

GENEALOGICAL STRUCTURE OF MOLDOVAN KARAKUL TYPE SHEEP

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Abstract

The purpose of this research was to study the genealogical structure and characterization of elite lines of basic herd of sheep Moldovan Karakul type. The research has been done on Karakul sheep from Experimental Section of the National Institute of Animal Husbandry and Veterinary Medicine, Maximovca, from Anenii Noi district. The qualitative assessment of lamb's skins was performed using evaluation methods in the second day after birth, according to the available Instructions on evaluation of Karakul sheep. Elite genealogical lines were created through stringent selection of rams that were founders and followers of the line. The main objectives common to all genealogical lines were: typical exterior of the Karakul race, high body mass at all stages of assessment, according to criteria for the type requested, high milk production of rams mothers line significantly higher than the average herd. The specific objectives were: black line - excellent qualities of the skin, black colour and intense pigmentation; greyish line - medium or dark shade light greyish colour, with an excellent uniformity of staining required or appropriate; gray colour line - excellent gray colour and suitable expressed staining required. As a result of research and selection work has improved the genetics of herd type of Moldovan Karakul sheep, which resulted in forming a genealogical structure of three elite lines, differentiated by colour: black line Corpulent 7094, greyish line Delicat 2049 and gray line Buhar 7001. Each of these lines have common characteristics of selected characters, mainly, on the development of significant weight of the rams at birth 5.5 to 6.8 kg, at 6 months 40-47 kg and at 18 months 70-83 kg, an increased milk production of mothers founders and followers within 80-180 kg per lactation, the weight of lambs was increased in descendants elite and class I (80.8 to 86.8%) and also some specific characteristics of curls, particularly related to colour and colouring follicle sheath, such as blue marble - at the greyish colour, and gold, bronze and diamonds - at the gray colour. The proportion of the animals of each elite lines is quite significant genealogical distributed in the structure of the herd (20.5 to 37.4 %), which provides over a relatively long period, an increase effect in independent pure breeding- this way reducing the high risk of inbreeding.

Key words: genealogical lines, Karakul rams, sheep types.

INTRODUCTION

In husbandry breeding at creation of new races, types intraracial, a special importance shall be given to the construction of the genealogical structure of the population, in particular at the stage of genetic typing and consolidation of the main characters and many of its qualities by means of increase in pure race-based lines and families (Борисенко, 1967). The structure problems of Karakul race, breed type, genealogical, flock (population) were described in the works of a string of researchers both classics of traditional from geographical regions with tradition in breeding this race (Гигинейшвили, 1976; Дьячков, 1980; Иванов, 1964; Кошевой, 1975; Юдин, 1943), as well as in other regions, relatively new

(Adametz, 1927; Pecuta, 1938; Ле Ру Дж, 1975; Нел Дж, 1975), which was extended this world wide unique race.

For example, Иванов М.Ф., 1964, noted that increasing the sheep in the genealogical lines is important in establishing qualitative traits in progeny and subsequent application of crossbreeding to avoid negative impact of inbreeding. Researcher Дьячков И. Н., 1980, in describing the principles and methods of creating lines and new populations of sheep Karakul told that for new bloodlines, and those with common origin is characteristic a common provenience of elite interlinear, but last ones differ from first through a uniformity (typification) of morpho-productive characters and a constant transmission of hereditary descent. To create a new type of sheep Karakul

of Surhandaria, Гигинейшвили Н.С., 1976, started the selection with the creation of two genealogical lines of the elite on the basis of two remarkable Rams Halbai-4733 and Al-baş-22. Subsequently, selecting stew, grandchildren and great-grandchildren were created a string of other elite lines under this type.

In the breeding farm "Ulus" (Uzbekistan), Кошевой М.А., 1975, has consolidated a genetically population of black sheep with population over 20,0 thousand list, creating 6 genealogical lines of elite with different specific curls particularities.

According to information of Ле Ру Дж. П., 1975, as a result of the work of perennial selection and testing the Rams after their descent into the herd of sheep Karakul of the Experimental Station Neidam, Namibia (South Africa-West) was built upon the structure of the genealogical line of elite 4, which differed by some features of modelling, fibers drawing of the type and form of the curls, with the average body weight of lambs at birth 4.05 - 4.28 kg. Referring to the same flock, Дж Нел. А., 1975, mentions, that the sheep population of Neidam has a predominantly genetic impact (52%) of the genealogical structure of the race (African Karakul intraracial type) as a whole, because of the pressure for improvements carried out by providing breeding rams from elite genealogical lines obtained with inbreeding moderated after Rait (3.51-3.59%).

