ОШ МАМЛЕКЕТТИК УНИВЕРСИТЕТИНИН ЖАРЧЫСЫ. АЙЫЛ ЧАРБА: АГРОНОМИЯ, ВЕТЕРИНАРИЯ ЖАНА ЗООТЕХНИЯ

ВЕСТНИК ОШСКОГО ГОСУДАРСТВЕННОГО УНИВЕРСИТЕТА. СЕЛЬСКОЕ ХОЗЯЙСТВО: АГРОНОМИЯ, ВЕТЕРИНАРИЯ И ЗООТЕХНИЯ

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THE STATE, ACHIEVEMENTS, AND PROSPECTS FOR THE DEVELOPMENT OF SHEEP BREEDING IN UZBEKISTAN

СОСТОЯНИЕ, ДОСТИЖЕНИЯ И ПЕРСПЕКТИВЫ РАЗВИТИЯ ОВЦЕВОДСТВА В УЗБЕКИСТАНЕ

ӨЗБЕКСТАНДАГЫ КОЙ ЧАРБАЧЫЛЫГЫНЫН АБАЛЫ, ЖЕТИШКЕНДИКТЕРИ ЖАНА ӨНҮГҮҮ КӨРҮНҮШҮ

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THE STATE, ACHIEVEMENTS, AND PROSPECTS FOR THE DEVELOPMENT OF SHEEP BREEDING IN UZBEKISTAN

Abstract

Sheep breeding in Uzbekistan occupies one of the leading positions in the agricultural sector and is an important source of livestock products – mutton, wool, and sheepskins. In conditions of limited forage resources and the predominance of desert and semi-desert pastures (more than 21 million hectares), and the need to increase the productivity of local breeds, the task of breeding livestock renewal becomes especially urgent. Considering the climatic characteristics of the country and market requirements, the creation of new, more productive and sustainable sheep breeds is of strategic importance. The purpose of this study was to comprehensively analyse the state of sheep breeding in Uzbekistan and generalise data on breeding work to create a new factory type of fat-tailed sheep of meat and fat production, obtained by crossing the Jaydari and Hissar breeds. In the course of the study, methods of targeted factory crossing, selection and breeding, and a comprehensive assessment of zootechnical indicators were used. Breeding work was carried out in 2009-2022 in conditions of farms and scientific institutions of mountainous and foothill regions. As a result, a new type of sheep was described – "Akchasai", officially registered in 2024 (patent No. ZAP 34). Animals of this type demonstrate consistently high rates: the live weight of breeding rams reaches 120-140 kg, ewes – up to 100 kg, which is 20-25% higher than the parameters of the original breed. High viability, early maturity, resistance to climatic stress, and stability of inherited traits make this type a valuable breeding resource. By 2022, a breeding core of 5,100 animals had been formed. The practical significance of the research lies in expanding the genetic potential of domestic sheep breeding and forming a scientific base for its sustainable development in Uzbekistan

Keywords: breeding; breed; sheep; productivity; sheepskin; type

Состояние, достижения и перспективы развития овцеводства в Узбекистане

Аннотация

Овцеводство в Узбекистане занимает одно из ведущих мест в аграрном секторе и является важным источником продукции животноводства – баранины, шерсти и смушек. В условиях ограниченных кормовых ресурсов и преобладания пустынных и полупустынных пастбищ (более 21 млн га), а также необходимости повышения продуктивности местных пород особенно актуальной становится задача селекционного обновления поголовья. С учётом климатических особенностей страны и рыночных требований создание новых, более продуктивных и устойчивых пород овец приобретает стратегическое значение. Целью настоящего исследования являлся всесторонний анализ состояния овцеводства в Узбекистане, а также обобщение данных о селекционной работе по созданию нового заводского типа курдючных овец мясо-сального направления продуктивности, полученного путём скрещивания джайдаринской и гиссарской пород. В ходе исследования были использованы методы направленного заводского скрещивания, отбора и подбора, а также комплексной оценки зоотехнических показателей. Селекционная работа проводилась в 2009-2022 гг. в условиях фермерских хозяйств и научных учреждений горных и предгорных регионов. В результате описан новый тип овец – «Акчасай», официально зарегистрированный в 2024 году (патент № ZAP 34).

