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

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

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PRODUCTIVITY OF KUIBYSHEV SHEEP OF DIFFERENT INTRA-BREED TYPES

ПРОДУКТИВНОСТЬ ОВЕЦ КУЙБЫШЕВСКОЙ ПОРОДЫ РАЗНЫХ ВНУТРИПОРОДНЫХ ТИПОВ

КУЙБЫШЕВ ТУКУМУНДАГЫ АР КАНДАЙ ИЧИ ТУКУМДУК ТИПТЕГИ КОЙЛОРДУН ӨНДҮРҮМДҮҮЛҮГҮ

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PRODUCTIVITY OF KUIBYSHEV SHEEP OF DIFFERENT INTRA-BREED TYPES

Abstract

The authors studied the productivity of Kuibyshev sheep in the Saratov region during intrabreed breeding to identify promising intrabreed types of animals with improved productive qualities. The purpose of the research was to study and substantiate the methods of improving Kuibyshev sheep using intrabreed selection in the Saratov region of the Volga region. The studies were conducted taking into account generally accepted methods. When mating Kuibyshev sheep, animals deviating to a certain intrabreed type were conditionally selected – ewes were of the meat and wool type, rams belonged to the meat type. The offspring obtained after mating were selected into groups: I – meat and wool intrabreed productive type; II – meat. When evaluating the productivity, an advantage of meat and wool type young animals over meat ones was revealed. The live weight of the meat-type ewe lambs was 5.0% higher than that of the meat-and-wool type peers, while the meat-and-wool type offspring exceeded their meat peers in dirty wool yield by 2.50% (P≥0.99). The meat-and-wool type young animals exceeded the meat individuals in pure fiber yield by 4.08%, and in pure wool yield – by 10.47% (P≥0.999). The wool fiber of the ewe lambs of both intra-breed productive types corresponded to quality 50 (29.1-31.0 μm). Thus, the best uniformity of wool fineness was characterised by the meat-and-wool type offspring, in comparison with the meat type analogues. The natural wool length of the meat-and-wool type ewe lambs was 1.29 cm higher, in comparison with their meat peers (P≥0.999). The young animals of the meat productive type had rarer wool, lower fleece density, which contained 1.85% more mechanical impurities, and less sweat. Thus, mating of ewes of the meat-wool intrabreed type with meat producers can be considered an improving selection method not only for live weight, but also for wool parameters necessary for further selection work with Kuibyshev sheep of the Saratov region of the Volga region

Keywords: ewes; intrabreed breeding; live weight; wool clip; wool yield

Продуктивность овец куйбышевской породы разных внутрипородных типов

Аннотация

Авторами была изучена продуктивность овец куйбышевской породы в Саратовской области при внутрипородном разведении для выявления перспективных внутрипородных типов животных с улучшенными продуктивными качествами. Цель исследований заключалась в изучении, обосновании приемов улучшения овец куйбышевской породы с использованием внутрипородного подбора в Саратовской области Поволжья. Исследования проводились, с учетом общепринятых методик. При спаривании овец куйбышевской породы условно отбирались животные, уклонявшиеся к определенному внутрипородному типу – овцематки были мясо-шерстного типа, бараны относились к мясному. Полученное после спаривания потомство, отбирали в группы: I – мясо-шерстного внутрипородного продуктивного типа; II – мясного. При оценке продуктивности было выявлено преимущество молодняка мясо-шерстного типа над мясным. Ярки мясного типа обладали на 5,0 % более высокой живой массой, чем сверстницы мясо-шерстного типа, при этом, потомство мясо-шерстного типа по настригу грязной шерсти преобладало на 2,50 % над сверстницами мясного (P□0,99). Молодняк мясо-шерстного типа превосходил особей мясного по выходу чистого волокна на 4,08 %, а по настригу чистой шерсти – на

