilarga nisbatan ustunlik qilgan va fermalarda yetishtirish uchun tavsiya etilgan. Chet el zotli echkilar mahsuldorligini oshirish uchun yil davomida yaylovda boqish sharoitida yetarli oziqa yetishmasligini bartaraf etish maqsadida qo'shimcha oziqlantirish tavsiya etiladi. Shuningdek, yil bo'yi yaylovda saqlash sharoitida mahalliy zotli echkilar moslashuvchanligi bilan ajralib turdi.

**Kalit so'zlar:** echki suti, zot, ruscha oq zot, zaanen, mahalliy (aboriginal), parhez mahsulotlar, tibbiyot, ekologiya, oziqlanish, quruq modda, titrlanuvchi kislotali muhit, yog', azotsiz birikmalar, fizik-kimyoviy xossalalar.

**Аннотация:** В статье под названием "Изменения продуктивности и показателей качества молока коз в зависимости от их происхождения и условий кормления" представлены результаты экспериментов по изучению влияния различных методов кормления и содержания в период лактации на молочную продуктивность и физико-химические свойства молока коз разных пород. В ходе исследований установлено, что местные козы (смешанные породы) превосходят своих зарубежных аналогов по надою, содержанию жира и ряду других компонентов молока, и рекомендуются для разведения в хозяйствах. Для повышения продуктивности иностранных пород целесообразно организовать дополнительное кормление с целью восполнения дефицита питательных веществ при круглогодичном выпасе. В то же время местные козы показали лучшую адаптивность и продуктивность в аналогичных условиях.

**Ключевые слова:** козые молоко, порода, русская белая, зааненская, аборигенная, диетические продукты, медицина, экология, питание, сухое вещество, титруемая кислотность, жир, безазотистые соединения, физико-химические свойства.

## INTRODUCTION

Relevance of the Topic. In many countries around the world, goat breeding is currently undergoing intensive development. Goat milk and its dairy products are increasingly recognized as a valuable source of dietary nutrition for people of all age groups [6]. Goat milk differs significantly from other types of milk in terms of its nutrient composition, notably containing a high concentration of calcium salts. For this reason, goat milk is often recommended for individuals of various ages and sexes, including children, as part of the treatment for metabolic disorders and bone-related diseases [7].

## LITERATURE REVIEW ON THE TOPIC

According to several physiological and immunological indicators, goat milk is comparable to human milk. Moreover, in certain aspects, it even surpasses it. Therefore, in cases where mother's milk is insufficient or unavailable—such as for orphaned infants—the use of goat milk is recommended. It should be noted that, to meet a child's daily requirement for animal fat, goat milk is consumed in 30–40% smaller quantities compared to cow milk [3, 4, 7].

As is known, in the mountainous and foothill pastures of the northern part of the Nurata and Koshrabad regions of Uzbekistan, farms have been established to breed dairy goats of various breeds. However, there is a lack of scientific research examining milk productivity and milk quality in a comparative manner under year-round grazing conditions. This gap prompted us to conduct a comparative analysis of milk productivity in imported Zaanen and Russian White goats, as well as in local aboriginal goats, the latter serving as a control group under an economic maintenance system.

Furthermore, no prior studies have investigated the milk productivity and physicochemical properties of milk in goats of different origins during the lactation period, under conditions of year-round pasture grazing without supplemental feeding.

The aim of the study is to conduct a comparative assessment of milk productivity and the physicochemical characteristics of milk in goats of different breeds during lactation under mountainous and foothill year-round grazing conditions in Uzbekistan. The following specific task was formulated: to determine the level of milk production, chemical composition, and quality indicators of milk in goats of various genotypes.

## RESEARCH METHODOLOGY

Materials and Research Methods. For a comparative study of the milk productivity of goats belonging to different genotypes, the method recommended by N.I. Ovsyannikov [11] was applied. According to this method, three groups of animals were formed, each consisting of 10 heads and analogous in age, live weight, and breed [2, 9].

