

INTRARASIAL TYPE OF BIG MOLDOVAN KARAKUL SHEEP

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Abstract

The purpose of research is to create a new intraracial type of Karakul sheep, which would ensure a high productivity of fur leather, meat, milk. Was used a method of growing through cross-breeding of sheep of indigenous breed named Tsushca with those from Karakul classic breed of asian type. As a result was created a new type of sheep population named Moldavian Flesh Karakul, with a typical exterior for Karakul race, from which will be obtained 68,5-71,2% of fur leather of highest sorts with a large surface (1839 cm²). Body mass of adult rams is 89.0 - 98.5 kg, of sheep - 55.5 - 57.2 kg. Ewe's production of milk is 76,6-80 kg. Ewe's genotype is 12.5 - 25.0% share of blood of Tsushca breed and 87.5 - 75.0% of Asian Karakul breed. New type of Karakul sheep breed overcomes the classical Karakul breed mass body with 45.1%, milk production with 53.2% and fur leather surface with 31.3%. Mass of reformed sheep carcass after the fattening is 32.3 ± 1.0 kg, of 6 months lambs- 16.6 ± 0.3 kg. The slaughter benefit is respectively 54.8% and 47.5%.

Key words: Type, sheep, Karakul fur leather, meat, milk

INTRODUCTION

In Moldova there are around 800 thousand sheep, 400 thousand of which are Karakul breed, Tsushca and their metisses (Karakul x Tsushca). These sheep breeds ensure, firstofall, food security of rural population with dairy products (cheese, urda), meat and the manufacturing processes raw materials (fur leather, fur, skins, wool). The sheep use effectively to feed the natural pastures and crop residues as a result of harvesting crops. Therefore, sheepbreeding is an accessible branch, essential to the rural population. Nearly 95% of the shepherd is in individual sector, but their productivity is not high. From one sheep it is obtained annual an average of 40-45 kg milk, 7-8 kg meat, 2,0-2,2 kg wool, and 10-15 % fur leather of high quality, which is inferior to economical requests of this branch. To increase the production potential of animals is required a genetic improvement of autochton sheep breed, which is scientifically argued, taking in consideration the biological characteristics of sheep and historical traditions of our people.

MATERIALS AND METHODS

As a biological material for researches, have served the aboriginal sheep breed Tsushca, classic breed Karakul (Asian), imported from Central Asia countries (Uzbekistan, Turkmenistan) and their metisses of different generations.

Tsushca sheep breed is described by researchers [6,7,8] as animals which are easy to feed and maintain, with robust constitution, resistant body to different diseases and environments, but at the same time, with a low productivity for the mixed type of milk-fur leather-wool. The sheep body has a pear-shaped form, the head is elongate with a right profile, with horns or without horns, small ears, short and thin or long tails. The udder has a globular shape with well-developed nipples. Tsushca sheep have a good milk production which is over 100 kg per lactation. [8] Their body mass is about 42-45 kg. Their prolificity is 105-107%. Average yield of raw wool is 2,5-3,0 kg. Rams have horns twisting in a spiral with very robust members, hoof horn resistant to necrobacterioziz, and body mass of 60-65 kg. From Tsushca lambs, slaughtered at 2-3 days after birth can be obtained fur leather with low quality loops, attributed to the

assortment of "smushca". On the main regions of fur leather (buttocks, back) are separated non-valuable ring-type loops, half rings and peas, on the lateral sides overbear loops of snail type, and smoothness. The pilose covering consists of overgrown fibers, which are rough, with gloss or opaque appearance, fibers pigmentation is reduced-black, and the light grey fur leathers are mixed with white fibers.

Classic Karakul breed is famous in the world for its valuable and unique loops characteristics of lambs fur leather, slaughtered at 1-3 days after birth, this is well described by a number of notorious researchers [3,4,10]. However, pure Karakul sheep breed of import manifest in Republic of Moldova, also some negative features such as low resistance to a number of helminthous and respiratory diseases, a low potential of milk and meat production (small body mass).

In this context, our purpose was to create a new intraracial sheep type, which would combine a good quality of fur leathers loops, inherited from Karakul breed, with a high milk productivity, inherited from Tsushca race and a high body mass development (potential for meat), obtained by selection. At different stages of this type creating, various methods of research and breeding have been applied.

