THE LENGTH CURLS - IMPORTANT CHARACTER IN SELECTION OF KARAKUL LAMBS

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Abstract

The purpose of this research was to reveal the optimum parameters of length curls at the Moldovan Karakul lambs and identify factors influencing this trait variability. The research was conducted on Moldavian Karakul sheep from flock of National Institute of Animal Husbandry and Veterinary Medicine from Maximovca village, Anenii Noi district, Republic of Moldova. The length of the curls has been evaluated at the evaluation marks lambs, considering the dimensions of their differentiation (according to the instructions in force) in the following categories: long curls (over 30 mm), medium (20 to 30 mm), short (12 mm to 20 mm) and very short (up to 12 mm). It was found that the length of the curls at the Moldavian Karakul lambs is in negative relationship with of the fibers length and thickness of the skin. With the shortening fibers from 12-13 mm to 4-5 mm substantially increase the weight of lambs with very long curls from 1.4% to 66.7%, or 65.3% (td = 2.4; P <0.05). The reduction of fiber length from 16-17 mm to 8.9 mm, the weight increase the share of the lambs with long curls from 8.7% to 28.8%, or with 20.1% (td = 2.8; P <0.01). With thinning skin from thickened to thin category, the share lambs with very long curls increases from 2.4 to 6.8%, or with 4.4% (td = 2.6; P <0.01). At the lambs with type of curls costal and flat has been recorded the largest share of individuals with long curls (48.5 and 44.4% respectively) and very long (9.1 and 5.6% respectively) compared with 20 8 and 1.4% respectively at the lambs with curls jacket type. With increasing silky fibers from reduced up to excellent, significantly increases the rate of lambs with very long curls from 0.8 to 4.0%, or with 3.2% (td = 2.6; P < 0.01) and those with long curls, from 4.1 to 46.6%, or with 42.5% (td = 14.2; P <0.001). With increasing strength and elasticity of curls from reduced up to excellent increase the lambs share with long curls from 1.2% to 58.5% or 57.3% (td = 22.93; P <0.001). With increasing the degree of modeling curls from suitable to excellent, increase the share of lambs with long curls from 9.4 up to 66.9%, or with 57.5% (td = 19.2; P <0.001), and those with very long curls from 0.8 to 10.2%, or with 9.4% (td = 5.3; P <0.001). Therefore, the length curls at the Moldavian Karakul lambs is in negative relationship with the length of the fibers and thickness of the skin and in positive relationship with the type of curls, the silky and gloss of the hair fibers, strength and elasticity, making it one of the most important characters of the skin that determines the modeling of curls, skin value and lambs class at the evaluation marks.

Key words*:* curls length, Karakul lambs, quality, skin

INTRODUCTION

Elaboration the first base of curls classification at the lambs for skins have been initiated at the end of the XIX century by Тихомиров В.А. [24], Петров Н.В. [21] and Синицын И.В. [22, 23] for race Socoliskaia and Reşetilovka from Ukraina. Subsequently, the beginning twentieth century, this classification has been transposed at the Karakul race, by Иванаев И. [13], Демянко В.А. [8], Иванов М.Ф. [14].

Further, elaboration of scientific bases of assessment and classification of curls has been developed between 1925-1935 years by researchers of Experimental Station for Karakul breeding from Katakurgan (Петров В.А., Арапов П.В., Одинцова Е.П. et al.), cited by Дъячков И.Н. [12], and the chair collective of sheep of Animal Husbandry Institute from Moscow headed by prof. Иванов М.Ф. [15, 16]. In based on researches of these authors and profile

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institutions have been elaborated firsts instructions of evaluation Karakul lambs improve principles and first standards (ГОСТ) for Karakul skin.

Mentioned that, at the time, at the base of assessing curls stood types of loops (wave, beans, peas, rings, etc.) and their differentiated size (width) in three dimensions: large, medium, small. About the curls length in those instructions did not specify anything. Subsequently, prof. Васин Б.Н. [3] of the Fur Institute from Moscow, researchers of Union Institute of Scientific Research for Karakul Breeding from Samarkand Дъячков И.Н., Писменная Р.Т. [10, 11], Кузнецов Б.А. [20] at all, have drew attention to the length of the curls as one of the most important characters that characterize their value, elaborating parameters for differentiating curls after length, which were been included in the instructions of official evaluation [17, 18] and the official standards of sorting Karakuls skin [5-7].

