RESEARCHEAS IN THE CURL TYPE IMPROVEMENT AT THE WHITE AND PINK LINES FROM KARAKUL OF BOTOSANI BREED

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Abstract

The purpose of this work was to evaluate the improvement stage of the curl type in the white and pink lines from Karakul of Botoşani breed. The biological material analyzed was represented by the active and inactive herd, respectively by the Karakul of Botoşani purebred lambs belonging to the white and pink lines. The method applied in assessing the quality of the skins was based on the technical norms specified in Section 1.4 and 1.5 of MADR Order no. 22/20.01.2006, respectively RE 1012/2016. Following the evaluation of the skins, the data were systematized and processed statistically, for which the WINDOWS computer base program SPSS 16.00 was used. For both lines of color studied, the conducted research highlights the fact that the predominant flattened curls dominate, at white line with 83.51% and at pink line with 75.34%, followed by tubular curls, at white line with 10.39% and at pink line with 16.59 %. In the conducted study, the flattened curl holds the superiority and the gloss gives value to the skin.

Key words: sheep, Karakul, curl type, quality, line

INTRODUCTION

The Karakul of Botosani is a specialized Romanian breed in skin production, formed by the combination of the Karakul breed (males from the Bukhara basin - Turkmenistan, Kazakhstan, Germany, Austria, Basarabia) with black and grayish Turcana females, a native breed with coarse wool well adapted to the specific conditions in the north-east of Moldova. Within the breed, of the 7 color varieties, the first four are currently homologated, as follows: black, grayish, brown and grey [1;2;3;4;5]

The Karakul sheep breed has a series of biological particularities, one of which is primordial and refers to the unique, very beautiful skin of the newborn lamb, slaughtered 1-2 days after lambing. According to its value, Karakul fur is considered a valuable fur in the same row as the noblest natural furs (mink, fox, etc.). This is explained by the superior qualities and esthetic ornamental of the curls, the excellent silkiness of the hairy covering, the perfect thermal properties, as well as the durable exploitation resistance of leather garments [6;7;8].

Karakul lamb skins have various curl shapes (tube, bob, mane waves, ribs, ringlets, pan, etc.) with a wide range of colors (black, grayish, grey, brown, pink, white), shades (dark, medium, light) and coloration. Hair cover fibers possess various qualities of gloss, silkiness, elasticity, etc. The curl quality is determined by the properties of the component fibers, its dimensions and the degree of closure. [2;9;10].

The importance of this production is largely due to the specific influence of some

characters that influence the curl as a whole, but also the dermal layers, the total surface and the one occupied by the curl. [6;11;12;13]

From here, the need to evaluate the curl quality specific characteristics and especially their shape is also confirmed by the fact that through direct intervention in the improvement process of sheep bred for skins in South Africa and in Namibia, a new genotype of Karakul sheep was outlined in which the curl it is easily unfolded, flattened, and which by arrangement generates sinuous designs and has a moire appearance, very low height and an intense luster. [14;15]

MATERIAL AND METHOD

The biological material analyzed was represented by the active and inactive herd, respectively by the Karakul of Botoșani purebred lambs belonging to the white and pink lines. The entire herd subjected to evaluations is included in the Genealogical Register of the breed and is in skin quality improvement program.

The method applied in quality skin assessing is based on the technical norms specified in Section 1.4 and 1.5 of MADR Order no. 22/20.01.2006 and RE 1012/2016 which specify the aspects on the basis of which the official control of skin production and body conformation and constitution evaluation at Karakul is carried out (Nechifor I. 2019).

The data thus obtained, following the skin evaluation, were systematized and processed statistically. The statistics, respectively the parameters, which characterize a normal distribution, are on the one hand the mean or median, and on the other hand the dispersion indices represented by the variance and the standard deviation of the observed character. Statistics are written with Latin letters: arithmetic mean ($\overline{X}$), variance (s^2), standard deviation (s), and parameters with Greek letters: theoretical mean (μ), variance (σ^2) and standard deviation (σ).

For this purpose, the WINDOWS computer program SPSS 16.00 was used to determine the frequency, the arithmetic mean ($\overline{X}$), the error of the arithmetic mean ($\pm s_{-x}$), the standard deviation (s), Chi-Square Tests, ANOVA Test, the significance test p. and the confidence interval (C.I.).

The statistical test is a decision method that helps us to validate or invalidate with a certain degree of certainty a statistical hypothesis:

- hypothesis H0 (or null hypothesis): the data are not related, they are independent/the compared values do not differ from each other

- hypothesis H1 (or alternative hypothesis): the data are related to each other, are dependent/the compared values differ from each other.