Куйбышев тукумундагы ар кандай ичи тукумдук типтеги койлордун өндүрүмдүүлүгү

Аннотация

Авторлор продуктуу сапаттары жакшырган малдын перспективдүү породанын ичиндеги түрлөрүн аныктоо учун Саратов областындагы Куйбышев койлорунун продуктуулугун асылдандырууну изилдешкен. Изилдөөнүн максаты – Поволжьенин Саратов областында порода ичиндеги селекциясын колдонуу менен Куйбышев койлорун жакшыртуунун ыкмаларын изилдөө жана негиздөө. Изилдөөлөр жалпы кабыл алынган ыкмаларды эске алуу менен жүргүзүлгөн. Куйбышев койлорун жупташтырууда белгилуу порода ичиндеги типке четтеген малдар шарттуу тандалып алынган – койлор эт-жүндүү, кочкорлор эт тибине кирген. Жупташкандан кийин алынган төлдөр төмөнкүдөй топторго тандалып алынган: I – эт жана жүн тукумундагы продуктуу түрү; II – эт. Кунардуулугун баалоодо эт жана жүн тибиндеги жаш малдын этке караганда артыкчылыгы аныкталды. Эт багытындагы койлордун тирүүлөй салмагы эт-жүн тибиндегилерге караганда 5,0 %га жогору, ал эми эт-жүн тибиндеги төлдөр кир жүн алуу боюнча этке салыштырганда 2,50 % ашып кеткен (P≥0,99). Эт-жүн тибиндеги жаш малдар этке караганда таза булалуулугу боюнча 4,08 %га, жүндөн 10,47 %га (P≥0,999) көп. Эки тукумдагы продуктуу түрдөгү койлордун жүн буласы 50 (29,1-31,0 мкм) сапатка туура келген. Ошентип, эт тибиндеги аналогдорго салыштырмалуу жүн уяңдыгынын эң

10,47 % (P≥0,999). У ярочек обоих внутрипородных продуктивных типов шерстное волокно соответствовало 50 качеству (29,1-31,0 мкм). Так, лучшей уравненностью шерсти по тонине характеризовались потомки мясо-шерстного типа, в сравнении с аналогами мясного типа. У ярочек мясо-шерстного типа естественная длина шерсти оказалась выше на 1,29 см, по сравнению со сверстницами мясного (P≥0,999). Молодняк мясного продуктивного типа, имел более редкую шерсть, меньшую плотность руна, в котором было больше на 1,85 % механических примесей, меньше жиропота. Таким образом, спаривание овцематок мясо-шерстного внутрипородного типа с производителями мясного можно считать улучшающим селекционным приемом не только по живой массе, но и шерстным параметрам, необходимым для дальнейшей селекционной работы с овцами куйбышевской породы Саратовской области зоны Поволжья

Ключевые слова: ярка, внутрипородное разведение, живая масса, настриг шерсти, выход шерсти

жакшы бирдейлиги эт-жүн тибиндеги тукуму менен мүнөздөлгөн. Эт-жүн тибиндеги койлордун табигый жүнүнүн узундугу эт багытындагыларга салыштырмалуу 1,29 см көп болгон (P≥0,999). Эт продуктуу тибиндеги жаш малдын жүнү сейрек, жүнүнүн тыгыздыгы төмөн, анын курамында механикалык аралашмалар 1,85 % көп, тер азыраак болгон. эт-жүндү туудурган тибиндеги койлорду эт өндүрүүчүлөр менен жупташтырууну жакшыртуучу селекциялык метод деп эсептөөгө болот Ошентип, Поволжьедеги Саратов областынын Куйбышев койлору менен мындан аркы селекциялык иштерди жүргүзүү учун тирүүлөй салмак боюнча гана эмес, жундун параметрлери боюнча да селекция жүргүзүү талап ылайык.

Ачкыч сөздөр: койлор, интригация, тирүүлөй салмак, жүн кыркмасы, жүн продуктуулугу

Introduction

The Kuibyshev sheep breed remains one of the few semi-fine-wool breeds in the Volga region that has retained its breeding value and prospects for further breeding. On farms specialising in breeding this breed, in particular at the “Shirokoye” closed joint-stock company (CJSC) in the Saratov district of the Saratov region, two productive intra-breed types have been clearly identified as a result of long-term selection work: “meat-wool” and “meat”. These types differ in the level of expression of economically useful traits and require comprehensive morphological, productive and genetic characterisation. The need for a detailed scientific justification of the differences between intraspecific types, an assessment of their breeding and economic value, and an analysis of their adaptability to the requirements of modern animal husbandry makes this study highly relevant.

