

Questions of admixture crossing in semi-fine-wool sheep breeding in Kyrgyzstan

*A.S. Azhibekov, S.M. Derkenbaev**, *S.K. Osmonaliev, A.K. Samykbaev, U.A. Shergaziev, and A.B. Bekturov*

Kyrgyz National Agrarian University named after K. I. Scriabin, Bishkek, Kyrgyzstan

Abstract. The paper deals with the use of admixture crossing in semi-fine-wool sheep breeding in Kyrgyzstan and its results. The purpose of the research was to develop and scientifically substantiate the methods of using the North Caucasian meat and wool breed during admixture crossing for further improvement of the Tian Shan sheep breed. Generally accepted zootechnical methods were used (the classical scheme of introductory crossing), wool qualities were determined on the OFDA device – 2000. The half-blooded (1/2SKTSH) and quarter-blooded (1/4SKTSH) North Caucasian Tian Shan young animals have better wool qualities without reducing the live weight of the crossbreeds. At the same time, the crossbreeds obtained from the back crossing with wool of 58-56 quality in the specific weight of the herd reached 85.5%, and with the most desirable degree of fineness of 56 quality – 63.3%. According to wool density (M+), the proportion of mixed bred young ewes reached 33.3%, which was 25.2% more than that of half-bloods. It was revealed that the inheritance of wool density trait as a result of crossing these breeds had a positive effect on wool productivity. The crossbred wool cut from them had the best marketable appearance. All this makes it possible to switch to the breeding of quarter-blooded North Caucasian Tian Shan animals “in itself” in the future.

1 Introduction

At the present stage, a feature of sheep breeding development around the world is that in recent years, the economic share of mutton has been increasing in the structure of production and sale of sheep products. In most countries, in the value of marketable products received from sheep, the revenue from the sale of mutton is 90% or more, and from the production of wool – about 10%. Therefore, more attention is paid to the development of meat and precocious meat – wool sheep breeding, mainly crossbred direction, as the most optimal combination of the production of mutton (lamb) with valuable crossbred wool. At the same time, the share of lamb in the meat balance of the industry increases, since the population's demand for it is greater than for mutton obtained from older sheep [1-4].

* Corresponding author: sovet.derkenbaev@mail.ru

Although wool products have moved to a secondary role in economic terms, but as a breeding trait has not lost its significance, because to some extent it has a protective function of the body and characterizes the adaptive ability of the animal [5]. Therefore, when improving the productive qualities of sheep of certain breeds, a comprehensive approach to assessing the constitutional-exterior and productive properties of animals is necessary.

The predominant emphasis in the specialization of sheep breeding on the production of meat in combination with crossbred wool becomes the main way to increase the economic efficiency of semi-fine-wool sheep breeding.

The Tian Shan breed of sheep represents the meat – semi-fine-wool sheep breeding of Kyrgyzstan and is bred in the climatic zone of unconventional for this sheep direction. This breed is bred in extremely harsh pasture conditions of the highlands. The Tian Shan breed was created by reproductive crossing of Precoce with fat-tailed crossbreeds with semi-coarse and semi-fine wool and with rams of the Lincoln breed of English reproduction, which combined good meat and wool productivity. Further work was carried out by breeding "in itself" crossbreeds of the first generation of the desired type.

In recent years, work has been carried out in the semi-fine-wool sheep breeding of the Kyrgyz Republic to improve insufficiently or weakly expressed traits in the domestic breed by introductory crossing using sheep of meat-wool and meat breeds.

2 Materials and Method

Guided by the methodological provisions developed by M.F. Ivanov and leading breeders-researchers further improvement of sheep of the Tian Shan breed consisted of several stages.

The research material was sheep of the Tian Shan breed in small farms and households located in the Kara-Kujur valley of the Naryn district of the Naryn region (breeding farm "Sabyr ata – TSH") at an altitude of 2800-3000 meters above sea level.

Considering the biological and productive features of the sheep of the Tian Shan breed, the small size of the herds, as well as the problems associated with the import of genetic material of the improving breed, such as the North Caucasian meat and wool, the scheme of admixture used in the herds of the Tian Shan breed is characterized as follows: the best producers of the first generation are mated with the queens of the improved breed, and crossbred queens – with producers of the improved breed [6]. Crossbreeds obtained from reverse crossing that meet the requirements of the desired breed type are bred "in themselves".