In the former Bessarabia, early research on the structure of a flock of sheep Karakul were undertaken (under the auspices of prof. A. Cardaş, director of the laboratory of Animal Husbandry of the Faculty of Agricultural Sciences in Chisinau) by agricultural-engineer Pecuta N., 1938, which has conducted an analysis of hereditary cattery „Onițcani-Synadino”, founded in 1883 by the importing a pure-bred of Karakul animals from the Emirate of Bukhara in 445 females and 22 males, at which, in the years 1928-1936, were imported from the farm 3 rams from Zootechnical Institute in Halle (Germany) and 1 ram from Farm of prof. Adametz, Vienna, Austria. In the structure genealogical of the flock, the author of the differentiated 4 lines of rams ("groups of families" according to the phrase of agronom Pecuta N.) the transmission characteristically with a "faithful" of one or more characters of

their offspring. For example: the rams from line A to transmit well through heredity character extension of curls; B-line specific to shine; C-line for shape and type of curls; D-line for the resistance and elasticity of loops; line E-the grade of closing of the curls. The author concludes that "The structure of the herd or flock of sheep in recent years provide a visible progress in improving the productive qualities of animals. From this flock of Karakul sheep were exported in southern France, Bulgaria, Algeria and Portugal, which were acclimatized very well".

In Republic of Moldova, research and selection work on the construction of genealogical structure of Karakul sheep populations were performed Ильев Ф.И., 1957; Iliev Theodor V., 1992; Богданович Н.И., 1957; Богданович Н.И. et al., 1983; Бузу И.А. et al., 1989. Further research and multiannual work of selection and genetic improvement of Karakul sheep (Buzu I., 1997, 2012) have been successfully completed, creating a new type of Moldavian Karakul sheep, approved by the State Commission of the Ministry Agriculture and Food Industry (Order no. 238 of 29.12.2007) and recognized by the State Agency for Intellectual Property like an invention (selection achievement) in animals (patent MD 3825 G2 2009.02.28).

In this context, the aim of this work was analyze of the structure genealogical and characterization of elite lines of basic herd of sheep type Moldovan Karakul.

MATERIALS AND METHODS

The researches have been conducted on Karakul sheep in the household of the Experimental Section of the National Institute of Animal Husbandry and Veterinary Medicine, Maximovca, Anenii Noi district. The assessing of skin qualities of the lambs was carried out by evaluation the day after the birth, according to the Instructions of evaluation with principles of sheep Karakul breeding in the Republic of Moldova (Buzu I. et al., 1996), with subsequent amendments and additions (Buzu I., 2012). Elite genealogical lines were created by exigent selection of rams both founders and followers of the line. To do this, from the annual generations of ram lambs,

destined at evaluation for breeding, were selected the most valuable individuals after its phenotypic characters and after the parents, being included in batch of the young rams in testing after descent qualities through biometric method of score (Buzu I., 2014). The creation of the genealogical line of elite was taken in consideration of the purpose and the targets so common to all lines, as well as specific to each line individually.

The main objectives were:

- to create black line: exterior the typical for the Karakul race, higher body weight at all stages of assessment, according to the criteria of the type requested, excellent qualities skin, black and intense pigmentation, mother's milk production significantly greater than the average of the flock;

- to create greyish line: exterior the typical for the Karakul race, higher body weight at all stages of assessment, according to the criteria of the type requested, excellent or appropriate qualities skin, greyish colour medium or dark shade, the staining required (blue, marble, pearl, silver, gray) with excellent uniformity or suitable, mother's milk production significantly greater than the average flock;

-to create gray the colour line: exterior the typical for the Karakul race, higher body weight at all stages of assessment, according to the criteria of the type requested, excellent qualities skin, excellent colour and suitable expression, staining required (gold, silver, diamond, bronze), the mother's milk production significantly greater than the average flock with certainty at least one threshold of the theory of probability forecasts without error ($P < 0.05$);

The data obtained were statistically processed experiences using computer software "STATISTICS - 6" and appreciated their certainty, according to the statistics, recent various methods, after methods of Плохинский H. A., 1969.