According to Yu.A. Kolosov & V.V. Aboneev (2024), the Kuibyshev breed was developed in 1936-1948 in the Samara region under the leadership of A.V. Vasilyev by crossing local Cherkasy sheep with English Romney Marsh rams imported from England. The descendants inherited a strong constitution, large size, high wool yield, and adaptability to breeding conditions from the Cherkasy sheep, but had some disadvantages, such as uneven wool and insufficient meat conformation. The sheep were able to adapt to the conditions of the Volga steppes and tolerate heat and cold. Researchers I.E. Grekova & A.N. Rudak (2023) concluded that in order to obtain high-quality sheep products, semi-fine-wool breeds must meet modern requirements and be resistant to the conditions of breeding in sheep farms.

According to researcher E.I. Anisimova (2020), intra-breed breeding is an important resource for effective sheep farming, ensuring genetic diversity in flocks and improving the breed population. Scientists N.I. Efimova & S.N. Shumaenko (2023) concluded in their work that in the Stavropol Krai, intra-breed breeding resulted in the development of the Russian meat merino breed for meat and wool production with six intra-breed lines of varying productivity. The authors proved that such breeding is an important method of improving sheep, allowing the use of animals with outstanding productivity, creating a genetic population for systematic selection and matching of parent pairs to obtain highly productive individuals. The scientists developed a scheme for combining parent pairs for sheep farms. It was found that linear ewes were inferior to crossbred ewes in terms of washed wool yield, dirty wool yield, and live weight.

Scientists A.Ch. Gagloev et al. (2021) proved that the use of intra-breed selection of Prekos sheep – ewes of different intra-breed types – in purebred breeding and crossbreeding with rams of semi-fine-wool breeds (Romney-Marsh, Kuibyshev) improved the biological value of meat in offspring. According to the results of studies investigating the effect of different mating options for ewes and rams on the composition and quality of lamb meat, it was found that the water content in the meat of crossbred young animals was lower compared to purebred individuals. In terms of protein content in meat, rams from purebred breeding and crossbreeding prevailed over individuals from wool-meat type ewes. The lamb meat of meat-wool ewes was significantly higher in essential amino acids than that of wool-meat ewes.

According to O.N. Onishchenko et al. (2022), it was determined that the use of intra-breed selection in the Stavropol Krai region contributed to the creation of an effective intra-breed type of Soviet Merino fine-wool sheep. The authors noted that three groups of ewes were selected from the Soviet Merino sheep breed of the Stavropol population, the main difference between them being the number of folds on the animal’s body. The first group belonged to the usual intra-breed type in

terms of skin folds, the second to the medium-front type, and the third to the full-front type. These ewes were inseminated with typical rams for each group of ewes. The scientists noted that at 14 months of age, ewes of the medium-front type outperformed their peers of the typical type and full-front type in terms of exterior indicators (compactness index) by 136.7-140.3% and 140-142.3%. In terms of other indicators, medium-front type animals, compared to young animals of the usual intra-breed type, in terms of skin folds and full-front type, surpassed them in terms of chest index and long-legged index. Sheep of the Soviet Merino breed of Stavropol, to a greater extent, deviated towards the medium-front type; Merinos of this intra-breed type are in demand and profitable.

The aim of the research was to study and justify methods for improving the productive qualities of Kuibyshev sheep through the rational use of intra-breed selection in the Saratov region of the Volga zone. In connection with the set goal, the main task was to analyse the productive qualities of Kuybyshev sheep of the local population of different intra-breed productive types.

The scientific novelty was that, for the first time in the Saratov region, the productive parameters of Kuybyshev sheep of different intra-breed types were studied. The live weight, quantitative and qualitative indicators of wool in intra-breed breeding were assessed, optimal options for the selection and matching of paternal and maternal forms of different intra-breed types were substantiated, and reasoned recommendations for the rational use of such parental pairs for mating semi-fine-wool sheep in the Volga region were developed.

Materials and methods

The research was conducted at “Shirokoye” CJSC in the Saratov District of the Saratov Region from April 2023 to July 2024. Purebred Kuibyshev sheep were used as the source material for the experiment. Three rams were selected for insemination of 50 ewes. After fertilisation, offspring were obtained from mating pairs of different intra-breed types, formed into two experimental groups (n=20 heads in each). Productivity was assessed in young animals at 14 months of age. The productive and physiological characteristics of the sheep were studied using standard methods:

1. The live weight of sheep (ewes) was determined by weighing during bonitation on special platform scales: with an accuracy of 0.5 kg according to State Standard 25955-83 (1984).