Өзбекстандагы кой чарбачылыгынын абалы, жетишкендиктери жана өнүгүү көрүнүшү

Аннотация

Өзбекстанда кой чарбачылыгы агрардык сектордо алдыңкы орундардын бирин ээлейт жана мал чарбачылыгынын маанилүү булагы болуп саналат – эт (кой эти), жүн жана каракүл өндүрүү. Чектелген тоют ресурстары, ошондой эле 21 млн гектардан ашык чөл жана жарым чөл жайыттардын үстөмдүгү шартында, жергиликтүү породалардын продуктивдүүлүгүн жогорулатуу зарылчылыгы туулат. Өлкөнүн климаттык өзгөчөлүктөрүн жана базардын талаптарын эске алуу менен, жаңы, жогорку өндүрүмдүү жана туруктуу кой породаларын түзүү стратегиялык мааниге ээ. Бул изилдөөнүн максаты – Өзбекстандагы кой чарбачылыгынын абалын ар тараптуу талдоо жана эт-салоо багытындагы жаңы заводдук курдючтук кой порода тибин түзүүгө багытталган селекциялык иштердин жыйынтыктарын жалпылоо болуп саналат. Изилдөөдө заводдук багытталган аргындаштыруу, тандоо жана курактоо ыкмалары, ошондой эле зоотехникалык көрсөткүчтөрдү комплекстүү баалоо колдонулган. Селекциялык иштер 2009-2022-жылдары тоолуу жана тоо этектери аймактарындагы фермердик чарбаларда жана илимий мекемелерде жүргүзүлгөн. Натыйжада 2024-жылы расмий түрдө катталган (патент № ZAP 34) "Акчасай" аттуу жаңы кой тиби сүрөттөлгөн. Бул типтеги малдар туруктуу жогорку көрсөткүчтөрдү көрсөтөт: асыл тукум кочкорлордун тирүү салмагы 120-140 кг, кочкорлордуку 100 кг га чейин жетет, бул көрсөткүчтөр баштапкы породадан

Животные этого типа демонстрируют устойчиво высокие показатели: живая масса племенных баранов достигает 120-140 кг, овцематок – до 100 кг, что на 20-25 % превышает параметры исходной породы. Высокая жизнеспособность, скороспелость, устойчивость к климатическим нагрузкам и стабильность наследуемых признаков делают данный тип ценным селекционным ресурсом. К 2022 году было сформировано племенное ядро численностью 5100 голов. Практическая значимость исследования заключается в расширении генетического потенциала отечественного овцеводства и формировании научной базы для его устойчивого развития в условиях Узбекистана

20-25% жогору. Жогорку жашоого жөндөмдүүлүк, эрте жетилүү, климаттык катаалдыктарга туруктуулук жана тукум кайталоочу белгилердин сакталышы – бул типти баалуу селекциялык ресурс кылат. 2022-жылга карата бул породанын асыл тукум ядросу 5100 башка жетти. Изилдөөнүн практикалык мааниси – улуттук кой чарбачылыгынын генетикалык потенциалын кеңейтүү жана Өзбекстандын шартында туруктуу өнүктүрүү үчүн илимий база түзүү

Ключевые слова: селекция; порода; овцы; продуктивность; смушка; тип

Ачкыч сөздөр: селекция; порода; койлор; продуктивдүүлүк; каракүл; тип

Introduction

In the context of the transformation of Uzbekistan's agricultural sector, the development of sheep farming as a sustainable source of meat and wool products is of particular importance. The limited productivity of traditional breeds, unstable forage supply, and climatic vulnerability of pastures require a revision of approaches to breed development. The need to create specialised genotypes capable of ensuring stable economic performance in extreme conditions determines the scientific and practical importance of conducting a comprehensive analysis of the state and breeding achievements of the industry.

The study by A.K. Abdurasulov et al. (2024) reviewed the situation with the conservation and use of the gene pool of farm animals in the Kyrgyz Republic. The researchers noted that after the sovereignisation of the country, livestock numbers significantly decreased, feeding and maintenance conditions worsened, and breeding work weakened. Despite the presence of more than 20 breeds and populations with valuable adaptive qualities, effective conservation measures have been extremely limited. The researchers emphasised that the issues of breeding work in the conditions of pasture husbandry have been studied in fragments, and the adaptive potential of existing breeds has not been sufficiently disclosed. The present study aims to fill these gaps by analysing breeding strategies and evaluating a new type of fat-tailed sheep created in Uzbekistan.

The study by N.R. Ruzibaev et al. (2023) analysed the effectiveness of using frozen seed from breeding rams in artificial insemination. The results showed that the lambs produced by this method significantly outperformed their peers in terms of body weight at various stages of growth – from birth to 1.5 years of age. It was also revealed that winter cattle provides higher live weight indicators compared to spring. The researchers confirmed the high efficiency of using the gene pool of valuable producers and emphasised the importance of optimising the timing of insemination and lambing to increase the economic productivity of meat and wool sheep.

