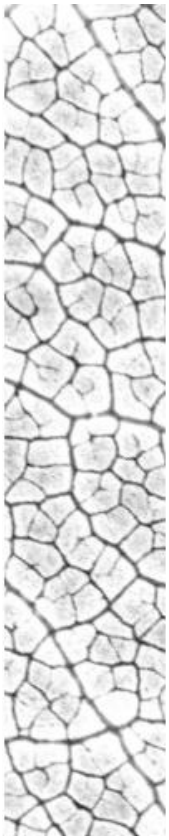

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Selection method of karakul sheep of gray color by viability

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Abstract
The developed selection method of homozygous Karakul sheep of gray color by viability makes it possible to reduce the yield of albino gray lambs by homogenous selection of animals in gray color by 2.1% in offspring of rams with intensive pigmentation of the hair covering in comparison with the parameters of rams with weakened pigmentation.

Keywords: homozygous, albino, pigment, viability, gray color

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INTRODUCTION

In the "Methodology of breeding gray Karakul sheep" (Vasin et al. 1971), the following types of color matching are given: homogeneous - gray rams x gray ewe and heterogeneous - gray rams x black ewe; black rams x gray ewe. With homogeneous selection (♂♂gray x ♀♀ gray), the inheritance of colors is 25% black and 75% gray, and of these, 25,0% of lambs are non-viable albinos, who show tympanitis (bloating) of the stomach in the suckling period up to 4-4.5 months of age. Due to the lethal effect of "WW" roan genes, there are no homozygous gray Karakul sheep in the population of Karakul sheep. This situation is found in populations of other animal species, where the pleiotropic effect of genes is manifested. The consequence of the pleiotropic effect of genes limits the use of homogeneous selection of gray Karakul sheep by color.

Therefore, N. S. Gigineishvili (Gigineishvili 1976) for early determination of the viability of homozygous gray lambs proposed a method for early determination of the viability (EDV) of gray lambs, based on determining the level of pigmentation of the palate. There is also a method "Method of selection of Karakul sheep by marker phenotypic sign of cytogenetic status" (Alibayeva et al. 2009), also based on the level of manifestation of pigmentation of the oral cavity of lambs. The disadvantages of the EDV method and the marker method are that these methods are limited only to determining the non-viability of lambs during life and cannot affect the heredity of gray Karakul sheep to reduce the specific weight of non-viable individuals.

R. Kh. Tyapayev, R. E. Asylbekov (Tyapayev and Asylbekov 1982) proposed the selection of gray lambs for breeding, taking into account the pigmentation of the eyelashes, where lambs with black eyelashes with a homogeneous selection by gray color in the offspring give 19.8% of albinos. The disadvantage of this method is that the management of pigmented lambs' eyelashes at birth does not reflect the individual genotypic age status of the animals. However, this experiment was conducted by the authors once and the method is not in demand for widespread use in other farms.

Therefore, currently, in economic conditions, the traditional heterogeneous type of color matching is widely used (rams are gray x ewes are black; rams are black x ewes are gray), where the inheritance of colors is 50.0% - gray and 50.0% - black, while the resulting gray lambs are heterozygous and are not albinos.

In traditional selection, according to the results of scientists researches, it is known that the selection of individuals by viability was carried out depending on the degree of pigmentation of the pelage and skin covering. Previously, the selection of animals for viability by the degree of pigmentation was carried out visually, which reduces the effectiveness of selection.

Based on this, the development of a perfect method of selecting homozygous gray rams aimed at using the genetic potential of animals using objective measurement methods is relevant.

The aim of the research is to study the effect of the pigmentation intensity of the hair of homozygous Karakul sheep of gray color on their viability.