2. The physical and technological indicators of wool – the yield of unwashed wool was determined by weighing during shearing on special platform scales with an accuracy of 0.1 kg individually; the yield of washed wool was assessed after washing and removing all impurities (dust, coarse feed residues, particles of pasture vegetation seeds, faeces) by weighing using C-200 analytical scales with an accuracy of 0.1 kg individually.

Primary processing of unwashed (physical) wool fibre was carried out, including the separation of plant (straw, leaves, parts of branches and plant stems) and mineral (sand, clay) impurities, as well as loosening the wool for better penetration of the washing solution. Contaminated wool was washed with detergent solutions of surface-active substances at a temperature of 40-60 °C. Clean (washed) wool was evaluated using a method based on determining the yield of clean fibre (the ratio of the mass of washed fibre to the weight of unwashed wool in percent) using C-200 analytical scales, TS-53A devices, GPO-2M devices, and AK-2 conditioning apparatus (“Metrotek” and “Ivmashpribor”, Ivanovo, Russia). Assessment stages: selection of

samples weighing at least one kilogram; preparation of wool for soaking in a soda solution for 40 minutes, then washing and drying. The yield of clean wool was calculated using the formula:

$$P = U \times (100 + C) / A, \quad (1)$$

where P – the percentage yield of clean wool; U – the constant dry weight of the sample; A – the initial weight of dirty wool; C – the conditioning moisture content (for homogeneous wool – 17%, for heterogeneous wool – 15%).

All wool tests were conducted in accordance with Methodological recommendations for the study of wool quality (ARRISGB) (1985) in accordance with Methodological recommendations on the procedure and conditions... (2020) and in accordance with Order of the Ministry of Agriculture of the Russian Federation No. 860 (2021). The natural length of wool (accurate to 0.5 cm) was measured during individual grading of sheep on a barrel. Wool density was determined by the counting and weighing method, using a special fork for taking samples and torsion scales. Wool fineness (in micrometres) was determined on a lanameter (in qualities) during individual grading of sheep on a barrel. Wool tensile strength was measured on a DSH-3M dynamometer using torsion scales. True length and crimp were determined on a "Metrimpex" type 4-10-12 device ("Automatika" Trading House, Smolensk).

The physical and chemical composition of wool and the quality of fat were studied in ewes using the methods of the ARRISGB (All-Russian Research Institute of Sheep and Goat Breeding) (1985): wool fat (wax) content – by extraction in a Soxhlet apparatus; sweat content; mechanical impurity content – by the difference in mass of constantly dry samples before and after washing; nitrogen content – by the Kjeldahl method; sulphur content – by the Benedict-Denis method; melting point of wool grease (wax); iodine number of wool grease (wax) – by the Ganus method; the colour of the fat was determined visually in all animals during individual grading; an expert zootechnical description of the fleece was carried out in accordance with the ARRISGB (1985) methodology on wool samples taken from the main topographical areas of the fleece. For mating Kuibyshev sheep, animals belonging to a specific intra-breed productive type were conditionally selected, with ewes being typical of this breed's meat-wool type and rams leaning towards the meat type. A visual assessment of the level of wool and meat productivity was used, which was refined according to productive indicators: live weight, wool yield and their ratio (Study book of the Kuibyshev breed..., 2021).

Ewes had an average live weight of 60-65 kg and an unwashed wool yield of 5-6 kg. Ram producers had an average live weight of 120 kg and a physical wool yield of 9-11 kg. As a result of mating parent pairs, the offspring were divided into conditional types: I – meat and wool; II – meat. The offspring were monitored for productive performance from birth to 14 months of age. All experimental groups of animals were kept under the same feeding and housing conditions. The sheep were mainly kept on pasture and in stalls. The animals were grazed from the beginning of April until mid-November, and in winters with little snow, until December (the grazing period lasted about 8 months).

The feeding rations for all age and gender groups of sheep were based on the nutritional value of the farm's feed, according to recommended and detailed feed and feeding standards (Kalashnikov et al., 2003). In addition to winter pasture feed, hay, straw, haylage and concentrates

were used in the daily rations for sheep. Table salt was regularly used as a mineral supplement, both in loose form and in the form of a lick.