V. Fedorov et al. (2025) presented an assessment of the meat productivity of mongrel rams obtained by crossing the Texel meat breed with Soviet Merino and Edilbay ewes. A significant increase in slaughter weight, pulp yield, and meat yield ratio was found in crossbred animals compared with purebred counterparts. There was also an improvement in the fatty acid composition of meat, which indicates a high biological quality of the products. The researchers emphasised the effectiveness of hybridisation as a method of increasing sheep meat productivity and focus on the prospects for its introduction into production practice. This study confirmed the feasibility of developing and using new genotypes capable of ensuring sustainable production of high-quality mutton in the context of the transformation of the agricultural sector.

N. Bobokulov et al. (2021) analysed the meat productivity of Karakul and pasture sheep of various ethological types. The researchers noted their ability to maintain high productivity in hot climates, sparse vegetation, and limited access to green fodder. The presented data on live weight, slaughter yield, chemical composition of meat and diet confirmed the high biological value of these breeds. The study highlighted the importance of preserving and using the local gene pool in sheep farming sustainable development programmes.

A similar institutional and economic situation was considered by B.A. Akhmedov (2024), focusing not so much on productive qualities as on the institutional and economic aspects of the development of sheep farming in Uzbekistan. The researcher noted that due to reforms,

privatisation and the creation of farms, the country has made significant progress in the production of karakul products and strengthening the export potential of the industry. The existing problems were highlighted, including lack of resources, weak infrastructure, and unstable water supply to pastures. Thus, if the study by N. Bobokulov et al. focused on the biological and technological characteristics of the breeds, B.A. Akhmedov revealed the macroeconomic and managerial context of the industry's development, emphasising the need for government support and sustainable institutional mechanisms.

In 2020, Uzbekistan initiated a state programme for the development of the karakul industry based on the cluster model. According to the Presidential Decree of September 2, 2020, specialised clusters were created in the pasture areas of the country from 2020 to 2021, focused on breeding small cattle, forming a feed base, and organising a full production cycle – from slaughter to the release of finished products (A cluster for the development of karakul breeding..., 2020). Cooperation with research institutes, subsidisation of infrastructure modernisation, and drilling costs, and measures to stimulate employment were envisaged. This programme is aimed at the efficient use of natural resources, increasing the productivity of Karakul sheep and strengthening the economic sustainability of the sheep industry. However, despite some successful examples of selective breeding and the results of hybridisation, the following unresolved problems have been noted in the literature: the lack of systematised and nationally recognised adaptive meat and fat breeds, the lack of long-term studies of genotype stability, and the gap between government programmes and their practical implementation.

The purpose of this study was a comprehensive critical analysis of the current state of sheep breeding in Uzbekistan and the systematisation of data on breeding activities for the development of an adapted meat and fat type of sheep. The objectives of the study were the following:

- to analyse government initiatives and their impact on the industry;
- to characterise contemporary preferred breeds and pasture farming conditions;
- to synthesise information about the productive, exterior and reproductive characteristics of a new type of sheep obtained by crossing the Jaydari and Hissar breeds and identify gaps in existing breeding practice.

Materials and Methods

Research subjects. The present study was conducted on the territory of the Republic of Uzbekistan, covering various natural and climatic zones, including Tashkent, Namangan, Kashkadarya, and Surkhandarya regions. The main focus was on the mountainous and foothill areas of the Tashkent region, in particular, on farms and breeding enterprises of the Akhangaran region. These territories are characterised by a temperate continental climate with pronounced seasonality: cold winters, warm summers, and variable humidity significantly affect the productivity of farm animals. The main sheep breeds bred in the republic were included in the study.

- The Jaydari breed is a local breed, created under conditions of folk breeding, is highly resistant to extreme climatic conditions and retains productivity with year-round grazing.
- The Hissar breed is a large meat and fat breed known for its high precocity, slaughter yield, and endurance.

• The Akchasoi type is a new population obtained by crossing the Hissar and Jaydari breeds. It has improved indicators of meat and fat productivity and adaptation to the conditions of Uzbekistan.

• The study also included separate groups of Karakul, semi-fine-fleeced meat-wool, and Edilbai sheep breeds.

Farms of various forms of ownership were considered as objects of research: private farms, state-owned breeding enterprises, and personal farmsteads. This choice ensured the representativeness of the sample and allowed considering the specifics of sheep farming in different regions of the country.