RESULTS AND DISCUSSIONS

At the early stages of creation of a new type of sheep have been using a number of different enhancers rams genealogical lines of Asian origin from various breeding farms, as they were: „Karnab", „Kenimeh" „Gagarin", „Nurata" and others. Following, in the flock

were breeding rams own use including with half breed origin, which correspond to the standard-purpose type requested.

Since 1997, of the many genealogical lines and their ramifications, exiting in herds, have been identified three lines of perspective that works have been carried out by the creation and consolidation of the new lines of their own breeding sheep. As the founders, were elected 3-copulent breeding rams, top-ranking elite, with curls type requested: jacket, costal and flat and increased milk production of mothers. Productive characters and hints of the outside of the line of the high and meet the demands were made of breeders.

For foundation lines were selected by breeders rams exterior features well manifested and typical Karakul race and also so as founders and the successors of lines were preferred hornless rams (polled) or with small horns, rudimentary.

The black line Corpulent 7094. Founder of the ram line was selected without horns, with the identification 7094, with black pigmented intensive elite class, with costal type curls. Body weight of this ram, 2.5 years of age was 100 kg (Figure1).



Figure 1. Ram founder of the black line Corpulent 7094

During the use of this ram within 4 years were obtained 146 lambs, from which 131 heads the elite class I (Table 1), being regarded as having the qualities of descent, breeder of grade I and grade II. In the period 1999-2000, as followers of this line, were selected sons of founder, the rams with identification 9206 (Figure 2) and 0230 (Figure 3).

Table 1. Characteristics progeny obtained of black line Corpolent7094

Ser. No.	Regist number	Year of birth	Class, type of curls	Name of kinship	Year of test	N	Incl. elite+class I		Value of breed
							heads	%	
1	7094	1995	El. costal	Founder	1997	146	131	89.7	<i>II gr. br</i> ***
2	9206	1999	El. jacket	Son	2001	29	25	85.2	<i>Ord. br</i> **
3	0230	2000	El. jacket	Son	2002	28	27	96.4	<i>Rel. br</i> *
4	1226	2001	El. flat	Son	2005	219	181	82.6	<i>Rel. br</i> *
5	1129	2001	El. jacket	Nephew t	2005	131	116	88.5	<i>I gr. br</i> ****
Total per line				1998 - 2005		553	480	86.8±1.4	$t_d=6.15$
Total perflock				1998 - 2005		2809	2160	76.9±0.8	$P<0.001$

Remark: *Rel. br** – breeder relatively; *Ord. br*** – ordinary breeder; *II gr. br**** – second degree breeder; *I gr. br***** – first degree breeder.



Figure 2. Son nr. 9206 follower of the Figure 3. Son nr. 0230 follower of the black line 7094 black line 7094

Table 2. Feature progeny obtained from greyish line Delicat 2049

Ser. No	Regist number	Year of birth	Class, type of curls, coloration	Name of kinship	Year of test	N	Incl. el.+class I		Value
							heads	%	
1	2049	1995	El. gr. bluish	Founder.	1997	263	208	79.1	<i>II gr. br</i>
2	9085	1999	El. gr. marble	Son	2004	140	105	75.0	<i>Ord. br</i>
3	0286	2000	El. gr. bluish	Son	2005	187	157	84.0	<i>Ord. br</i>
4	1237	2001	El. gr. bluish	Son	2005	185	161	87.0	<i>Ord. br</i>
5	2127	2002	El.cost. marble	Nephew	2005	130	116	89.2	<i>Ord. br</i>
Total per line				1998-2005		905	747	82.5±1.3	$t_d=3.66$
Total per flock				1998-2005		2809	2160	76.9±0.8	$P<0.001$