According to the comunication of Дъячков И.Н., Шаптаков С.Э., 1971 [9], the curls length is determined hereditary. In the experiments conducted, from the ewes with long curls type jacket, seeded with rams with long curls, were been obtained in descendents lambs with long curls in a proportion of 48.7%, from the similar ewes with flat curls type were been obtained also 52.6% of lambs and sheep with curls costal type were 60.3% of lambs with long curls, from the similar ewes with flat curls type were been obtained 52.6%, also lamb, and from the ewes with costal curls type were been obtained 60.3% of lambs with long curls.

Other researchers [4, 12-19] have shown that the length of curls is in relation with type of curls, size of curl, length of the fibers and finally determined evaluation class of lamb.

However, Кошевой М.А. 1975 [19], mentioned that "*until now not given an explicit answer to the question - what is the optimal length curls for obtaining superior leather aprons „Jachet I" şi „Kirpuk".*

In this context, revealing the optimum parameters of length curls at the Moldavian Karakul lambs and identify factors influencing the variability of this character, presents an actual problem.

MATERIALS AND METHODS

The research was conducted on Moldavian Karakul sheep from flock of National Institute of Animal Hundsbadry and Veterinary Medicine from Maximovca village, Anenii Noi district, Republic of Moldova. Have been investigated length curl that represent the distance between the beginning and end of the linear arrangement of the fibers forming the curl itself (fig. 1).

On the surface of the main parts of the lamb met long curls arranged so in a straight line (a), a semicircle (b), a sinusoid (c), as well as in other forms. In the research purposes at the some lambs, length curls where form letters (a) was measured using a ruler, where the shape of letter (b) - the curbometre, and where the shape of letter c) - a lace superimposed on curl in the form of arrangement superimposed on them, then lay a ruler and measured to the millimeter Measurements were carried out in several regions of the skin. The evaluation marks mass of lambs, curls length was assessed visually, image the curl lying on a straight line. According to the Guidelines of evaluation sheep Karakul with principles for improvement in force [2], the curls by length were differentiated in the following categories: *long* curls (over 30 mm), *medium* (20 to 30 mm), *short* (12 mm to 20 mm) and *very short* (up to 12 mm).

The length over 12 mm, regularly, had the waves and furrows ridges. The dimension up to 12 mm size was characteristic for curls type bob, floral ridge, peas etc.

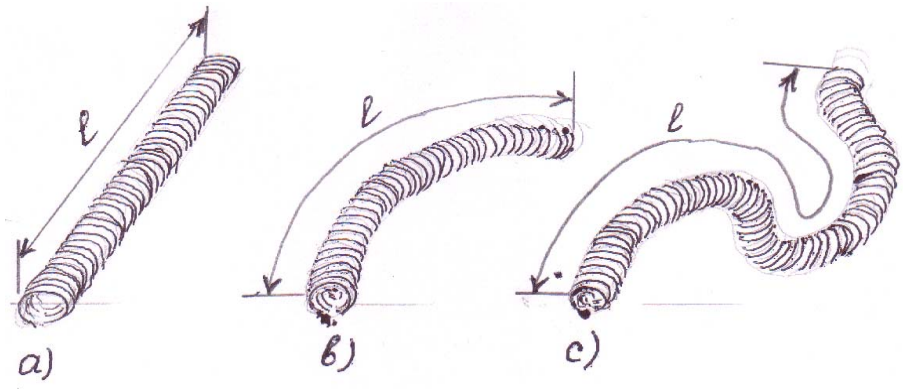

Fig. 1 The length of the curl and their linear arrangement

In evaluation marks practice at the some lambs of elite class met curls longer than 50 mm - *very long* (V. long), named by the breeders the whip sheep. *Long* and *very long* curls, at the evaluation marks were appreciated by 8-10 points. In cases where the length of the curls on the main regions (rump, back) of the skin is about 30 mm or slightly exceed this size, the curls were been appreciated with 8 points. In cases where the length of the curls was about 40-50 mm, were been appreciated with 9 points. If the curls length exceeded 50 mm, this character is appreciated with 10 points. Have been met great length curls, which were arranged uninterrupted from one side of the lamb back up on the other side, rising to abdomen. These curls were, of course, the most valuable, characteristic for high quality skin.

Medium curls with a length of 20-30 mm, at the evaluation marks, have been appreciated with 5-7 points.