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Table 1. Correlation between the intensity of pigmentation and the diameter of pigmented hairs in homozygous lambs of various hues of gray

№	Gradations of the diameter of pigmented hairs, μm	The correlation coefficient - r	Intensity of black pigmentation
1	Less ≤ 30	0.25 -0.32	Weakened
2	30.1 -34.9	0.35 -0.38	Weakened
3	35.0 -39.9	0.41 -0.47	Normal
4	40.0 -44.9	0.51 -0.59	Normal
5	45.0 -49.9	0.60 -0.68	Intensive
6	50.0 -54.9	0.65 -0.72	Intensive
7	Over ≥ 55.0	0.70 -0.85	Intensive

MATERIALS AND METHODS OF RESEARCH

The object of research is gray Karakul lambs of light gray, medium gray and dark gray hues. When selecting (valuation) from gray homozygous Karakul lambs at birth and at 30 days of age, take samples of wool with 1 cm^2 of skin on the rump. Then, in the laboratory, it measures the hair fineness and determines the degree of pigmentation by EPR spectrometry (Vsevolodov et al. 1974).

RESEARCH RESULTS

At the initial stage of the experiment, we investigated the degree of correlation between the pigmentation of the hair covering of gray lambs obtained from a homogeneous selection with the degree of palate pigmentation of individuals. To do this, the frequency of occurrence of gray lambs with different degrees of palate pigmentation depending on the severity of the intensity of pigmentation of the hair covering of individuals is analyzed.

Research results show that the frequency of occurrence of individuals with dark palate pigmentation increases in lambs with intense hair pigmentation, which was in the range of 60.9-80.0%.

In poorly expressed lambs, the frequency of occurrence of individuals with dark palate pigmentation decreased to 2.9-6.3%.

However, the frequency of occurrence of lambs with low palate pigmentation increased among lambs with weakened expression of hair covering to 83.3%. The results of the experiments show that the degree of pigmentation of the hair and palate of the oral cavity of lambs has a high degree of correlation, which allows for effective selection for reducing albino lambs.

Based on this, we studied the effect of the pigmentation level of the hair covering of parents on the yield of albino - gray lambs in the offspring (**Table 1**). Analysis of the yield of albino lambs at a homogeneous selection of animals by gray color shows that the offspring of rams with intense pigmentation of the hair covering shows a decrease in the specific weight of albino lambs compared to those of rams with weakened pigmentation.

Table 2. Distribution of gray lambs by EPR indicators that differ in its level of variability

Characteristics of parents		Coefficient of variation of hair fineness Cv, %		The level of pigmentation by EPR indicators, %
Hues and colors of rams	Hues and colors of ewes			
Dark gray hue, dark gray color	Dark gray color, dark gray color	Low level Cv >5.9	49	>70
		Medium level Cv=8.0 – 9.9	47	=60
		High level Cv >10.1	45	<50
Medium-gray hue, blue color	Medium-gray hue, blue color	Low level Cv >5.9	54	>65
		Medium level Cv=8.0 – 9.9	51	=55
		High level Cv >10.1	56	< 45
Light gray hue, lacteous color	Light gray hue, lacteous color	Low level Cv >5.9	46	>60
		Medium level Cv=8.0 – 9.9	45	=50
		High level Cv >10.1	46	< 40

Thus, the yield of albinos in intensely pigmented rams of a dark hue was 22.9%. The difference in theoretical indicators is -2.1%.

Similar data for medium gray – 23.7% and – 1.3%, for light gray – 24.2% and - 0.8%. In the offspring of rams with weakened pigmentation, the yield of albino lambs increased slightly.

Based on this, we studied the degree of pigmentation manifestation taking into account the diameter of the lambs' hair covering (**Table 1**).

The correlation between the intensity of pigmentation and the diameter of pigmented hairs in homozygous lambs of various hues of gray was studied (**Table 2**). The results of the study show that there is a certain tendency of correlation between the gradations of the diameter of pigmented hairs and the intensity of pigmentation of the hair covering. Thus, lambs with hair fineness up to 34.9 μm have low correlation coefficients with the intensity of hair pigmentation and amounted to h=0.25-0.38 μm and had a weakened expression of hair covering pigmentation. Also, with an increase in the amount of hair fineness in lambs, the correlation coefficient also increased, and the expression of hair covering pigmentation improved. Also, in lambs with intensive hair pigmentation, the correlation coefficient with the gradation of the diameter of pigmented hairs over 45,0 μm is h=0.60-0.85.