Figure 4. Ram founder of greyish line Delicat 2049

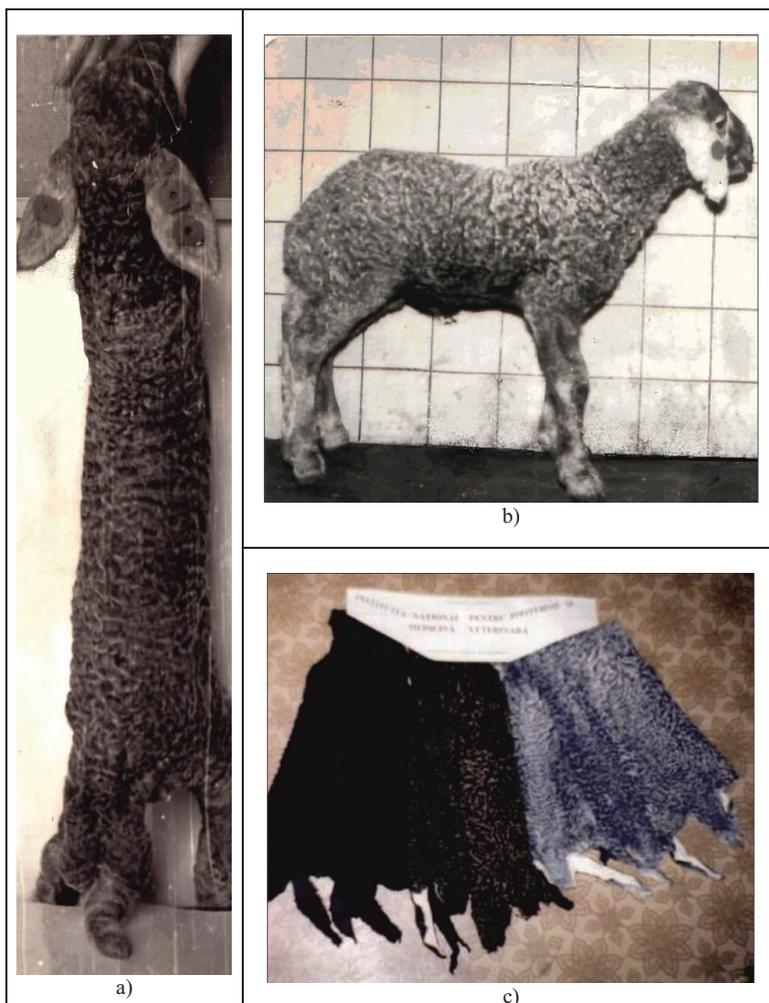


Figure 5. Moldovan Karakul lambs from greyish line Delicat 2049 a) Lamb 9085 greyish-marble; b) Lamb 0286 greyish-bluish; c) lambskin greyish-bluish to the right.

Table 3. Feature of progeny obtained from grey line Buhar 7001

Ser. No	Regist number	Year of birth	Class, type of curls, coloration	Name of kinship	Year of test	N	Including elite+class I		Value
							head	%	
1	7001	1997	Elite flat grey	Founder	1999	196	156	79.6	<i>II gr. br</i>
2	0285	2000	Elita flat diamont	Son	2001	44	36	81.8	<i>I gr. br</i>
3	0130	2000	Elite jacket grey	Son	2002	44	38	86.4	<i>I gr. br</i>
4	0267	2000	Elite flat grey	Son	2003	74	56	75.7	Neutral
5	1054	2001	Elite costal grey	Son	2003	54	44	81.5	<i>Ord. br.</i>
6	2501	2002	Elite flat grey	Nephew	2005	41	36	87.8	Neutral
7	2500	2002	Elite flat grey	Nephew	2005	47	38	80.8	<i>Ord. br.</i>
Total per line					1999-2005	500	404	80.8±1.8	$t_3=2.62$
Total per flock					1999-2005	2421	1826	75.4±0.9	P<0.01