The result p of the test, provided as a number between 0 and 1, the probability of making or error if we reject the hypothesis H0. If it is lower than the significance threshold α chosen - usually $\alpha=0.05$ - we reject the hypothesis H0 and accept as true the hypothesis H1.

The interpretation of p values is done in most statistical tests as follows:

➢ $p < 0.05$, the statistical relationship is significant (S, 95% confidence)

➢ $p < 0.01$, the statistical relationship is significant (S, 99% confidence).

➢ $p < 0.001$, the statistical link is highly significant (HS, confidence 99.9%).

➢ $p > 0.05$, the statistical relationship is insignificant (NS).

The ANOVA test compares the mean of several samples at the same time.

➢ H0: m1 = m2 = m3 = m4 (for 4 samples)

➢ H1: At least two means differ significantly

The result is a number p which is interpreted in the same way as the other tests:

➢ If p>0.05, H0 is not rejected, the difference is insignificant at the 95% significance level;

> If p < 0.05, H0 is rejected with the significance threshold of 95%. At least two means differ significantly;

> If p < 0.01, H0 is rejected with the significance threshold of 99%. At least two means differ significantly;

> If p < 0.001, H0 is rejected with the significance threshold of 99.9%. At least two means differ highly significant.

RESULTS

After slaughtering the lamb, the Karakul skin becomes a merchandise, which is subjected to primary processing and preservation (salting, drying) and industrial processing. Like any merchandise, skins have commercial properties, which determine, to a large extent, their value,

expressed in the end by the selling price. In addition to the characteristics of the hair cover and the curling qualities, Karakul skins also have a series of particularly important commercial characters, such as: the surface, the mass and the thickness of the dermis. Therefore, the correct assessment of the commercial characteristics of the skins has a particular importance and, in table 1, we present the average value of the score obtained for the quality of the skins at white and pink varieties.

Figure 1 shows a comparative score for the skin quality in the case of the two analyzed color varieties and, in tables 2 and 3 we present the gender distribution of the studied population.

Table 1. Skin quality statistical estimators in the studied color lines

| Descriptive Statistics		N	Minimum	Maximum	Mean		Std. deviation	Variance
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
White line	Score	558	355,00	630,00	504,44	1,89	44,63	1991,74
	Birth weight (kg)	558	1,50	6,50	3,52	0,035	0,82	0,67
	Valid N (listwise)	558						
Pink line	Score	669	345,00	670,00	500,22	2,21	57,05	3255,16
	Birth weight (kg)	669	1,50	7,00	3,69	0,036	0,93	0,86
	Valid N (listwise)	669						
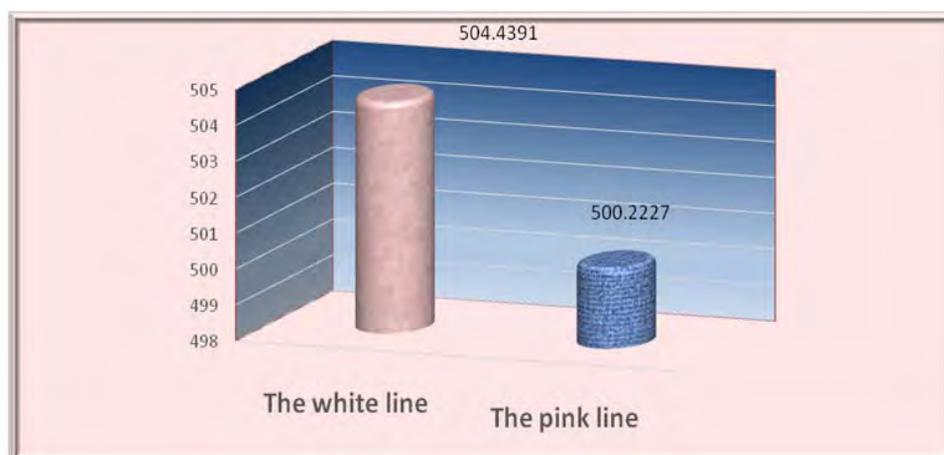
Fig. 1 Graphical representation of the total skin score for the two lines studied

Table 2 Absolute and relative frequency for the white color line depending on sex

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Validity	Females	321	57,5	57,5	57,5
	Males	237	42,5	42,5	100,0
	Total	558	100,0	100,0	

Table 3 Absolute and relative frequency for the pink color line depending on sex

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Validity	Females	380	56,8	56,8	56,8
	Males	289	43,2	43,2	100,0
	Total	669	100,0	100,0	

Color uniformity has a particular importance. In these skins, most of the time on the upper part of the body, from the nape to the tail, the shade of the color is lighter. The smaller the difference between the color on the middle line of the body and on the sides, the more valuable the skin is. Therefore, the results regarding the color shades of the two studied varieties are presented in tables 4 and 5.