Milk productivity was calculated twice a month during milking control by multiplying the number of days in a month (30) by the average daily milk yield. Milk samples were collected from each goat in the morning and evening. These fresh milk samples were combined to form a single mixed sample for analysis. The resulting mixture was used for chemical analysis to determine the amount of total fat, milk fat content, protein, solids-not-fat (SNF), density, and other milk quality indicators [1, 3, 13].

For statistical processing of the obtained data, the programs "Biomet" and Microsoft Excel were used. The arithmetic mean and its standard error, the coefficient of variation (Cr), and the statistical reliability of the results were calculated in accordance with the method of E.K. Merkurjeva [10].

## ANALYSIS AND RESULTS

The goats used in this study were similar in terms of productivity. However, a genetic difference was observed between the groups based on their origin and the intensity of metabolic processes occurring in their bodies. All three breeds studied—Zaanen, Russian White, and local goats—are dairy-oriented, which serves as a commonality. Nevertheless, certain differences in productivity emerged due to breed-specific adaptations to prevailing weather and feeding conditions, especially with respect to nutrient utilization for milk synthesis and metabolic efficiency.

To ensure consistency, all groups of first-lactation goats were kept and fed under identical conditions. In our view, studying the effects of natural environmental stressors on milk productivity and the physicochemical parameters of milk in both imported and local first-lactation goats is of significant scientific and practical importance [8, 12].



Although the animals used in the experiment were similar in age, their body weights differed slightly. All first-lactation goats were brought to the farm simultaneously and were kept together for 10 days with Zaanen breeding bucks. In the autumn (mating season), local goats had an average live weight ranging from 30.2 to 31.1 kg, while goats from the Zaanen and Russian White breeds had 5.8% and 8.9% higher live weights, respectively.

**Table 1: Milk productivity and live weight of the first flow of different origins (n = 10 heads)**

Indicators	Groups		
	Local	Zaanen	Russian white
Duration of the lactation period, days	140±9,2	133±8,8	141±8,3
Milk actually milked, kg	110±4,5	90,6±0,6	103±1,5
Milk productivity for the lactation period, kg	117,8±0,8	102,2±0,5	109,6±0,3
Live weight at the end of the experiment, kg	32,5±0,3	34,5±0,1	35,7±0,2

The observed differences in live weight among the goat groups are likely associated with the breeding history of each breed. Russian White goats were developed for high milk productivity under harsh conditions, whereas Zaanen goats were bred in more favorable environments with ample feeding. As a result, when maintained in Uzbekistan's sharply continental climate, the imported breeds exhibited their respective genetic adaptations.

Similar trends were noted in the duration of lactation: 140, 133, and 141 days for the local, Zaanen, and Russian White goats, respectively (Table 1). Correspondingly, the amount of milk actually milked differed: 110 ± 4.5 kg in the control group, while the experimental groups produced 90.6 kg and 103 kg—17.6% and 6.4% less than the control, respectively.

When calculated over a standard 150-day lactation period, the milk yield of the control group amounted to 117.8 ± 0.8 kg. In contrast, the Zaanen and Russian White goats yielded 13.25% and 7.0% less, respectively.

Further analysis revealed intergroup differences in the main milk components critical to physiological functions, which are synthesized alongside milk and indicate its nutritional value (Table 2). In the local goats, dry matter content reached 18.31 ± 0.1 kg. This was 12.5% and 9.1% higher than in Zaanen and Russian White goats, respectively. These differences are most likely attributed to insufficient nutrient intake from pasture in the foreign breeds.

**Table 2: The amount of emitted milk components in the first flow of different origins during the lactation period, kg**

Indicators	Groups		
	Local	Zaanen	Russian white
Dry matter	18,31±0,1	16,02±0,1	16,66±0,1
Milk fat	6,13±0,04	5,20±0,03	5,50±0,03
Common protein	4,98±0,03	4,56±0,02	4,47±0,02
Casein	4,13±0,02	3,84±0,01	3,79±0,01
Whey proteins	0,85±0,004	0,72±0,001	0,68±0,001
Lactose	5,89±0,02	5,33±0,03	5,32±0,03

The first-lactation goats of local origin also had higher milk fat content than their foreign counterparts—by 15.2% and 10.3%, respectively. A similar pattern was observed for total protein content.