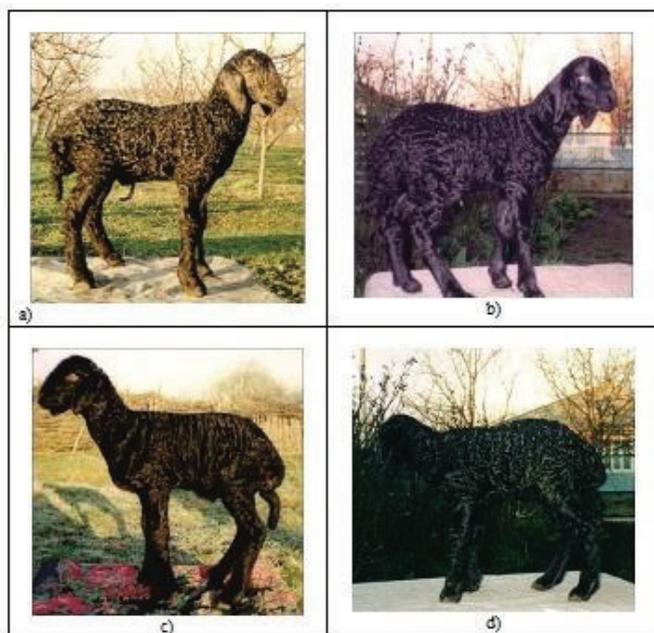


Figure 8. Moldovan Karakul lambs from genealogical line grey Buhar 7001

Table 4. Milk production of mothers and daughters of rams from Buhar 7001 line

Ser. No	Regist. number of ram	Year of birth	Name of kinship	Milk production		
				mother, kg	daughters of ram	
					N	M \pm m, kg
1	7001	1997	Founder	180	28	79.4 \pm 3.7
2	0285	2000	Son	125	15	78.3 \pm 4.2
3	0130	2000	Son	80	12	74.5 \pm 2.8
4	0267	2000	Son	81	11	80.4 \pm 5.1
5	1054	2001	Son	84	-	-
Total per line				110.0 \pm 24	66	78.4 \pm 4.6 ($t_d = 2.2$; $P < 0.05$)
Total per flock					267	67.6 \pm 2.0

They, as the founder, were the elite class, with curls type requested. The curls were very long and wonderfully shaped. The fibers had a great silky and luster. After the exterior, these rams were black-intense, hornless, well developed, with characters well cast for new Karakul type breed. The mother of the first ram, sheep nr.1257, had an increased productivity of milk, for 116 kg, during the whole lactation. The result of the testing after these lads progeny qualities were appreciated as soil improvers. The share of elite and class I lambs in their descent was 85.2 – 96.4%.

In 2001, from the progeny, as followers, 2 rams were selected, among which-the son, with the

identification 1226, and the grandson of the founder, with the identification 1129. On new type approval Moldovian Karakul sheep, these rams (no.1226 and no.1129) were alive and active in the flock. Both rams had the qualities of excellent lambskin and black colour-intense. On the surface of their lambskin were large and very long curls, which formed a drawing of concentric parallel, the type of fibers was silky excellent and high-gloss.

After pace of development body, both rams were precocious. For example, son nr. 1226 at the age of 6 months have body mass 46 kg, at 1.5 years - 80 kg, and adulthood (2.5 years) body weight has reached the level of 103 kg. From this ram have been obtained 219 lambs,

including 181 heads, or 82.6%, descendants elite and I class. From the founder's grandson, with the registration 1129, were obtained from 131 lambs, of which 88.5% - higher ranking (elite and class I).

Black line on average, since 1998, the male line, followers was obtained a total of 553, including descendants 480 of descendants elite and class I. Average rate of lambs seek, high ranking (first class and elite), the black line is 86.8 ± 1.4 %, which significantly exceeds the average flock with 9.9 % ($P < 0.001$).

Selection works with this line continued to the date of approval of the new type of sheep. Then, in the flock were select 3 grandchildren followers line-class elite young rams, nr. 5366 and nr. 5337, which have been using the service since the age of 18 months, and grandson with the registration 7248, elite class, with curls flat-type, was included in the test after their descent from the age of 6 months.

In the structure of the herd or flock, the sheep share the full-bodied 7094 constitutes 34.7%.

The greyish line Delicat 2049. Based on this line of the ram founder registration 2049, greyish colour, blue coloration (*Figure 4*). The rams founder was of elite class and has a close jacket type curls. The body conformation was smooth and specifies where the name appeared Delicat. Characters exterior of the ram were typical Karakul for the race. It was rather corpulent and hornless, have robust constitution. Body weight, at age of 2.5 years, was 100 kg. Since 1997, was tested after the quality of descent, and recognized by multiple times as a breeder (*Table 2*).

From the founder of the line have been obtained a total of 263 lambs, including 208 thousand elite and first class.

The qualities of lambskin of the progeny were excellent (*Figure 5*), coloration marble and bluish. On average, the period of use at this breeding ram lambs share of elite and first class called type was 79.1%. According to the results obtained in the test, after the qualities of descent, was praised as a valuable and awarded in the category of breeder second grade.

In 1999, the progeny of the founder's story has been selected son-follower line with registration 9085 (*Figure 5, point a*). He, like his father, was greyish in colour and possesses the requested colour-marble with excellent

uniformity, silkiness and fibre-excellent gloss. After ranking elite class, was the size of large curls with costal curls type. Black and white fibres were very short and virtually equal, 7, and respectively 8 mm. Silkiness and gloss were excellent fibers. After the body was development of early type. At the age of 6 months had 43 kg body weight at the age of 1.5 years has reached 83 kg weight.