Table 4 White line shades of color

Shade		Frequency	Percent	Valid Percent	Cumulative Percent
Validity	White brown	2	0,4	0,4	0,4
	Chalky white	29	5,2	5,2	5,6
	Yellowish white	82	14,7	14,7	20,3
	White ermine	81	14,5	14,5	34,8
	Normal white	351	62,9	62,9	97,7
	Buttery white	13	2,3	2,3	100,0
	Total	558	100,0	100,0	

Table 5 Pink line shades of color

Shade		Frequency	Percent	Valid Percent	Cumulative Percent
Validity	Brick pink	6	0,9	0,9	0,9
	Amber pink	10	1,5	1,5	2,4
	Light pink	112	16,7	16,7	19,1
	Dark pink	80	12,0	12,0	31,1
	Normal pink	437	65,3	65,3	96,4
	Platinum pink	24	3,6	3,6	100,0
	Total	669	100,0	100,0	

The quality of the curl and the pile cover, as a whole, influences the price of the skin. The skins with the silky hair coat, with intense shine, with tubular wave curls, flat with well-expressed modeling, excellent and suitable, are the best paid. On the world level, for a long time, the skins with the classic tubular loop type were in demand. The frequency for the curl type in the studied color varieties was presented in tables 6, 7 and figure 2.

Table 6 Frequency for the loop type at the white color line

Curl type The white line		Frequency	Percent	Cumulative Percent
Validity	Tubular loop	58	10,39	10,39
	Bob curl	26	4,66	15,05
	Flattened curl	466	83,51	98,57
	Other types (rings, sickles, feathers, etc.)	8	1,43	100
	Total	558	100,0	

Table 7 Frequency for the loop type at the pink color line

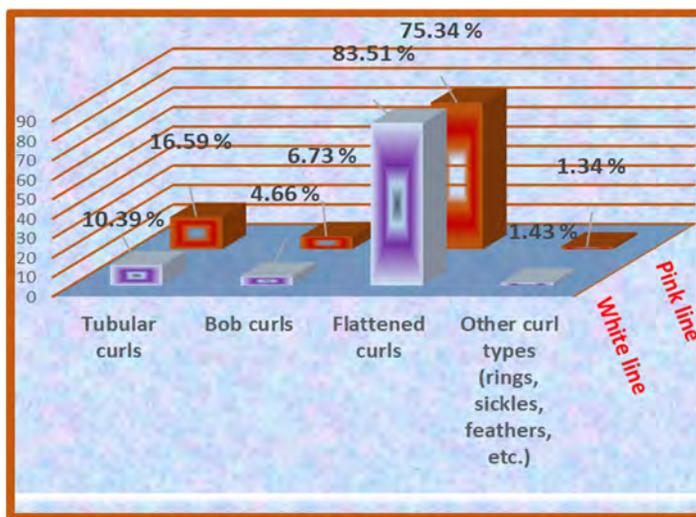| Curl type The pink line		Frequency	Percent	Cumulative Percent
Validity	Tubular loop	111	16,59	16,59
	Bob curl	45	6,73	23,32
	Flattened curl	504	75,34	98,65
	Other types (rings, sickles, feathers, etc.)	9	1,34	100
	Total	669	100	

Fig. 2 Graphical representation of frequencies for loop type

DISCUSSIONS

At each stage of curl shape character improvement evaluation, multiple evaluations were carried out, so that the data processing provides objective values and highlights the intensity and effect of selection. The differences between the two means are not significant since p>0.5 and C.I. 95% Only for the white line, the evaluation of skin quality allowed the score to be higher than 500 points for more than 550 lambs evaluated.

In tables 2 and 3 we present the distribution of the studied herd by gender in the two white and pink lines. The differences between the relative frequency for the two sexes (57,5% females respectively 42,5% males and 56,8% females respectively 43,2% males) and for the two color lines are insignificant as p> 0,5 and C.I. 95%.

In tables 4 and 5 we present the shades of color at those two lines taken into study. The highest share is held by the white-normal shade with 62,9%, followed by yellowish-white 14,7% and ermine-white 14,5%. In the pink line (Tab. 5), the highest share is held by the pink-normal shade with 65,3%, followed by light pink with 16,7% and dark pink 12,0%.

In tables 6, 7 and figure 2 we present the type and shape of the curl for the studied white and pink lines of colors.