The coefficient of variability of a trait indicates the diversity degree of a trait in a particular criterion. For selected traits, the level of homogeneity of this trait is of great importance. The distribution of gray lambs by EPR indicators that differ in its level of variability is analyzed (**Table 3**). The results of the analysis show that all lambs with different colors and low variability have a high level of pigmentation. In dark gray lambs with a low level of variability - Cv >5,9%, the degree of EPR pigmentation is over >70%, with a medium hue - >65%, with a light hue - >60.0%. Such tendencies of increasing the degree

Table 3. Results of a homogeneous type of selection by the gray color of sheep with intensive pigmentation that differ in its level of variability

Characteristics of parents		Coefficient of variation of hair fineness Cv	The level of pigmentation by EPR indicators, %		The distribution of lambs according to the colors			
Hues and colors of rams	Hues and colors of ewes				black	gray	Including albinos	The difference in indicators from the theoretical
Dark gray hue, dark gray color	Dark gray hue, dark gray color	Low level Cv >5.9	>70	49	26.5	73.5	18.4	-6.6
		Medium level Cv=8.0 – 9.9	=60	47	25.5	74.5	21.3	-3.7
		High level Cv >10.1	<50	45	26.7	73.3	24.4	-0.6
		Average		141	26.2	73.8	21.3	-3.7
Medium-gray hue, blue color	Medium-gray hue, blue color	Low level Cv >5.9	>65	54	24.1	75.9	20.4	-4.6
		Medium level Cv=8.0 – 9.9	=55	51	25.5	74.5	23.5	-1.5
		High level Cv >10.1	< 45	56	25.0	75.0	25.0	0
		Average		161	24.8	75.2	23.0	-2.0
Light gray hue, lacteous color	Light gray hue, lacteous color	Low level Cv >5.9	>60	46	23.9	76.1	21.7	-3.3
		Medium level Cv=8.0 – 9.9	=50	45	24.4	75.6	24.4	-0.6
		High level Cv >10.1	< 40	46	23.9	76.1	26.1	+1.1
		Average		137	24.1	75.9	24.1	-0.9
TOTAL				439	25.1	74.9	22.8	-2.2

of pigmentation, depending on the level of variability, were repeated in lambs of medium-gray and light-gray hues.

However, in lambs with a high level of variability - Cv >10.1%, the degree of pigmentation decreased, so in lambs with a dark gray hue was <50%, medium-gray lambs - <45% and light-gray lambs - <40%.

We analyzed the hereditary qualities of homozygous gray Karakul sheep with hair fineness indicators of more than 45.0 μm and differing in the level of variability of Cv>5.9%; Cv=8.0-9.9% and Cv>10.1%, as well as with the corresponding indicators of pigmentation levels by EPR spectrometry (**Table 3**).

A lower level of inheritance of albino gray lambs – 18.4% was observed in the offspring of parents of a dark gray hue with a hair fineness value of more than 45.0 μm and their variability of no more than Cv>5.9% and the level of pigmentation preservation of more than 70.0%.

Here, the difference in indicators from the theoretical one was – 6.6%. The corresponding low indicators in the inheritance of albino gray lambs of 20.7% and 21.4% were observed in the offspring of parents of medium-gray and light–gray hues by the corresponding selection criteria.

Higher indicators of inheritance of albino gray lambs – 24.4%, 25.0% and 26.1% were manifested in the offspring of parents of dark gray, medium gray and light gray hues with a hair fineness value of more than 45.0 μm and their variability is no more than Cv>10.1% and the level of pigmentation preservation is less than 50.0%; 45.0% and 40.0%.

CONCLUSIONS

In general, according to the results of the research, it can be concluded that the selection of gray Karakul sheep with a hair fineness value of more than 45.0 μm and their variability of no more than Cv>5.9% and the level of pigmentation preservation of more than 70.0% reduces the yield of albino gray lambs in the offspring.

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