The body weight into adulthood was 107 kg. This ram had received a total of 140 people, including 105 descendants elite and class I. Based on the results of testing after the qualities of descent, was praised as a breeder. In 2000, the founder of the progeny was selected over a valet-line, ram works with the registration 0286 (*Figure 5, point b*). He was at birth a great body and development weighed 5.5 kg. In the autumn, at the age of 6 months had 44 kg, at the age of 1.5 years reached the weight of 73 kg and 100 kg into adulthood. This ram is greyish in colour and coloration bluish. The coloration has an excellent uniformity. On the surface of the skin were scattered tubular long and bob curls, forming an excellent drawing of parallel-concentric type. From this ram during use in breeding, have obtained 187 descendants, including 157 lambs elite and class I. Share of higher ranking lambs was at this ram 84.0%. After the test results, he was awarded the category of breeder.

In 2002, from the progeny selected for breeding as the followers of a grandson of the founder, ram nr.2127 elite class, with costal-type curls, new coloration-marble.

After the exterior parameters, comply with new type. He is a development hornless body good. On the surface of the skin, at evaluation, have been recorded in coastal and long tubular curls, which formed an excellent model of parallel-type scale. The fibers were excellent and luster silkiness. Personal development was pretty good. At the age of 6 months has reached 39 kg body weight, 1.5 years have 68 kg and adulthood had 88 kg. After testing this ram quality progeny, he was assigned to the category of breeder. Of the 130 descendants obtained, 116 were heads of elite and class I. The share of high ranking lambs was 89.2 %, which exceeded the average of the flock with 12.3 % ($P < 0.001$).

At the date of approval of the type new Moldovan Karakul, in the flock were alive and is used in breeding rams with registration 0286, 1237 and 2127. As a prospective followers, two rams were selected, grandchildren, line numbers 5205 and 5988 projects, both from the elite class and the type curls of jacket, bluish coloration, with excellent luster and silkiness. After they meet the requirements of exterior standard-aim, hornless, well developed and represents a potentially valuable genetic. According to the genealogical structure of sheep flock, Delicat line 2049 occupies a share of **31.9%**.

The grey line Buhar 7001. This line was founded on the basis of ram with the registration 7001, born in 1997. The founder was grey colour and goldish coloration, elite class and has a flat-type curls. After the development of the outer body, body weight complied with the standard-purpose. Hornless, was robust and peculiarities characteristic of the Karakul race type. After conformation and development was full bodied. At the age of 3.5 years reached 94 kg body weight. At the same time, with special colour and requested, in this line, have selected ewes with increased milk production. Thus, the mother of the founder of the line had increased milk productivity of 180 kg per lactation. In the result of the matings over many years, from this ram has been obtained 196 descendants, including 156 heads or 79,6% were elite and first class (*Table 3*).

Improvement category, obtained as a result of testing after their descent has been breeder second grade.

In the period 2000-2005, in this line, as followers, were selected for breeding 4 rams - sons grey colour, with registration numbers 0285, 0130, 0267, 1054 and 2 grandchildren rams - 2500 and 2501 (*Figure 6 and 7*).

For example, ram 0285, at birth, had body mass 6 kg, and at the age of 6 months has reached mass of 40 kg. From him was obtained 44 offspring, of which 36 heads, or 81.8 % were elite and first class. Ram with nr. 0130 elite class have curls type gray coloured jacket and goldish coloration. From this ram, yielded a total of 44 offspring, of which 38 or 86.4 % were head and elite class I. Followers of the line had traits similar to the line the founder. They had good body development and meet the

requirements of type. After breeding value, this ram was awarded the degree breeder category I.



Figure 6. Ram nr.2500, follower of grey line Buhar 7001



Figure 7. Ram nr.2501, follower of grey line Buhar 7001

The ram with the registration number 0267, in mature age, at weighing in autumn 2005, reached 99 kg body weight. From followers obtained (67 heads) from this ram, the majority, 56 cap, or 75.7%, where superior class, elite and first class.

