DETERMINING THE CURRENT DEGREE IN IMPROVEMENT OF CURL'S RESISTANCE AND ELASTICITY IN THE KARAKUL OF BOTOSANI BREED

I. Nechifor[1], Al.M. Florea[1], A. Crismaru[2], C-tin Pascal[2*]

[1]Research and Development Station for Sheep and Goat Breeding, Popauti, Răchiti Village, Botosani County, Romania
[2]Faculty of Animal Sciences, University of Agricultural Sciences and Veterinary Medicine of Iasi, Romania

Abstract

The aim of the research was to carry out a complex study in order to evaluate the current state of improvement of the resistance and elasticity of the curls to the main color varieties formed within the Karakul of Botoșani breed.

The biological material subjected to the assessments was represented by purebred lambs obtained from the elite nucleus of the Karakul of Botoșani breed growing at the Research and Development Station for Breading Sheep and Goats Popuți-Botosani. The lambs subjected to the evaluations belonged to all color varieties of the respective breed, obtained over three successive generations, coming from lambing seasons that took place in 2013, 2014 and 2015, respectively.

The method applied in assessing the objectives was based on the technical norms specified in Section 1.4 and 1.5 of the MADR Order no. 22 / 20.01.2006, published in the Official Gazette of Romania no. 146 of 15.02.2006 and in which are specified the aspects based on which the official Control of the skins production is performed.

Following the research, it was found that the breeding process is located on different levels in the color varieties found in the Botosani Karakul breed. The evaluation of the degree of expression for the strength and elasticity of the curl in black lambs shows that the breeding process is more advanced because the average score was very close to the maximum accepted (45.19 ± 0.451) for these characters. On the other hand, the fact that the proportion of lambs that received the maximum score in 2005 was 57.36% and reached only 69.47% in 2015 shows that the improvement of the strength and elasticity of the curl is slower in the grayish variety.

Key words: pelts, Karakul de Botosani, curl, improvement

INTRODUCTION

Directly, the quality of the pelts depends on many characteristics and properties of the covering fibers, the curl as a morphological formation, the curling in its entirely and last but not least on the quality of the dermal layers. The great shortcoming, which could make it difficult to obtain the expected effect of selection, is due to the fact that many of these characters are evaluated in practice using mainly subjective methods [2, 7]. For this reason, the results of evaluations are often inaccurate and inconsistent [1, 8, 9 10, 11] and the clear determination of the effect due to a character evaluated in this way is very difficult to quantify.

Strength and elasticity are two very important characteristics on which the expression of the quality of the skin curl depends. Due to their role, both strength and elasticity are selection criteria included in the breeding program of Karakul of Botoșani sheep. These two characters are positively correlated, which is why the selection of one produces a simultaneous response at the level of the other trait [3, 5, 8].

MATERIAL AND WORKING METHODS

The biological material subject to research belongs to the Karakul of Botoșani

*Corresponding author: pascalc61@yahoo.com
The manuscript was received: 06.07.2020
Accepted for publication: 20.08.2020

breed, with known origin, included in one of the specific forms of production performance control, namely that based on evaluation in PP system (own performance) and control based on OP type evaluation (origin and productivity).

The biological material analyzed was represented by purebred Karakul of Botoșani lambs belonging to all color varieties, obtained over three successive generations, from calving seasons that took place in 2013, 2014 and 2015, respectively.

The working method used to assess the characters followed was based on the technical norms specified in Section 1.4 and 1.5 of the MADR Order no. 22 / 20.01.2006, published in the Official Gazette of Romania no. 146 of 15.02.2006 and in which are specified the aspects on the basis of which the Official Control of the production of skins is performed [6].

Statistical data processing was based on use of the computer program S.A.V.C. (Statistics Analysis of Variance and Covariance 2003). To test the statistical significance of the differences between the average values of the studied parameters as well as the correlations between them, the algorithms Analysis of Variables (ANOVA Single Factor) and the Pirson Correlation were used, both included in the computer program used.

RESULTS AND DISCUSSIONS

Elasticity is the property of the fibers to return to their original shape after deformations due to an external cause of a mechanical or physical nature (example - wetting or stretching). Due to the close connection between elasticity and curl strength, the two properties are evaluated simultaneously.

The elasticity and strength are influenced both by the height and degree of closure of the curls, by the thickness and quality of the fibers in the curl, and by the density of the curls between them. Pediculous and high curls, with a low degree of closure, with sparse fibers, with a weak resistance, are considered defective.

In the evaluation of these characters, is taken into account the resistance that the curls oppose when passing with the back of the palm in the opposite direction to the winding one, but also the time of their return to their initial shape. In the improvement of this character a great influence has the technical staff that makes the evaluation because being a criteria that is appreciated only by purely subjective methods the results can be extremely different from one season to another or even from one rating to another.