The diet of pregnant ewes in the first half of pregnancy consisted of cereal and mixed grass hay – 1.0 kg; legume hay – 1.0 kg; spring straw – 0.5 kg; silage – 2.8 kg; barley bran – 0.4 kg; concentrates (barley, oats, bran, peas) – 0.5 kg; table salt – 15.0 g; beetroot – 1.0 kg; sulphuric acid copper – 50.0 mg; feed phosphate – 10.0 mg; elemental sulphur – 1.0 g, and for ewes in the second half of lactation, respectively – 0.8 kg; 1 kg; 0.4 kg; 2.6 kg; 0.2 kg; 0.3 kg; 10.0 g; 0.8 kg; 40.0 mg; 8.0 g; 0.8 g. During the suckling period, the diet of ewes consisted of the highest quality feed. In the first half of lactation, they were given: cereal-legume hay – 1.3 kg; haylage – 3.0 kg; barley bran – 0.6 kg; elemental sulphur – 19.0 g, and in the second half of lactation, respectively – 1.1 kg; 3.0 kg; 0.40 kg; 15.0 g.

The diet of young stock (ewes) during weaning from their mothers at 4 months of age consisted of alfalfa hay – 0.5 kg; cereal hay – 0.5 kg; barley straw – 0.5 kg; haylage – 0.5 kg; barley bran – 0.4 kg. The rearing of young stock from 8 to 14 months of age took place during the stall period. In winter, the daily feed ration consisted of hay (cereal, legume) – 0.8-1.0 kg; haylage – 2.0-2.5 kg and concentrates – 200-300 g. The balanced feed rations for sheep fully provided them with adequate nutrition. In order to make rational use of natural feeding grounds and reduce feed transportation costs, the sheep population was dispersed throughout the farms in small flocks and kept at so-called “points”.

During the period of scientific research (2022-2023), this sheep farm was considered favourable in terms of maximum permissible veterinary and sanitary standards. Sheep mortality due to disease ranged from 3% to 8% on average. The main reasons for the insignificant mortality of sheep were non-contagious diseases, injuries, as well as invasive diseases, pneumonia and gastroenteritis at an early age, arising in connection with gas contamination, excessive crowding of sheep, dampness, draughts in rooms or hypothermia if weather conditions on the pasture deteriorated. Lambs were affected by invasive diseases primarily on pasture due to the prolonged use of the same areas. Drinking from stagnant water bodies also contributed to the infection of sheep with helminths, so the means of combating infestations was grazing with a change of pasture areas and sheepfold locations every 10-12 days. The farm’s sheep sometimes suffered from pylorobezoar disease – eating wool, which blocked the stomach – as well as inflammation of the mucous membrane of the eyes due to a lack of vitamins in their diet, particularly vitamin D.

At the same time, CJSC “Shirokoye” implemented a set of preventive measures to prevent the occurrence of diseases: annual preventive vaccinations of animals; avoiding contact between sheep and other farms; taking measures against wolves, which cause great damage to the farm on the pasture; timely repair of premises, especially those intended for lambing; annual cleaning of sheepfolds and bases from manure; observance of pasture rotation when grazing sheep; prevention of cuts during shearing, followed by annual preventive shearing or treatment of each sheep; equipping all departments and shepherd stations with cattle burial grounds; carrying out preventive work to prevent diseases such as scabies, vibriosis, epididymitis, and brucellosis, while avoiding contact between sheep and animals from other farms, especially those bordering Kazakhstan. The main scientific data obtained during the research were processed biometrically (Merkuryeva, 1977), and standard software for personal computers, Microsoft Word and Excel, was used for calculations and graphical techniques in the research process.

Results

When purebred sires and dams were mated, heterosis resulted in changes in the productive performance of the offspring: live weight, pure wool yield, wool clip, and the physical, technological, and physical-chemical properties of the wool fibre. Productivity was assessed in young animals at 14 months of age (Table 1).

Table 1. Productivity of ewe lambs of different intrabreed types

Indicator	Group / intrabreed type	
	I – meat-wool	II – meat
Live weight, kg	60.00±0.10	63.00±0.06
Dirty (physical) wool yield, kg	4.10±0.08**	4.00±0.07
Pure wool yield, %	56.58±0.38	52.50±0.32
Wool clip, kg	2.32±0.05***	2.10±0.03

Note: ** – differences significant at P>0.99; *** – differences significant at P≥0.999
Source: author's own development

Table 1 shows that in the offspring of group II (meat type), compared to group I (meat-wool type), there was an increase in live weight of 3.0 kg or 5.0%, while the young animals of group I (meat-wool type) exceeded their peers of group II (meat type) in terms of dirty (physical) wool yield by 0.1 kg or 2.50% (P≥0.99). Given the superiority of young animals of the meat-wool type over meat-type individuals in terms of clean fibre yield (by 4.08%), which closely correlated with the intra-breed type (combined meat-wool), their predominance in terms of pure wool yield over meat counterparts was 10.47% (P≥0.999). This provided the basis for assessing that mating meat-wool intra-breed ewes with meat producers was considered an improving selection technique not only in terms of live weight but also wool parameters.