The 5 mark has been attributed to the curls length of about 20 mm, the 6 mark given curls length of about 25 mm and 7 mark applies curls length of 29-30mm.

Short loops with a length of 12 to 20 mm, at the evaluation marks has been appreciated with 3-4 points.

Very short curls have been ppreciated by only 1-2 points and lambs were been reformed to meat increase.

In assessing the length of the curls, overall, on the skin, was taken into account and the area occupied with curls of different lengths. This area was been determined visually at the evaluation marks.

RESULTS AND DISCUSSIONS

Our researches [1] has shown that the curls length, usually, is not smooth on the body regions of lamb. The longer curls met predominantly rump and back, then on the sides. If on the first regions, curls could be long, then of the sides these were middle long or short. They met lambs, which had long loops the entire skin. These lambs, of course, were the most valuable. There were lambs, which could have on the entire body surface curls medium only or short only.

The curl length is determined and influenced by many factors, both hereditary and environmental. This appropriation genotypic and phenotypic correlation is both positive and negative, with a string of lamb morph-productive character and also of their parents. As one of the most important qualities selection of Karakul lamb. Knowing the specifics of these correlative links with other qualities presents a primordial problem.

We found that the length of the curl is negatively correlated with the length of the fibers (Tab. 1). The longer curls are found at the lambs with very short and short fibers (6-7 and 8-9 mm). Share lambs with long and very long curls, in these batches, 39.0 and, respectively, 42.5%.

Individuals rates with short curls, in these lots, is insignificant and is only 6.8 - 6.1%. The under medium lambs fibers (10 -11 mm), medium (12-13 mm) there is a substantial proportion (58.7% and 61.9%) of individuals with medium length curls, followed by a second weight of lambs with long and very long curls, constituting 29.3, respectively 22.6%.

Table 1 The curls length at the Moldavian Karakul lambs depending on the length of the fibers

Length of the fibres, mm	N	Including the length of the curls									
		V. long		V. long		V. long		V. long		V. long	
		head	%	head	%	head	%	head	%	head	%
16-17	23	-	-	2	8.7	10	43.5	6	26.1	5	21.7
14-15	58	-	-	14	24.1	31	53.5	11	19.0	2	3.4
12-13	147	2	1.4	31	21.1	91	61.9	23	15.6	-	-
10-11	189	7	3.7	48	25.4	111	58.7	23	12.2	-	-
8-9	146	20	13.7	42	28.8	75	51.4	9	6.1	-	-
6-7	59	17	28.8	6	10.2	32	54.2	4	6.8	-	-
4-5	3	2	66.7	1	33.3	-	-	-	-	-	-

The lambs with short curl, in these batches, occupy an insignificant share and constituted 12.2 and, respectively, 15.6%. It was found that, with the shortening of the fibers from 4-5 mm to 12-13 mm substantially increase the weight of lambs with very long curls from 1.0 to 66.7%, or 65.3% (t_d = 2 4; P <0.05). The reduction of fiber length from 16-17 mm to 8.9 mm, increase the lambs share with long curls from 8.7% to 28.8%, or 20.1% (td = 2.8; P <0.01). However, with increasing fibers length from 8-9 mm to 16-17 mm, significantly increases the weight of lambs with short curls from 6.1 to 26.1%, or 20.0% (td = 2.1; P <0.05).

With the increase in fibers length from 14-15 mm to 16-17 mm, at the Karakul lambs reduce summary rate of individuals with long and medium length curls from 77.6% to 42.5%, and at the same time increase share of lamb with short and very short curls, from 22.4% to 47.8%.

The length of the curl is conditioned by the curls type of lamb. The longest curls meet at the lambs with rib type of curl, flat and jacket (Tab. 2).

In the batch of lambs with costal curls type have been found the greatest share of lambs with very long curl (9.1%) and long (48.5%), followed by 36.4% for lambs with middle curl and only 6.0% of lambs with short curl. Share lambs with long and very long curl in this batch was 57.6%.