This is also one of the explanations why the proportion of individuals who have been identified as having good strength and elasticity has a sinuous evolution (Table 1). Another cause that contributed to giving a maximum score for this character to the 2015 generation is also due to the fact that for the consolidated varieties (black, gray and brown) through the breeding program we want a better expression of them in the future generation's genotype.

For the black variety, the average score was 45.19 ± 0.45, being less than five points above the maximum accepted level. That is why the professional organization represented by ACOC MOLDOOVIS, which manages the Genealogical Register of the breed, decided to implement an improvement program that would allow a better expression of the resistance and elasticity of the curl. As a result of this new approach, the assessment may become more objective and gradually increase the positive expression of those characters.

The analysis of how the proportion of lambs that received the maximum score has evolved highlights the fact that the improvement is certain, being supported by the genetic progress registered over the ten successive generations. Thus, if in 2005 the proportion of lambs that had a good expression for strength and elasticity was only 68.12%, their share increased to over 80% in 2015. This average value indicates a constant improvement of these characteristics but also the fact that under the effect of selection, and management of mating, on each generation increases by about 1.25% the number of individuals who received a maximum score.

Table 1 Statistical parameters for the resistance and elasticity of the curling

Colour variety	n	$\overline{X} \pm s_{\bar{x}}$	V%	% of hight frequency curls				diference ± 2005/2015 (%)	
				2005	2013	2014	2015	total	generation
Black	1501	45.19±0.45	21.83	68.12	80.55	84.56	80.63	12.51	1.251
Grayish	1181	42.73±0.33	26.58	57.36	61.59	72.08	69.47	12.11	1.211
Brown	428	41.24±0.57	28.95	60.88	75.57	73.05	70.25	9.37	0.937
Grey	103	37.86±1.23	33.16	57.13	67.46	64.76	64.29	7.14	0.714
Pink	530	39.65±0.53	31.14	38.19	40.73	45.94	46.12	7.93	0.793

At the grayish variety the tendency and evolution of the improvement of the degree of resistance and elasticity follow, in general, the same coordinates. The difference is that the average value of the score is only 42.73 ± 0.33 points, being 2.46 points lower than that obtained in black lambs and insignificant for $p<0.01$ (Table 2). Also, the fact that the proportion of lambs that were evaluated with the maximum points was 57.36% in the 2005 generation and reached only 69.47% in 2015 shows that the improvement of the strength and elasticity of the curl is slower at grayish variety (figure 1).

However, through the applied breeding program, the genetic gain indicates an increase of 1.21% of the individuals of each generation who were assessed with a maximum score. The relatively slow pace of the genetic improvement process is largely due to the differences found between the traits on which the quality of black and white colored fibers depends. When it will be possible to promote through the applied selection only those breeders that have curl fibers with close length and thickness, the chances that the improvement will register higher levels will increase.

Table 2 The difference and significance of difference for the resistance and elasticity of the curling

Character 1	Character 2	Average Diference	Semnification of diference	Semnification treadshot
Grey	Grayish	3.08	insignificant	-
Grey	Brown	1.59	insignificant	-
Grey	Black	1.79	insignificant	-
Grey	Pink	4.87	significant	0.01
Pink	Grayish	3.37	significant	0.05
Pink	Brown	7.32	significant	0.01
Pink	Black	2.45	insignificant	-
Black	Brown	1.5	insignificant	-
Brown	Grayish	3.08	insignificant	-
Black	Grayish	2.46	insignificant	

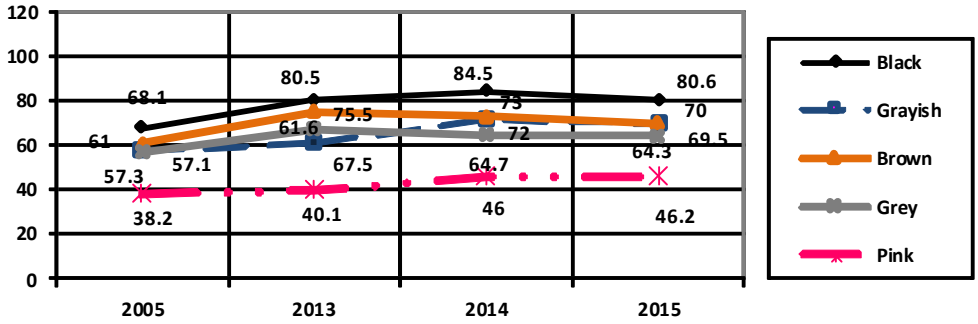

Figure 1. Frequency of character represented by resistance and elasticity (%)

Between grayish, pink and black varieties there are significant differences for the statistical threshold of 1% and insignificant for grayish with gray and brown (Table 2). However, the improvement program applied shows an increase of 1.21% of individuals in each generation who were assessed with a maximum score.

Between grayish, pink and black lambs, there are significant differences for the statistical threshold of 1% and insignificant for grayish with gray and brown (Table 2).