The physical and mechanical properties of wool were assessed in young animals obtained by selecting parent pairs – ewes of the meat-wool type x rams of the meat type. When evaluating the young stock, it was found that the wool of both intra-breed productive types of the Kuibyshev breed corresponded mainly to 50 quality or 29.1-31.0 microns. At the same time, in terms of wool uniformity in terms of fineness, animals of the meat-wool type of group I surpassed their meat-type counterparts of group II by 3%. In terms of natural wool length, lambs of the meat-wool type prevailed over their meat-type peers by 1.29 cm (P≥0.999). In terms of wool crimp, the meat-wool type offspring were 16.8% superior to the meat type animals (P≥0.999).

It should be noted that for breed and pedigree evaluation, virtually all physical and technological parameters are significant and important, as they affect sheep productivity, wool quality and its suitability for processing. The wool of the experimental ewes of the Kuibyshev breed of both intrabred types was strong and complied with State Standard 30702-2000 (2000). Wool properties such as fineness, length, density and crimp were inherited as polymers, i.e. each of them was determined by a number of genes, which opened up prospects for the successful selection of animals of both intraspecific types, even for one of the parameters. Analysis of the physical and chemical properties of wool and the quality of fat in the offspring, with specified mating of parent pairs, showed that young animals of the meat-productive type had sparse wool, low fleece density, exceeding their meat-wool peers in the amount of mechanical impurities by 1.85%, and inferior in the amount of grease (Table 2).

Table 2. Colour of suint and properties of wool grease of ewe lambs in different intra-breed types

Group/	Grease content, %	Wool grease

intra-breed type	Light cream	Cream	Melting point, ºC	Iodine number, g
I – meat-and-wool	26.40	1.90	42.95±0.14	16.51±0.14
II – meat	23.53	3.92	42.64±0.18	16.71±0.13

Source: author's own development

In terms of the ratio of grease to sweat, sheep of both experimental groups (intra-breed types) showed fairly similar values, corresponding to the optimal level for domestic semi-finewool breeds – 1.03:1.0. It should be noted that the chemical composition of suint and its physical properties are not constant, depending on changes in nutrition and the physiological state of the organism. Considering the management conditions of the experimental ewe lambs of both groups, it was established that there were no significant differences between the intrabreed types in the content of sulphur and nitrogen in the wool: sulphur ranged from 3.36-3.41%, nitrogen from 14.86-14.90%. The colour of wool grease also influenced the technological properties of the fibre. According to Table 2, in ewe lambs of the meat-wool intrabreed type the proportion of animals with the desirable light cream wool grease was 26.40%, whereas among the meat-type young stock, the proportion of animals with cream-coloured grease was 3.92%.

The analysis of physico-chemical properties of the ewe lambs of both groups revealed certain differences between them, which may have been determined by hereditary information received from the maternal and paternal animals in the matings. In both groups, the melting point of wool grease was sufficient (42.64-42.95 °C), which provides grounds to consider them well adapted for breeding under the conditions of Saratov Region. At 14 months of age, all experimental ewe lambs underwent individual grading, which demonstrated the breeding class of the animals. The criteria for grading of breeding and productive qualities included live weight, wool quality, and productivity. In the overall assessment, the ewe lambs of Group I (meat-wool type) stood out compared with the meat-type young animals, since the proportion of animals rated as "elite" and Class I amounted to 88.2% (17 head) and 90.5% (19 head), respectively, of the total numbers in the groups. The Group I animals mainly had one drawback – insufficient live weight. However, compared with Group II, they had denser fleeces combined with excellent wool grease quality.

The number of rejected ewe lambs in both groups was small, within 2–3 animals. All animals of the experimental groups had correct body conformation, strong constitution, good live weight, dense closed fleeces, and wool of appropriate fineness and crimp, characteristic of semi-finewool breeds. The grading results of the experimental ewe lambs of both intrabreed types showed that all animals possessed good productive traits, representing high genetic and breeding value for Kuibyshev semi-finewool sheep.