We believe that the differences observed are reliable and can be attributed to the metabolic intensity and physiological productivity of goats raised in the extreme environmental conditions of Uzbekistan<sup>[8]</sup>.

The levels of dry matter, fat, casein, whey proteins, lactose concentration, and milk density varied depending on productivity and genotype. In terms of milk density, the foreign breeds demonstrated a significant advantage over local goats (Table 3).

**Table 3: Physico-biochemical properties of milk in goats of different origins**

Indicators	Breeds		
	Local	Zaanen	Russian white
Density, g / cm <sup>3</sup>	1,02976±0,003	1,03471±0,008	1,0324±0,004
Titrated acidity, T0	16,5±0,10	16,9±0,10	16,3±0,10
Dry matter,%	15,54±0,09	15,68±0,09	15,21±0,09
Fat,%	5,2±0,03	5,09±0,02	5,02±0,01
Total protein,%	4,23±0,02	4,46±0,02	4,08±0,01
Casein,%	3,51±0,01	3,76±0,01	3,46±0,09
Whey proteins,%	0,72±0,002	0,70±0,002	0,62±0,001
Lactose,%	5,0±0,01	5,22±0,01	4,86±0,07

From Table 3, it can be seen that Zaanen goats had a slight advantage in titrated acidity compared to the other breeds. Similar trends were observed in other physicochemical parameters.

Overall, goats of foreign origin surpassed local goats in certain aspects of milk composition, including titrated acidity, density, total protein, and casein concentration. Specifically, the milk of Zaanen goats contained higher levels of total protein, casein, and lactose compared to the other groups. However, in terms of total protein and fat concentration, the local control group showed superiority over the imported breeds.

## CONCLUSION AND SUGGESTIONS

When breeding goats, regardless of their origin, it is necessary to organize supplemental feeding during the insemination season (from autumn) through to early spring (up to the second month of lactation). This ensures the replenishment of nutrient deficiencies in the pasture-based diet and supports the proper course of metabolic processes in goats maintained under year-round grazing conditions.

Based on adaptive traits, local goats demonstrated greater resilience, flexibility, and suitability for the extreme environmental conditions of Uzbekistan. Therefore, they can be successfully bred for selection and improvement aimed at obtaining high-yielding individuals.

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- 13.00.00 Pedagogika fanlari
  - 13.00.01 Pedagogika nazariyasi. Pedagogik ta'limotlar tarixi
  - 13.00.02 Ta'lim va tarbiya nazariyasi va metodikasi (sohalar bo'yicha)
  - 13.00.03 Maxsus pedagogika
  - 13.00.04 Jismoniy tarbiya va sport mashg'ulotlari nazariyasi va metodikasi
  - 13.00.05 Kasb-hunar ta'limi nazariyasi va metodikasi
  - 13.00.06 Elektron ta'lim nazariyasi va metodikasi (ta'lim sohaları va bosqichlari bo'yicha)
  - 13.00.07 Ta'limda menejment
  - 13.00.08 Maktabgacha ta'lim va tarbiya nazariyasi va metodikasi
  - 13.00.09 Ijtimoiy pedagogika
  - 07.00.00 Tarix fanlari
  - 19.00.00 Psixologiya fanlari
  - 01.00.00 Fizika-matematika fanlari
  - 02.00.00 Kimyo fanlari
  - 03.00.00 Biologiya fanlari
  - 09.00.00 Falsafa fanlari
  - 10.00.00 Filologiya fanlari
  - 11.00.00 Geografiya fanlari



# MAKTABGACHA VA MAKTAB TA'LIMI

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**Musahhih:** Alibek Zokirov

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