On brown lambs variety, the average score of 41.24 ± 0.577 shows a very good proportion of those who had a good degree in the evaluation for the strength and elasticity of the curls. The fact that the proportion of lambs with the desired type of character increases in each generation by about 9.37% shows a good efficiency of selection and an obvious genetic progress, but also a higher degree of improvement. The difference between the average score obtained in brown with grayish, brown with gray and brown with black is insignificant for $p < 0.01$.

In lambs of the grey variety, the improvement of this character is at a lower level compared to the homologated varieties. The average score of 37,86 ± 1,237 being 24.28% lower than the maximum accepted by the instructions for certification of the quality of biological material in purebred animals.

Determining a progressive increase of the lambs that received the maximum points in the evaluation of these characters indicates that the improvement is on favorable coordinates, even if the genetic progress was identified in only 0.7% of the individuals obtained from the sheep registered in the breed register.

In the pink lambs variety, although it obtained a better average score (39.65 ± 0.536), the fact that, so far, the proportion of lambs with a maximum score is below 50% shows a difficult improvement for these characters. The slow rate of improvement is due primarily the small size of the active population, with effects on the intensity of selection and, secondly, to the fact that in the curl structure are found red and white fibers of different length and thickness, influencing the expression of these traits in the genotype.

Determining the degree of significance between the average scores for the grey and pink varieties are significant for $p < 0.01$ and still significant for $p < 0.05$ between pink and grayish.

CONCLUSIONS

1. Evaluating the degree of expression for strength and elasticity of curls at black lambs show that the improvement process is advanced because the average score was at five points of the maximum accepted level (45,19 ± 0,451).
2. The fact that the proportion of lambs which received the maximum score in 2005 was of 57.36% and reached only 69.47% in 2015 shows that improving the resistance and elasticity of the curls are running slower at the grey variety.
3. Between the average scores for the resistance and elasticity of fibers at grey x pink and grey x black is found that the differences are significant for the statistical threshold of 1% and insignificant for grey with grizzled and brown.
4. At the brown variety the average score obtained in the evaluation of resistance and elasticity of curls was of 41,24 ± 0.577 which denotes that at a high proportion of individuals was found the desired shape.
5. The improvement of curl resistance at the grizzled variety is found at a lower level and the average score was lower with 24.28% from the maximum accepted by the instructions of certification of quality of the biological material from the pure-bred animals.
6. The average score obtained by the pink variety was of 39.65 ± 0,536 and by the fact that, to this time, the proportion of lambs with a maximum score is located below 50% shows a difficult improvement for these characters, and this slow pace of improvement is primarily due to the small size of the working population, with effects on the intensity of selection and, secondly, because in the structure of the curl can be found red and white fibers that have a different length and a thickness, influencing the expression of these features in the genotype.

REFERENCES

[1] Albertyn L.R., Schoeman SJ., 1990 - *In evaluasie van subjektiewe beoordeling*. Karakul, *p* 32, 35.
[2] Anonymous, 1982 - *Beskrywing van Karakoellammers en die beoordeling van foto's Karakul* 24, p 13- 18.
[3] Buzu I., 2014 - *Selection of Moldovan Karakul sheep by the body weight*. Scientific Papers. Series D. Animal Science. Vol. LVII, 2014, p 25-31
[5] Nechifor I., Pascal C., Claudia Nechifor, 2014 - *Studies regarding the application effect of productive control techniques on improvement of Karakul lamb skins quality*, Lucrări Ştiinţifice, Seria Zootehnie, ISSN L 1454-7368, vol 60, p 76-81.
[6] Pascal C. 2019. Tehologia creșterii ovinelor și caprinelor-aplicații practice. Editura Ion Ionescu de la Brad, Iași
[7] Pascal C., 2015 – *Tratat de creștere a ovinelor și caprinelor*. Editura Ion Ionescu de la Brad Iași.
[8] Pascal C., 2011 - *Researches regarding quality of sheep skin obtained from Karakul Botosani sheep*, Biotechnology in Animal Husbandry Belgrad, *ISSN* 1450-9156, vol 27, p 1123-1131.
[9] Shoeman S.J., 1968 – *Fenotipise parameters by Karakulscaples*. M. Sc. (Agr) verh, Univ. van die OVS Bloemfontein
[10] Schoeman S.J., Albertyn J.R., 1992 – *Estimates of genetic parameters and genetic trend for fur traits in a Karakul stud flock*. S. Afr. J., Anim. Sci. 22, p 75
[11] Schoeman S.J., 1998 - *Genetic and environmental factors influencing the quality of pelt traits in Karakul sheep*. South African Journal - Anim Sci, vol 28 (3/4), p 125-139
Monitorul Oficial al României (Ordinul MADR nr. 22/20.01.2006 publicat în nr. 146 din 15.02.2006).