Discussion

Modern industrial technology has always played a leading role in the scientific and technical process of sheep breeding, and specialised semi-fine-wool sheep breeds have been an integral part of this process. The decisive factor in increasing efficiency is the improvement of existing domestic semi-fine breeds, as well as the creation of new, more productive types and lines based on interbreeding and intrabreeding. In the sheep breeding industry, namely in semi-finewool sheep breeding, it is only possible to obtain high-quality products if highly productive animals are available. According to A.A. Velmatov et al. (2020), providing the country's population with high-quality agricultural products is the main and integral task of the agro-industrial complex. Scientist A.A. Gerasimov (2022) confirmed that the Kuibyshev breed of sheep has genetic and productive

potential, which was demonstrated during its breeding and use in the climatic and feed conditions of the Volga region.

L.I. Kibkalo & A.S. Glushenko (2024) concluded in their work that in order to solve the agro-industrial problem, it is necessary to accelerate the development of livestock breeding, which is one of the promising strategic directions for increasing the production of high-quality products. The semi-fine-wool Kuibyshev sheep breed, bred in the Saratov region and adapted to the ecological, climatic and feed conditions of the Volga region, consistently outperformed other local breeds with the same productive orientation in terms of high meat and wool productivity. In order to improve the productive and breeding qualities of the local Kuybyshev sheep population in the region, selection was carried out using purebred breeding with strict selection and selection, avoiding close-kin mating, to obtain animals of the meat-wool type characteristic of the breed.

According to scientists A.Ch. Gagloev et al. (2023), Kuybyshev sheep, due to their historical origin, are well adapted to any climatic and feeding conditions. Thanks to their mobility and endurance, these animals were able to make good use of pastures and were capable of making long journeys over long distances. A distinctive feature of these animals is their semi-fine, homogeneous wool of good quality and, at the same time, high live weight, early maturity and meat qualities. When entered in the stud book, the breed was defined as a combined meat-wool breed. Selection and breeding work with sheep of this breed made it possible to obtain animals not only of the meat-wool type, but also of the meat type and, sometimes, with strict selection, of the wool type.

Many scientists have studied the intraspecific selection of parent pairs to create intraspecific types and lines in sheep breeding. Thus, Z. Seitmusaeva & A. Gaziev (2023) presented studies of intra-breed homogeneous and heterogeneous selection of Karakul sheep of the Karakalpak sur of the Republic of Karakalpakstan with the aim of improving their productive qualities. The data obtained during the studies showed the influence of parent selection types on the uniformity of colouring in the offspring. In this case, a high yield of lambs with uniform colouring was noted from the homogeneous (uniform) selection of animals “steel x steel” (75.0±5.09%), compared to the heterogeneous selection “candle flame x steel” (56.2±7.15%). At the same time, it should be noted that the superiority of homogeneous selection in terms of this indicator was statistically significant compared to heterogeneous selection. In addition, with homogeneous selection, there was a decrease in the yield of lambs with insufficiently uniform and non-uniform colouring. The reason for these results was a certain incompatibility of mated sheep with “candle flame x steel” colouring; this combination led to a slight decrease in the yield of lambs with balanced colouring, which had to be taken into account in the selection work with sheep of the Karakalpak breed type. Lambs from heterogeneous mating exceeded their peers from heterogeneous mating in live weight by 1.6-2 kg or 4.64-0.6%, respectively. During the milk period, lambs from heterogeneous mating developed better than young animals from heterogeneous mating of parent pairs, and the wool of such animals was of uniform colour. At the same time, with the use of heterogeneous selection of parent pairs of Karakul sheep, the wool colouring indicators were 38 and 42%, respectively. The wool of these animals was not uniform. During the research, it was found that the offspring of different intra-breed selection inherited productive characteristics from their parents.

According to researchers E.A. Lakota & O.A. Vorontsova (2023), studies were conducted on intra-breed selection of Stavropol sheep in the Volga region with the aim of improving their productive qualities. After mating parent pairs: strong-type ewes x strong-type rams; fine-type ewes

x strong-type rams; loose-type ewes x strong-type rams, the productivity of the offspring was assessed. The assessment of productive parameters showed that in terms of live weight, the loose x strong young stock had an advantage over the fine x strong young stock by 11.93%, and the strong x strong young stock by 3.58%. In terms of wool yield, strong x strong sheep prevailed over tender x strong and loose x strong by 5.04% and 4.34%. In terms of exterior, the offspring of the loose x strong type outperformed the strong x strong type and the fine x strong type. In the process, it was noted that young animals of different intra-breed types developed well, inheriting exterior and productive qualities from their parents, but acquiring their individual characteristics in the phenotypic environment.