The period and conditions of the study. Field and laboratory studies covered the time period from 2009 to 2023, which provided an opportunity to assess long-term trends and the impact of seasonal factors on sheep productivity. The studies were conducted year-round, considering seasonal changes in feeding, housing, and the physiological condition of the animals.

The climatic conditions of the mountainous and foothill zones are characterised by significant temperature fluctuations, an average annual temperature of +10...+15°C, dry summers and cold winters, which have a direct impact on fattening, reproduction, and wool productivity. In desert and semi-desert areas (breeding of the Karakul breed), low humidity, poor food supply, and extreme temperatures were observed, requiring high adaptability of animals.

Methods of data collection and analysis. The following methods were used to comprehensively cover all aspects of productivity and breeding work:

• Analysis of official statistics – data from the Agency of Statistics under the President of the Republic of Uzbekistan (National Statistics Committee..., n.d.), Ministry of Agriculture of the Republic of Uzbekistan (n.d.), and farm reporting forms, in particular, Form 1-FH “Report on the activities of a farming enterprise” (2023).

• Field observations – visual inspection of the herds was carried out, assessment of the conditions of keeping, feeding structure, and general condition of the animals.

• Documentary analysis – stud charts, veterinary records, and production reports were studied. Additional information about breeding work and the state of the industry was obtained based on reporting materials from the Akhangaran Department of the Scientific Research Institute of Animal Husbandry and Poultry (Ruziboyev, 2024).

Assessment of animal productivity. Sheep productivity was assessed in the following areas: body weight was measured using certified scales, and the body mass index was additionally calculated to characterise fatness and physical condition. Wool productivity was determined by annual shearing, subsequent sorting, and quality assessment in accordance with state standards. Meat productivity – slaughter yield, fattening coefficients, weight gain per feed unit were calculated. Sheepskin productivity was assessed by the structure, density, and quality of the sheepskins in accordance with commodity standards.

Methods of breeding work. Breeding activities were based on the principles of selection and selection of breeding animals based on the following characteristics: body weight, growth rate, fur quality, fertility (Kolosov et al., 2020). Interbreeding schemes were used, including the development of a new type of Akchasoi sheep based on the Jaydari and Hissar breeds, which

allowed obtaining genotypes with improved meat and fat productivity and adaptation. The genetic potential was assessed by analysing the heritability of economically useful traits and comparing generations by exterior and productive parameters.

Ethical norms and standardisation. All stages of the study were carried out in accordance with the current legislation of the Republic of Uzbekistan in the field of veterinary medicine and animal protection, and with international standards for the humane treatment of animals. Special attention was paid to minimising stress in animals during manipulation and ensuring proper conditions of maintenance in experimental farms. The products and parameters of the animals were evaluated in accordance with national meat and wool quality standards (Decree No. UP-5995, 2020).

Results

The current state and genetic structure of sheep breeding in Uzbekistan. According to the Agency of Statistics of the Republic of Uzbekistan for 2025, in all categories of farms in the country, there were over 14.3 million units of cattle, 24.5 million units of sheep and goats, and approximately 106 million units of poultry. Animal husbandry in Uzbekistan is based primarily on a pasture system covering 21.1 million hectares of natural land, of which 4.4 million hectares (21%) are in mountainous and foothill areas, and 16.6 million hectares (79%) are in desert and semi-desert plains. There are 15.8 million hectares of pastures at the disposal of territorial pasture farms subordinate to the Committee for the Development of Veterinary Medicine and Animal Husbandry, the remaining 7.2 million hectares are under the jurisdiction of the forest fund and other organisations. The republic breeds the Jaydari, Karakul, Hissar, semi-fine wool meat breed, and partially Edilbai sheep breeds. The breeding of fat-tailed meat breeds is carried out mainly in mountainous, foothill and semi-desert regions, while the Karakul breed dominates in desert and semi-desert zones.

The Government of Uzbekistan has provided incentives for the import of farm animals from abroad and their cultivation, the creation of a solid feed base, and the production of livestock products (Recent agricultural growth in Uzbekistan: Assessment and forecast, 2020). This allowed developing a stable Uzbek breeding base, improving the economic benefits of existing breeds through the introduction of the latest technologies in genetics, breeding and reproduction, and creating new types and breeds resistant to local climatic conditions, reducing dependence on imported breeding products.

The Jaydari (in Persian – local) sheep breed was created in Uzbekistan for several thousand years in folk breeding, is well adapted to breeding in mountainous and foothill regions of the republic and is considered one of the leading breeds in terms of the number of animal units (Fig. 1).