Table 2 The curls length at the Moldavian Karakul lambs depending on the curs type

Type of curls	N	Including the length of the curls									
		V. long		Long		Medium		Short		V. short	
		head	%	head	%	head	%	head	%	head	%
Jachet	427	6	1.4	89	20.8	327	76.6	5	1.2	-	-
Costal	213	21	9.1	112	48.5	84	36.4	14	6.0	-	-
Flat	126	7	5.6	56	44.4	59	46.8	4	3.2	-	-
Kaukazian	198	-	-	-	-	25	12.6	166	83.9	7	3.5

In the batch of lambs flat curl type, the share of individuals with long and very long curls was 50.0%. The lambs with jacket curl type were in their overwhelming majority, middle and curls length. The share of individuals with middle curl, in this batch - 76.6%, and those with long curls - 20.8%. The shorter curls are found at the lambs with Kaukasian curls type. In these lambs batch prevails share individuals with short and very short curls (87.4%).

The length of the curl depends on the density and thickness on the skin (Tab. 3). It was found that at the lambs with middle and thin thick skin there is a higher share of individuals with very long curls, long and medium long.

Table 3 The curls length at the Moldavian Karakul lambs depending on thickness of skin

The skin thickness	N	The length of the curls									
		V. long		Long		Medium		Short		V. short	
		head	%	head	%	head	%	head	%	head	%
Thin	353	24	6.8	64	18.1	189	53.5	64	18.1	2	0.5
Medium	427	16	3.7	121	28.3	210	49.2	78	18.3	2	0.5
Thickened	206	5	2.4	70	34.0	88	42.7	38	18.5	5	2.4
Thick	26	-	-	1	3.8	14	53.8	8	30.8	3	11.6

At the lambs with thickened skin, length curls is shorter, but at those with thick skin - much shorter. Thus, at the lambs with thin skin, the share lambs with very long curls, long and medium long constitute 81.4%, including very long curls - 6.8%. In the batch of lambs with thickens middle skin, share of individuals with very long curls, long and medium long constituted 81.2%, including very long curls - 3.7%. In the batch of lambs with thickens middle skin, the share of individuals with very long curls, long and medium long decrease to 79.1, including curls very long - up to 2.4%. Among the lambs with thick skin there is observed a sudden decrease of share lambs with long curls up to 3.8%, and a substantial increase of individuals share with short and very short curls, up to 42.4%. With thinning skin from the thin to thickened category, the share of lambs with very long curls increases from 2.4 to 6.8%, or with 4.4% (td = 2.6; P <0.01).

Therefore, we find that the length of the curls at the Moldavian Karakul lambs is in negative relationship with thickness of the skin.

The length of the curls is conditioned by gloss coating and silky of follicle cover, by body weight of lamb. The longer curls meet at the lambs with thin skin, middle and dense with silky follicle coating and intensively gloss with body weight values ranging from 4.5 to 5.2 kg.

The longer curls are found at the lambs with excellent and suitable silky (Tab. 4).

In the batch of lambs with excellent silky, over 50% of lambs have long curls (46.6%) and very long (4.0%) and 44.0% of individuals have long middle curls.

Table 4 Size of the curls in Moldavian Karakul lambs as influenced by fur silkiness

Silky	N	Including the length of the curls									
		V. long		V. long		V. long		V. long		V. long	
		head	%	head	%	head	%	head	%	head	%
Excellent	429	17	4.0	200	46.6	189	44.0	23	5.4	-	-
Suitable	425	13	3.1	55	12.9	278	65.4	76	17.9	3	0.7
Reduced	123	1	0.8	5	4.1	25	20.3	89	72.4	3	2.4
Insufficiency	4	-	-	-	-	-	-	2	50.0	2	50.0

The lambs with shorter curls in this batch, occupies an insignificant share, constituting only 5.4%. The lambs with suitable silky have mostly (65.4%), medium length curls, long and very long (16.0%) and short (17.9%). In the batch of lambs with reduced silky prevails those with short curls (72.4%). In this batch there is, also, individuals with very short curls (2.4%). The share lambs with long and medium curls, in this batch, is by 3.1 - 3.2 times less than the in the batch with suitable silky. The lambs with insufficient silky possess, usually, equally short curls (50%) and very short (50%). With increasing the degree of fibers silky from low up to excellent, significantly increases the rate of lambs with very long curls from 0.8 to 4.0%, or 3.2% (td = 2.6; P<0.01) and those with long curls, from 4.1 to 46.6%, or 42.5% (td = 14.2; P <0.001). The length of the curls is related to their elasticity and strength (Tab. 5).