The proportion of blood of another breed should be relatively small, so that the main valuable qualities inherent in the improved breed are not lost or decreased.

At the same time, it is necessary to achieve a successful combination of the positive qualities of the Tian Shan meat – semi-fine-wool breed, such as large live weight, earliness, good meat properties, strong constitution, and adaptability to year-round mountain pasture maintenance, and the North Caucasian meat-wool breed – high-quality crossbred wool of 56-50 quality with relatively good density, equalization in thickness and the length inside the staple and along the rune, clearly pronounced tortuosity along the entire length of the staple [7].

3 Results

While ensuring an annual increase in the number of sheep by 1.6-2.0%, wool production – by 1.1-1.6%, there is no increase in wool productivity and remains at the level of 2.4 kg per

sheep for a number of years. The lack of purposeful breeding with animals with deficient feeding against the background of poor pasture vegetation contributed to a decrease in wool productivity and wool quality.

Therefore, since 2019, the improvement of the Tian Shan breed has begun by crossing with rams of the North Caucasian meat-wool breed, which also refers to meat-wool sheep in the Corriedale type. These breeds were created by crossing fine-wool-rough-haired crossbreeds, fine-wooled, and English long-haired sheep [7].

The North Caucasian meat and wool breed was bred in 1944-1969 in the Vostok stud farm of the Stavropol Territory by crossing merino ewes of the Stavropol breed with Lincoln and Romney Marsh sheep. Crossbreeds of the first generation that meet the requirements of the breed being bred were bred "in themselves". Appropriate selection and matching of animals were used. The sheep of the North Caucasian meat and wool breed have well-developed meat and wool productivity. Their barrel is wide, rounded, with good meat points. The ear is white, the wool is crossbred, 11 cm long and more, the degree of fineness is of 50-58 quality, the crimp is good, the fleece is staple-pigtail structure, the shearing of wool from rams is 8-12 kg, from ewes – 5-6.5 kg at the output of washed wool 50%. Rams weigh 100-115 kg, ewes – 55-60 kg. This breed is used for the production of crossbred wool and mutton by both purebred breeding and crossing with other breeds [8].

Table 1. Dynamics of changes in wool qualities of sheep, % (according to valuation data).

Year	Wool degree of fineness, in qualities				Density		Crimp	
	60	58	56	50	M	M+	I	I+
2019	2.5	15.0	48.8	33.7	100.0		100.0	
2020	1.8	14.3	51.8	32.1	93.1	6.9	98.9	1.1
2021		15.7	56.6	27.7	83.1	16.9	97.6	2.4
2022		15.5	64.3	20.2	90.5	9.5	95.2	4.8

Source: compiled by the authors

If in the 2019 initial year, when the work on the admixture crossing began, the group of ewes was characterized by the following wool degree of fineness: 60 quality had 2.5% of animals, 58 quality – 15.0%, 56 quality – 48.8%, and 50 quality had 33.7% of animals, whereas in 2022 15.5% of animals had wool of degree of fineness of 58 quality, 64.3% - the main of 56 quality, and the proportion of animals with wool of 50 quality decreased to 20.2%. This indicates the equalization of wool according to the fleece.

Ewe wool has acquired a much better marketable appearance. It has become softer, its elastic properties have increased. The crimp began to have a more pronounced character and be medium and large in shape. The specific weight of animals with crimp rating I+ was equal to 4.8% or 3.7 orders of magnitude higher compared to the wool of the original herd.

Table 2. Meat – wool productivity of young ewes of different genotypes.

Genotype	p	Live weight, kg		Wool length, cm		Wool clip, kg	
		M±m	Cv%	M±m	Cv%	M±m	Cv%
Ch/p	20	39.4±0.5	5.8	12.7±0.17	6.3	3.71±0.64	5.4
½ SKTSH	12	41.0±1.06	9.0	12.7±0.34	9.1	3.62±0.12	11.6
¼ SKTSH	27	41.7±0.14	3.1	12.5±0.14	6.0	3.73±0.25	21.2

Source: compiled by the authors

The ½ SKTSH young ewes have wool degree of fineness mainly of 58-56 quality (93.9%). 6.1% of the young ewes have wool of 60 quality, which is not a disadvantage of breeding, since, in the second year of life, their wool is coarsened by one or two qualities. According to the organoleptic assessment, there were no animals with wool of 50 quality among them, which is the result of the use of sheep seed of the North Caucasian meat and wool breed in the herd. According to the density of wool with M+ rating among the half-breds they were 6.1, and according to the crimp with I+ rating - 6.1%.