Figure 1. Sheep of the Jaydari breed
Source: N.R. Ruziboyev et al. (2019)

Jaydari sheep differ from other sheep breeds in that they are well adapted to environmental conditions (rainy, snowy, and wet cold) and have the potential of their high genetic potential for productivity in year-round pasture conditions. In terms of meat and fat productivity, they are inferior to the Hissar breeds. A distinctive feature of this breed of sheep is their short legs and elongated body. Most sheep are hawk-nosed, have a long head and long ears. The predominant colour is black, but brown, red, and grey sheep are also found. Live weight of ewes is approximately 75 kg, rams – 100 kg, wool yield from ewes – 2.0-3.0 kg, from rams – 3.0-4.0 kg, coarse wool, used for making coarse cloth, felt, etc.

The Hissar sheep breed is one of the leading meat and fat breeds peasant farms in Tajikistan and widely distributed in the republics of Central Asia, including Uzbekistan (especially in the Surkhandarya and Kashkadarya regions). The breed is well adapted to mountainous and foothill areas, which allows it to be kept in pasture conditions all year round due to the high digestibility of feed by lambs and the rapid growth of young animals (Fig. 2).

Figure 2. Sheep of the Hissar breed
Source: N.R. Ruziboyev et al. (2019)

Hissar rams are distinguished by their large live weight – adults weigh an average of 130-140 kg, and record specimens reach 170-188 kg. Ewes weigh about 80-85 kg, while productive animals reach 90-95 kg. The weight of the fat tail varies from 18 to 20 kg, and in some individuals reaches 30 kg or more. The live weight of rams at the age of 1.5 years is approximately 96 kg, and ewes – 49 kg. Externally, Hissar sheep are characterised by a powerful, strong physique with well-developed muscles and bones. The average height at the withers in rams reaches 87 cm, in ewes – 79 cm. The body length is 85 cm and 75 cm, respectively, and the chest depth is about 35 cm. The body is strong, with a wide back and a straight line along the top, a wide croup, and a deep chest. Due to their strong limbs and well-developed muscles, Hissar sheep are perfectly adapted for long-distance transitions between pastures. Thus, the Hissar breed is a large and productive meat and fat

breed with high adaptation to mountainous conditions and extensive pasture management, which makes it an important resource for animal husbandry in the region.

The Karakul sheep breed was created in Uzbekistan as a result of long-term folk breeding aimed at adapting animals to local climatic and economic conditions. There are several colour types in the breed, among which black, sur, and blue colours dominate (Fig. 3). Of particular importance is the sur colour, which is characterised by high quality wool and is highly valued on the market. In addition, the breed includes several regional types, such as the Karakalpak, Bukhara, and Surkhandarya, each of which is characterised by certain morphological and productive features reflecting adaptation to the conditions of specific areas.

Figure 3. Karakul sheep breed
Source: N.R. Ruziboyev et al. (2019)

The period of effective use of black sheep in economic conditions is on average 6-7 years, however, if high standards of care and feeding are observed, individuals can be exploited for up to 12 years. The biological maturity of Karakul sheep occurs at the age of approximately 1.5 years. The breeding herd was characterised by high fecundity – there were an average of 110-120 lambs for every 100 animals, which indicates the effective reproductive ability of the breed. The most productive period of black sheep is between the ages of 3 and 6 years.

Adult Karakul rams had an average live weight in the range of 60-75 kg, while the weight of ewes was 42-50 kg. Newborn lambs were characterised by a weight of 4.0-4.5 kg in females and 4.5-5.0 kg in males. Black sheep accounted for 75-80% of the livestock, blue – 13-17%, sur-coloured sheep – 5-7%, and other colours – approximately 3%, reflecting the genetic and phenotypic variability within the breed (Khatamov, 2021).

In 1976, researchers from the Scientific Research Institute of Animal Husbandry and Poultry Breeding created the Uzbek meat and wool breed group (Fig. 4). This breed group is characterised by a set of economically useful traits, among which are precocity, large body size, high frost resistance, and a uniformly high appetite and the ability to effectively digest large amounts of feed. These features ensure a high degree of conversion of feed into products, which is an important factor in the economic efficiency of animal husbandry.