In both lines of color studied, the conducted research highlights the fact that curls with a predominant flattened shape dominate (white 83,51%, and pink 75,34%), followed by tubular curls, with an average length greater than 12 mm (white 10,39 % respectively for pink 16,59 %). Both in the flattened curl and in the tubular one, the differences are significant for p<0.5 and C.I. 95%. The white line of color holds the superiority for the flattened curl type and the pink color line holds the superiority for the tubular curl type.

In figure 2 we find that the bob curl type has a frequency of 4,66% on the white line and 6,73% on the pink line. Other types of curls are also found in the two lines studied with a frequency of 1,43% in the white line and 1,34% in the pink line.

In addition to the specific characteristics of the fibers that form the hair covering and influence the appearance of the color, the value of a skin is also given by other characteristics specific to curl type, namely height, width, length and degree of closure. Some of these characters have a superior ameliorative role because, through expression, they define the patterning, shape and contour described by the curls on the surface of the skin.

When evaluating the character represented by the curl type, greater attention is paid to length dimensions. Explanation of this situations is the fact that the length is also a criterion for the classification of curls, those that have a length greater than 12 mm are considered

tube-shaped curls and if they have a length below this value, the curls are bob-shaped (Nechifor I. 2019, Pascal C. 2011).

The graphical representation of the color line distribution of the average values obtained after evaluating the quality of the pelts according to the scoring sheet with its included indicators highlights that the improvement process, although in progress, is at different levels for the two color lines studied within the Botosani Karakul breed (Table 1 and in Figure 1).

The color of the skin or fur in animals is determined by the presence, in various proportions, of melanin pigments. Color analysis in sheep holds significant scientific and practical importance, as it is known that their presentation also represents a breed characteristic. Particularly in sheep with lighter wool, and especially white wool, there is greater economic value. This has greatly contributed to the spread of sheep with white wool in almost all regions of the world due to the increased utilization opportunities. The diversity of colors observed in sheep is attributed to the different nature of wool and hair pigmentation in terms of intensity, shade, and the distribution of pigmented fibers on the body surface. There is a close correlation between the color of the fleece and that of the skin.

Man has always been drawn to and fascinated by the variety of colors and the diversity of color shades that can arise when practicing crosses aimed at modifying fur color.

White color is not characteristic of Karakul sheep breeds and was obtained for the first time through crossings between black Karakul sheep and white or mottled Persian sheep.

The pink Karakul line, with a larger population, was highlighted starting in 1990 at S.C.D.C.O.C Popăuți. The pink color emerged from crosses between the brumaire Karakul and the brown Karakul. During the pairing process, consideration was given to the characteristics of the ewes and rams

used for mating – coat color, lineage, descent, and so on.

In breeding programs for fur breeds, a high emphasis is placed on uniformity of the fundamental characteristics of the curls. It is desirable for over 75% of the curls to have approximately the same height, length, and width. Regarding the uniformity of this parameter, many specialized publications indicate that, typically, on the surface of a pelt, the curls have varying lengths, decreasing from the rump to the withers and from the top line of the trunk towards the abdomen.

The main characteristics that determine the value of furs are: curling, color, pelt quality, pattern, and luster. Regarding curling, a curl is a grouping of fibers in a certain direction, following the same curling pattern; this fiber arrangement lasts only a few days after the lamb is born. In the conducted study, flattened curling holds superiority, and luster adds value to the fur. Even other types of curling, such as tubular and loop curls, are valuable. However, other types of curling have a negligible proportion, ranging from 1.3 to 1.5%.

CONCLUSIONS

Following the study on the improvement status of curl type in the white and pink lines within the Botoșani Karakul breed, we can conclude:

1.The improvement process, although in progress, is at different levels for the two color lines studied within the Botoșani Karakul breed. The differences between the two means are not significant as $p > 0.5$ and C.I. 95%. Only in the white line, the evaluation for pelt quality allowed for over 550 lambs to score higher than 500 points.

2.The highest proportion is held by the white-normal color shade at 62.9%, followed by yellow-white at 14.7% and hermin-white at 14.5%. In the pink line, the highest proportion is held by pink-normal at 65.3%, followed by light pink at 16.7% and dark-pink at 12.0%.

3.In both color lines studied, the research highlights that the predominant curl shape is flattened, with the white line at 83.51% and the pink line at 75.34%, followed by the tubular curl type, meaning they have an average length greater than 12 mm, with the white line at 10.39% and the pink line at 16.59%. Both in flattened and tubular curl types, the differences are significant for $p < 0.5$ and C.I. 95%. The white color line has superiority in the flattened curl type, and the pink color line has superiority in the tubular curl type.

4.In the two color lines studied, other types of curl were also encountered, but they have a negligible proportion, ranging from 1.3 to 1.5%.

CONFIRMATION

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