After the qualities of descendant, this ram was recognized as the breeder of class I. In 2002, in this line, as were selected from followers growing grandchildren of the grey colour founder, with the registration number 2500 and 2501, elite class, both with flat curls type. From this rams where obtained 88 descendants, from which, 74 heads, or 84.1 % where elite and class I, to the category as breeders. Most of the lambs obtained from this lambs superior, curls very special, the follicle was shine and extremely silky. The predominant follicle sheath surface curls shaped long waves, which formed an excellent modelling concentric or parallel-scale (*Figure 8*).

The grandson of the founder, ram nr. 2500 in the breeding had the qualities of the lamb skin. After the breed value of their descendants, they classified period of use, have obtained a total of 47 descendants, of which 38 heads or 80,8 %, or elite and class I. On the time of approval

new Moldovian Karakul sheep type, both rams, no. 2500 and 2501, were alive and were used in the flock. From the progeny of ram 2500 since 2005 was selected and used in the flock for testing young ram nr. 5393 elite, with the jacket curls type, with big and long curls, with silky and excellent gloss. At birth the ram had body weight of 6.8 kg! And at the age of 6 months has reached 45 kg! At the age of 1.5 years, the ram had body weight of 70 kg. The progeny of this line, the new type-approval year of sheep, ram was selected with the registration No 7975 costal elite, which has reached the age of 6 months body weight 47 kg.

Subsequently, this ram will be tested after the qualities of descent. In the total on line Buhar 7001 were obtained 500 descendants, of which 404 heads or $80.8 \pm 1.8\%$ were elite and class I. After the share of elite and class I individuals, these descendants are significantly above average on the flock with 5.4% ($P < 0.01$).

It is worth mentioning that the ewes of this line have increased slightly more in skills milk production. For confirmation, we present below (Table 4) data about productivity of milk mothers line Buhar 7001 rams and their daughters.

From the table, we see that mothers of all rams Buhar 7001 line have increased milk yields and is on average 110.0 ± 24 kg per lactation. Followers of line, daughters also have increased milk productivity equal to 78.4 kg, which exceed the average throughout the whole flock with 16.0% ($P < 0.05$). The higher production of milk had no daughters of rams 0267, which constituted in average per lactation 80.4 ± 5.1 kg milk.

According to the data obtained, it can be concluded that the sheep in line potentially possess genetic 7001 Buhar valuable, so after the original color of the sheath of the follicle and the quality of skins, and after bodily development skills (meat production) and milk production. In the structure of the flock, the sheep grey color line Buhar 7001 share total is **20.5%**.

Most obviously, the weight of the animal genealogical lines mentioned above in the genealogy researched population structure can be viewed in the chart (Figure 9).

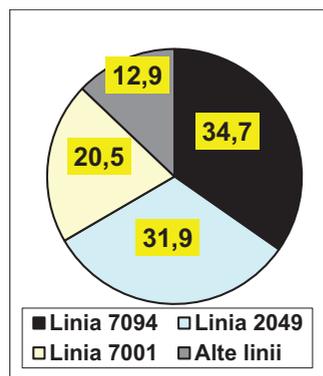


Figure 9. Share of animals in the population bloodlines

In the diagram we see that the largest share in the genealogical structure of populations occupying ancestral animals of the black line 7094 (34.7%) - and typical colour for the race traditional Karakul from all geographical regions, followed by the greyish line 2049 (31.9%) and those from the grey 7001 (20.5%). The rest of the population they occupy the other genealogical lines, showing no particular object selection.

There are multiple outcomes of external characteristics of rams founders followers of genealogical lines and elite, mention that, in addition to personal development and typical forms for most of the race, the rams were hornless (without horns), and only some individuals have had rudimentary horns.

CONCLUSIONS

Genealogy of the type structure of sheep Moldovan Karakul consists of three elite lines differentiated by colour: black line Corpolent 7094, greyish line Delicat 2049 and the grey line Buhar 7001. Each of these lines have common characteristics of selected characters, in particular, on the development of large body of rams from birth 5.5-6.8 kg, 6.0 months 40 – 47 kg, to 18 months 70-83 kg, increased milk production of mothers and followers within the limits of 80 -180 kg, the weight of the descent of lambs elite and class I ($80.8 - 86.8\%$) and, at the same time, some features of curls, and in particular, the colour and the coloration of the sheath follicles, such as: bluish, marble - the

greyish colour, and goldish, bronze, and diamond - at the grey colour.

The share of each elite line is significant enough in the genealogical structure of the flock (20.5 - 37.4%), which provides, for a long period, a relatively independent increase in breeding pure bred without applying high degrees of inbreeding.

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