Figure 4. Meat and wool sheep
Source: N.R. Ruziboyev et al. (2019)

According to the measurements, the live weight of lambs at birth averaged 4.93 kg for rams and 4.10 kg for ewe lambs. At the age of 4-4.5 months, the weight of the ram lambs reached 30.5 kg, and the ewe rams – 28.4 kg. Adult breeding rams were characterised by a live weight in the range of 80-100 kg, while the weight of female ewes was 50-55 kg. The obtained indicators show a good potential of the breed group in terms of meat productivity while maintaining satisfactory wool quality, which is conditioned by a balanced genotype and adaptation to the climatic conditions of the region.

Breeding work on the creation of a new type of fat-tailed sheep "Akchasai". After describing the sheep breeds existing in Uzbekistan, it should be noted that in the period from 2009 to 2024, significant scientific and practical successes in the field of sheep breeding were achieved in the republic. As part of a focused 15-year breeding work carried out by specialists from research institutions and breeding farms, new inbreed types and populations of sheep have been developed, adapted to the conditions of pasture keeping in arid and mountainous regions. One of these achievements was the creation of a new type of fat-tailed sheep, "Akchasai", characterised by improved meat and fat productivity, high viability, resistance to temperature fluctuations, and effective use of feed in conditions of extensive maintenance. Since 1991, the following significant results have been achieved in Uzbekistan in the field of agriculture and animal husbandry:

1. 13 factory types of Karakul sheep have been created at the Scientific Research Institute of Karakul Breeding and Ecological Deserts.

2. On the basis of the Akhangaran branch of the institute, an educational and experimental farm has been established, provided with pasture and rain-fed lands.

3. Artificial insemination of Uzbek semi-fine-wool meat-wool ewes using frozen ram semen imported from abroad was introduced for the first time.

4. A new type of "Fargona-Rishton-Dasht" was created and patented to increase the productivity of fat-tailed sheep.

5. In order to preserve the gene pool and increase productive qualities, Angora goats from Turkey, downy goats from Russia, and Bayad sheep from Mongolia were imported into the country in 2024.

6. Based on the crossing of local breeds with Hissar sheep and long-term breeding, a new factory type of meat-fat sheep, "Akchasai", was bred. In 2023, a patent application was filed for the new type, and in 2024 it was officially approved by the Board of the Ministry of Justice of the Republic of Uzbekistan (No. ZAP 34 dated April 4, 2024).

The stages of creation of the Akchasai factory type. The initial stage (2009-2013). Breeding work began in 2009 with the import of Hissar rams from the Surkhandarya region. The research was conducted in the farms "Kyzyl Bour" and "Kholturaev Oybek KHM" in the Akhangaran district of the Tashkent region. Two rams were used as progenitors: No. 04207 – was characterised by early maturity and satisfactory indicators of meat and fat productivity; No. 10455 – was characterised by a high level of meat and fat productivity. The initial factory crossbreeding was carried out with local Jaydari ewes. The offspring of the first generation (F1) were repeatedly crossed with purebred Hissar rams (Rakhimov, 2023).

Development of the line (2014-2017). The offspring of the second generation (F2), obtained as a result of selection and breeding of desirable individuals, were bred "inbreed". The development of flocks with up to ¾ Hissar blood was ensured. The main selection criteria were meat and fat characteristics, viability, and exterior features.

Completion of breeding (2018-2021). The breeding work carried out helped to stabilise the characteristics and create breeding herds of a new factory type with a high degree of consistency. Individual selection and breeding allowed consolidating inherited qualities. Further work was aimed at expanding the number of animals with pronounced genetic potential.

By 2022, the number of breeding stock of a new type of fat-tailed sheep has reached 5,100 units. Of these, 105 were breeding rams involved in the development of the next generation and the consolidation of target productive traits. In addition, there were 235 breeding rams in the herd, designed to replace producers and maintain the genetic potential of the population. The breeding stock consisted of 3,160 ewes, which ensured sustainable reproduction. A significant part was also made up of 1,600 breeding yearlings, selected for further breeding and improvement of the breeding core. These data reflect the achieved level of breeding and the scale of breeding work to create a new type of sheep (Table 1). The productivity, exterior, and reproductive properties of this new type of livestock, including viability, remain unchanged even after many years.