L.D. Milchevsky (2021) noted that within the semi-fine-wooled Tsigai breed, through purebred selection, a new intrabreed meat-wool type called “Solnechny” was created in the breeding farm “Solnechny” of Rostov region. It was developed by crossing local Tsigai sheep (wool–meat type) with rams of the meat-wool Azov-type rams from the Rosa Luxemburg breeding farm, which differs from the Azov type bred at the “Orlovsky” state breeding farm in the Rostov region the Black Sea type in Crimea and the Trans-Volga type in the Saratov Region, in that sheep of the Solnechny type produced white semi-fine wool and good-quality meat, while also being highly milk-productive. In Tsigai sheep of this intrabreed meat-wool type, the wool is semi-fine, homogeneous, strongly crimped, resembling coarse Merino, but with a relatively low amount of suint and grease.

According to researcher N.A. Rezun (2024), depending on their linear affiliation and the crosses obtained when selecting lines, animals of the fine-wool Russian meat merino breed had the ability to show unequal productivity, so the author recommended using the maternal line AS-30 and the paternal line MB-50 at the genetic-molecular level. Analysing the scientific conclusions obtained on intraspecific types in the Kuibyshev breed of sheep of the Volga population and comparing them with the scientific conclusions of scientist N.A. Rezun, the author’s opinion was confirmed, and the need for further in-depth study of the semi-fine-wool Kuibyshev breed in terms of intra-breed types at the genetic level was noted.

Thus, the results obtained in the course of the research showed that the economically useful productive traits of Kuibyshev sheep of different intra-breed types were influenced by the compatibility of parent pairs. At the same time, indicators of live weight and wool quality depending on the selection and pairing of Kuybyshev sheep of different intra-breed types have not been sufficiently studied, and it was necessary to make full use of the potential of animals of already tested intraspecific types in the breed by mating animals of different conditional types, which could result in the manifestation of conditional heterosis.

Conclusions

Mating sheep of the Kuibyshev meat-wool type with meat rams resulted in the selection of two intra-breed types: “meat-wool” and “meat”. An assessment of the productive qualities of the offspring of different types showed that meat-type ewes, unlike meat-wool-type animals, had an advantage in live weight, while meat-wool-type ewes prevailed over meat-type offspring in terms of dirty (physical) wool yield. When assessing the physical and mechanical properties of wool, it was noted that meat-wool type animals had wool of homogeneous thickness compared to meat type counterparts. Meat-wool type lambs had longer wool compared to meat type ewe lambs of the same age.

Analysis of the physical and chemical properties of the wool revealed that young animals of the meat type had sparse wool, low fleece density, more mechanical impurities and less grease in the wool, in contrast to young animals of the meat-wool type. The grease-to-sweat ratio in sheep of both intra-breed types was the same and amounted to 1.03:1.0. Ewes of the meat-wool intra-breed type were characterised by light cream-coloured grease sweat, while young animals of the meat type had cream-coloured grease sweat. Individual grading at 14 months of age showed that, based on a comprehensive assessment (live weight, wool quality, productivity), ewes of the meat-wool type, when compared with meat-type individuals, had an elite and first-class rating of 88.2% and 90.5%, respectively.

All animals were characterised by correct body parameters, strong constitution, good live weight, and dense closed fleece, which were characteristic of semi-fine-wool breeds. Considering the productive indicators of meat-wool intra-breed ewes compared to meat ewes, it was possible to testify to the potential genetic possibilities of such a rational selection of parent pairs during mating, and therefore, recommendations were made for the targeted use of this approach to improve the productive qualities of semi-fine-wool sheep flocks in the Volga region. Thus, the goal set at the beginning of the research and the task of studying and analysing the productive qualities of Kuibyshev sheep of the local population of different intra-breed productive types were achieved. In order to identify a desirable and promising intraspecific type in the Kuibyshev sheep breed, it is necessary to conduct an in-depth study of productivity indicators in terms of intraspecific types at the gene-molecular level.

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