In animals of ¼ SKTSH obtained from back crossing, the wool degree of fineness, like in ½ SKTSH, is mainly of 58-56 quality (85.5%). There is a significant number of animals with the most desirable degree of fineness – of 56 quality (63.3% vs. 51.5%). In this group there were no animals with wool of 60 quality, but 14.8% of the young ewes had wool of 50 quality, there was no noticeable coarsening of the wool on the thigh.

Wool density refers to traits with high heredity (the heritability coefficient is in the range of 0.3-0.6). Sheep of the North Caucasian meat-wool semi-fine wool breed are distinguished by thicker wool compared to the Tian Shan breed. The crossbreeds received from them inherited a thick wool. Thus, in the ¼ SKTSH young ewes, the specific weight of animals with a thick wool of M+ reached 33.3%, which is 25.2% more compared to ½ SKTSH.

4 Discussion

Many studies have been devoted to the use of admixture crossing in sheep breeding as a method of improving the productive qualities of sheep. When applying this mating method, great care and skill are required. Insufficient attention to the use of producers of another breed and non-careful selection and matching can lead to the deterioration of the herd due to the loss of valuable qualities of the main breed and poor inheritance of selected traits characteristic of the improving breed [9].

From a methodological point of view, introductory crossing or blood transfusion is considered as a temporary deviation from purebred breeding to borrow from another breed some qualities missing from this breed, while preserving the type and characteristic valuable traits of this main breed. This work consists of three stages: the first stage consists in crossing purebred ewes of a sufficiently valuable breed with specially selected producers of another breed that has the advantages that the breed taken for blood transfusion lacks; the second stage is characterized by obtaining several generations from backcrossing with purebred animals of the main breed; and the third final stage is the transition to breeding "in itself", crossbreeds of different bloodlines with desirable properties [10-12].

By the early eighties, in the mountainous Naryn region, the number of sheep of the Tian Shan breed was about 700 thousand heads with an average shearing of pure wool per sheep of 1.8-1.9 kg, and the volume of crossbred and crossbred type wool produced reached 1.4-1.5 thousand tons. Nevertheless, some of the sheep of the Tian Shan breed had insufficiently expressed wool qualities such as density and its equalization, the work to eliminate which was carried out by the method of introductory crossing of the ewes of the Tian Shan breed [7] with the Australian Corriedale sheep imported into the country in 1980-1981 and 1986.

As a result of scientific research, it has been established that the best combination of valuable properties of crossed breeds is observed in ¼-blood crossbreeds by Australian Corriedale. As a result of long and in-depth breeding work in the period 1980-2004 by the method of inbreeding and introductory crossing with sheep, the Australian Corriedale managed to create a qualitatively new consolidated factory type of sheep of the Tian Shan breed [7].

To improve the meat qualities of Tian Shan sheep by the method of introductory crossing, 500 doses of deep-frozen sperm of Suffolk sheep were imported from Austria to the republic in 2003. It was planned to get second-generation crossbreeds with a share of the paternal blood, and subsequently to breed animals "in themselves". At the same time, the main attention should be paid not so much to the degree of blood, but to the productive qualities of sheep and the ability to pass them on by inheritance [7].

Studies have shown that Suffolk – Tian Shan lambs are born large, well-formed and had good vitality and high growth energy. Clearly defined meat forms of physique, the best live weight and strong bones of cross-bred sheep allow them to be considered valuable genetic material in improving the meat qualities of the Tian Shan breed. Nevertheless, due to current difficult situation in the state breeding plant "Tian Shan" after the events of 2010, this work was not brought to an end [7].

Work on the use of sheep of the North Caucasian meat and wool breed on sheep of the Tian Shan breed to improve wool properties by introductory crossing is being carried out for the first time [13].

5 Conclusion

Thus, it can be summarized that the half-blooded and quarter-blooded North Caucasian Tian Shan young animals have better wool qualities without reducing the live weight of the crossbreeds. The crossbred wool cut from them had the best marketable appearance. All this makes it possible to switch to the breeding of quarter-blooded animals "in itself" in the future.

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