Table 5 The length of the curls at the Moldavian Karakul lambs depending on the their strength and elasticity

Strength and elasticity	N	Including the length of the curls									
		V. long		V. long		V. long		V. long		V. long	
		head	%	head	%	head	%	head	%	head	%
Excellent	444	22	5.0	260	58.5	155	34.9	7	1.6	-	-
Suitable	381	-	-	49	12.9	279	73.2	52	13.6	1	0.3
Reduced	168	-	-	2	1.2	42	25.0	120	71.4	4	2.4
Insufficiency	3	-	-	-	-	-	-	1	33.3	2	66.7

It was found that the curls with resistance and excellent elasticity in most size are long and very long (63.5%), those with appropriate resistance were mostly middle-length (73.2%). The curls with reduced resistance are mostly short in length (71.4%), but those with insufficient usually have very short length (66.7%) and short (33.3%). From the presented data is observed that with increasing strength and elastic curls from low up to excellent, increase the share of lambs with long curls from 1.2% to 58.5% or 57.3% (td=22.9; P<0.001). However, with decreasing the degree of strength and elasticity of curls from excellent to low, the share lambs with short curls increase from 1.6 to 71.4% or 69.8% (td = 19.66; P <0.001). The lambs with insufficient strength and elasticity of the curls are, mostly, very short curls (66.7%) and short (33.3%). Therefore, between the strength and elasticity of the curls, and their length there is a positive correlation, which also show that with as the strength and the elasticity of the curls is better, with that the curls are longer, so the quality of the skin lambs are valuable.

The curls length at the Moldavian Karakul lambs depending on the modeling curls (Tab. 6). The research data demonstrate that long and very long curls form a modeling the much better than medium curls, short and very short. In the batch of lambs with excellent shaping curls has been recorded the highest share of lambs with long curls (66.9%) and very long (10.2%).

Table 6 The curls length at the Moldavian Karakul lambs depending on the modeling curls

Modeling	N	Lungimea buclelor									
		V. long		Long		Medium		Short		V. short	
		cap	%	cap	%	cap	%	cap	%	cap	%
Excellent	305	31	10.2	204	66.9	70	22.9	-	-	-	-
Suitable	500	4	0.8	47	9.4	411	82.2	38	7.6	-	-
Reduced	153	-	-	-	-	13	8.5	138	90.2	2	1.3
Insufficiency	23	-	-	-	-	1	4.3	14	60.9	8	34.8

In the batch of lambs with suitable modeling of curls prevails individuals with medium long curls (82.2%). In the batch of lambs with poor modeling of curls, the overwhelming majority of individuals have short curls (90.2%), but lambs with insufficient modeling of curls have mostly short curls (60.9%) and very short (34.8%).

We have found that, with as the curls are longer, the modeling they form a better, with that these formed a better modeling more expressive and so skin value is higher. Thus, with increasing the degree of modeling curls from suitable to excellent, with long curls increase the share of lambs from 9.4 up to 66.9%, or with 57.5% (td = 19.2; P <0.001), and those with very long curls from 0.8 to 10.2%, or 9.4% (td = 5.3; P <0.001). At the same time, by decreasing the degree of modeling of curls from the suitable to the insufficient, decrease the rate of lambs with medium long curls from 82.2 to 4.3%, or with 77.9% (td = 16.7; P <0.001).

Therefore, between modeling of curls and their length there is a positive correlation, that showing that with as the modeling curls is better, with that curls are longer, so the skin qualities of lambs are more valuable.

Knowing these phenotypic correlations links of curls length with other characters and qualities of skin allow orientation of the selection process of flock towards improving

the curls length lambs. Selection for breeding over several generations, of lamb with long curls will ameliorate the type of Karakul sheep with long curl.

According to standards in force at the skin sorting and lambs classification in sorts and upper classes, one of the mandatory requirements is the existence in the first place, the long and medium long curls.

Therefore, the length curl is tracked by the selectors as one of the most important character qualities that characterizing the curls and karakul value skin.

CONCLUSIONS

1. The length of the curls at the Moldavian Karakul lambs is one of the most important characters of the skin, that determines modeling and value of the skin and the lambs class at the evaluation marks.

2. The length curls at the Moldavian Karakul lambs is in positive relation to the type of curls, silky and gloss of hair fibers, curls strength and elasticity, as well as with their modeling.

3. However, the length of curls is in negative relationship with length of the fibers and thickness of the skin. Knowing these correlative links of the curls length is important in guiding the selection process towards improving the skin quality of Karakul lambs.

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