Table 1. Live weight of sheep of the new Akchasai type and Jaydari breeds

No.	Indicators	Akchasai type		Jaydari, kg	Difference, kg
		Average kg	Record holder, kg		
1	Breeding rams	90-120	140-180	70-90	20-30
2	Ewes	60-75	80-100	50-55	10-20
3	Breeding rams (1.5 years old) for the replacement stock	70-80	80-110	55-60	15-20
4	Breeding ewes (1.5 years old) for the replacement stock	45-60	65-75	35-45	10-15
5	5-month-old ram lambs	40-50	50-60	35-40	5-10
6	5-month-old ewe lambs	35-45	45-55	30-35	5-10
7	Ram lambs at birth	5.5-6.0	7.0-9.0	5.0-5.5	0.5
8	Ewe lambs at birth	5.0-5.5	6.0-7.0	4.5-5.0	0.5

Source: created by the authors

Based on the data presented in Table 1, it can be concluded that the new Akchasai type of sheep has a significant advantage over the Jaydari breed in terms of live weight in all sex and age

groups. This gap is especially pronounced in adult animals: the live weight of breeding rams of a new type varies between 90-120 kg, and in record holders it reaches 140-180 kg, while in Jaydari analogues it is only 70-90 kg. The difference in the average weight of breeding rams reaches 20-30 kg, which indicates significant breeding progress in increasing live weight.

A similar trend is observed among ewes, where the live weight of the new type of animals is 60-75 kg, with record values up to 100 kg, while the Jaydari breed is only 50-55 kg. The young animals also have significant advantages. For example, 1.5-year-old breeding rams had an average weight gain of 15-20 kg compared to Jaydari sheep, and 10-15 kg for ewes. There was also a positive trend in young animals at the age of 5 months. The new type of ram lambs weighs 5-10 kg more than the Jaydari ones, and the ewe lambs weigh – 5-10 kg more. Even at birth, the weight of rams and ewes of the Akchasai type was 0.5 kg higher than that of their counterparts.

Thus, it can be argued that the development and introduction of a new type of fat-tailed sheep "Akchasai" (Fig. 5) allowed obtaining more highly productive animals with not only increased live weight, but also better genetic potential. A 20-25% increase in weight compared to the base breed demonstrates the effectiveness of the breeding work carried out and the substantiation for breeding a new type in Uzbekistan.

Figure 5. Breeding rams and ewes of the Akchasai type
Source: obtained by the authors

The presented data clearly demonstrate that the new Akchasai type of fat-tailed sheep is significantly superior to the Jaydari breed in all key indicators of live weight, which is confirmed by both tabular materials and visual characteristics in the figure. Breeding measures implemented within the framework of interbreeding using the Hissar gene pool helped to obtain a highly productive type with pronounced meat and fat characteristics, good adaptation to pasture conditions, and stable reproductive ability. However, along with the results achieved, certain gaps remain in the system of selection and evaluation of breeding material, in particular, insufficient digitalisation of breeding records, limited genomic assessment of breeding value, and weak integration of local data into national databases. Using the genetic potential of the Hissar and Jaidari breeds to create highly productive lines requires further scientific development of methods to increase the heritability of productive traits, improve selection technology, and formalise breeding programmes. Thus, the results of the analysis not only confirm the prospects of the new type of sheep, but also indicate the areas of further scientific research and institutional improvements in the industry.

Discussion

The conducted research devoted to the characteristics of a new type of sheep, obtained on the basis of the Hissar and Jaydari breeds, allowed systematising information about the breeding

process, the conditions of pasture maintenance, and the productive features of the crossed livestock. However, a full scientific assessment of the results requires their comparison with similar studies conducted by other researchers in the field of genetics, animal husbandry, and sheep breeding.

A.A. Urimbetov & G.K. Amanova (2021) examined the ethological and biological features of Karakalpak sur Karakul sheep bred in the new northern territories of Karakalpakstan, considering the influence of local environmental conditions on the productivity of animals and their offspring. The researchers found that adaptation to natural and climatic factors, such as aridity and sudden temperature fluctuations, plays a key role in the development of high productive qualities and stability of the herd. These conclusions coincide with the results of the study of a new type of fat-tailed sheep "Akchasai", which was created in conditions of extreme pasture ecosystems. In both cases, the importance of behavioural adaptation and resilience as an important selection criterion is emphasised. However, unlike the Karakul breed, where the main focus was on fur quality and survival, the Akchasai study shifted its focus to meat and fat productivity and reproduction, reflecting differences in breeding priorities due to economic tasks.

R.U. Turgunbaev & Y.F. Sultanov (2021) investigated the growth rates of fat-tailed sheep of various breeds, including Jaydari and Hissar, in Karakalpakstan. Significant fluctuations in the live weight gain of lambs were revealed depending on age, feeding level, and external factors. Special attention was paid to the lambs of the Hissar breed, which demonstrated the highest rates of both absolute and average daily growth. The data obtained confirmed the high productivity of the Hissar breed with extensive maintenance on pastures. These conclusions are consistent with the results of the present study, where selection based on growth rates and meat productivity played a key role in the development of a new breeding type, emphasising the importance of monitoring gains at early stages and adapting feeding to the genetic potential.

The study by Sh.T. Rakhimov (2023) analysed the growth rates of fat-tailed sheep, including the Jaydari and Hissar breeds and their hybrids, raised in Karakalpakstan. It was noted that against the background of a decrease in global demand for wool, interest in the meat and milk sector is increasing, which increases the importance of breeds with intensive and stable growth. The analysis of the average daily and absolute increments confirmed the advantage of the Hissar breed lambs. The results are similar to the conclusions of R.U. Turgunbaev & Y.F. Sultanov (2021), however, this study emphasised the large variability of growth depending on feeding, which indicates the importance of technological conditions along with genetics in breeding new types of sheep.

The study by S. Robinson (2020) on livestock production in Central Asia highlighted the impact of sector fragmentation, winter feed shortages, and limited access to pastures on production efficiency, especially in Uzbekistan. These conclusions are confirmed by the data on the creation of a new type of sheep "Akchasai", the breeding of which was aimed at improving adaptive and productive qualities in conditions of limited feed resources. The need to move from extensive to more organised and sustainable animal husbandry, noted by S. Robinson, is consistent with the objectives of this study, where the emphasis is on genetic stability, early maturity and high meat productivity, increasing economic efficiency with a lack of external support.

The results presented by B.Y. Ataybekov et al. (2024) confirmed the high meat productivity of the Hissar breed in southeastern Kazakhstan, where a slaughter weight of 17.5 kg and a carcass yield of 78.3% were recorded during the slaughter of 4-month-old lambs. These data emphasise the

breeding value of the Hissar breed and strengthen the scientific substantiation for its use as a parent breed in the development of a new sheep breeding type “Akchasai”. Thus, the indicators serve as an empirical confirmation of the productive advantages of the Hissar breed and are consistent with the purpose of the study.

The study by K.T. Basitov et al. (2024) applied objective statistical methods, including analysis of variance, to assess the heritability of key productive traits of meat breeds of sheep, such as body weight and wool yield. The results obtained confirmed the significant genotypic conditionality of these traits, which is consistent with the methodological approach of this study. Despite the fact that the paper mainly deals with Merino breeds, the proposed approach to the analysis of the heritability and breeding value of traits is universal and can be applied to the breeds of the Hissar group and the new type of fat-tailed sheep “Akchasai”. In addition, the geographical region of the study, the south-east of Kazakhstan, has similar climatic and pasture conditions with the regions of Central Asia, which increases the relevance and practical significance of these results for the studied sheep population.

Thus, a comparison of the data obtained with the results of similar studies helped to objectively assess the breeding significance of the new type of Akchasai sheep in comparison with the original breeds. The high productive potential and adaptive qualities inherited from the Hissar and Jaydari breeds have been confirmed, which ensures the prospects for further breeding of a new type in the conditions of pastoral animal husbandry in Central Asia.

Conclusions

The purpose of the study was to create a new type of fat-tailed sheep of meat and fat production, combining the best qualities of the Hissar and Jaydari breeds. As part of the work, methods of in-breed selection, crossbreeding, evaluation of productive indicators, and analysis of the adaptive abilities of animals in conditions of pasture keeping in Uzbekistan were used. The parameters of growth, reproduction, meat productivity, and adaptation were studied, which allowed a reasonable approach to breeding a new type of sheep.

As a result of many years of breeding work, a new highly productive type of fat-tailed sheep, Akchasai, has been created, characterised by high growth rates, good meat and fat productivity and resistance to extreme climatic conditions. As part of the breeding, special attention was paid to preserving desirable genetic traits, accelerating ontogenesis, and increasing the reproduction rate. The materials submitted to the Agency of Intellectual Property attest to the completion of the primary breeding stage and the readiness to consolidate the new type as an innovative genetic resource. The development of an electronic breeding data accounting system and proven selection and selection methods ensure the sustainable development of a new trend in sheep breeding.

The results obtained confirm the achievement of all the tasks set and the validity of the chosen breeding strategy. Breeding a new type of sheep opens up prospects for increasing the productivity of the industry, reducing dependence on imported genetic material, and improving the food security of the region. In the future, an in-depth study of the biological features of Akchasai at the interregional level is required, including monitoring the sustainability of productive traits in the next generations, which will provide a reliable scientific and practical basis for the expanded introduction of a new type in Uzbek farms.

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