At the first stage (1978-1985) was implemented a method of growing through *cross breeding* of Karakul sheep breed with Tsushca, according to the following schedule (Figure. 1). To infuse gene (We) of quetsch color has been practiced heterogeneous mating of black sheep (Karakul and metise) with Tsushca rams and quetsch metisses (Karakul X Tsushca) especially selected, and the metis quetsch sheep (initially there were no quetsch Karakul sheep in the flock) with black Karakul rams. Since third-generation all metise females, with different participation rate to Karakul breed (3 / 4 and 7 / 8), and the Karakul breed sheep, were mated, in biggest part with metis rams of their own reproduction. Since 1982 imports of rams from Republic of Moldova, has been suspended. Selection works were done through the method of increasing the sheep herd "in itself". The biggest part of sheep genotypes remained 12,5% share of blood Tsushca breed and 87,5% share of Karakul breed.

In the second phase (1986-1996) were applied well-known methods of intensive selection in order to improve the characteristics of quetsch by using their breeding rams, tested after the qualities of progeny fur leather.

At the third stage (1997-2000) was practiced the targeted, progressive method of selection according to the three main characters: fur leather quality (class), body mass and milk production. At this stage we sought to maintain the quality of fur leather and milk production at the already attained sufficient level, and to increase essentially the animals body weight (meat production potential). Were selected the most burliness breeders, mostly without horns. Were set minimal limits of characters for sheep selection in weeding nucleuses: the fur leather quality - class I, body mass: rams - 85 kg, sheep - 50 kg, mutton of 18 months - 65 kg, ewe lamb - 44 kg, rams of 6 months - 35 kg, ewe lambs of 6 months - 30 kg, milk production per lactation -65 kg.

The fourth phase (2001-2005) was a *period of consolidation*, at a desirable level, of morphoproductiv characteristics in the sheep population genotype, with a well defined structure type. In the list of continuers lines were selected only tested young rams after the progeny qualities, by applying methods of immunogenetical monitoring and being confirmed as enhancers.

The qualities of lamb fur leather were examined 1-2 days after delivery by the methods indicated in the USSR Instructions (Samarkand, 1989) of Karakul lambs inventory [9] - at first stages of research and selection, using the methods developed by the authors of this work [1] - the second phase of research and selection. Milk production of sheep was assessed by control milking over the entire lactation, according to the method of T. Nica [2]. Animal body developing was determined by their individual weigh at birth, at age of 20 days, age of 60 days, 6 months, 18 months, and all adult sheep - annually before monti, at the end of October. In the warm period (May-November) sheep were brought to grazing natural meadows and lands with stubble, in the cold period (December-April) - the

stabling, feeding them with corn silage, straw and concentrates, according to zootechnical rules.

RESULTS AND DISCUSSION

During the period of about 25 years, beginning with selection and growth work of sheep sovkhos of Cotovski (Cainari district) and continuing with selection work at breeding farms of National Institute of Zootechny and Veterinary Medicine and at CAP «Agrosargal», has been created a new intraracial sheep type for fur leather-milk-meat, called by some researchers [13] as an intensive type, with special features comparing to baseline breeds. Karakul sheep of Moldovan type is characterized by uniformity of individuals appearances represented by three color varieties – black, light grey and grey.

Rams are burliness have robust constitution, an oblong head with convex profile, long ears, hanging down (drooping), long and strong neck, long and straight or

slightly convex back, long and splay goat, palm and massive tail, formed in two emphasized parts, almost reaching jarets, the top of tail is thin, forming "S" and hanging below jarets. The trunk has a cylindrical shape, with strong legs, parallel located. Requested rams type, in their majority are hornless, or with just horns rudiments, after their temperament and neuro-physiological type are milder as the asian Karakul type. Sheep are also very well developed, with robust constitution, elongate head elongate with a less convex profile, long, hanging ears, elongate neck, straight or slightly convex back, a pear-shaped trunk, and long legs. Well-developed mammary glands. All sheep are hornless.

Fur leather production

New born lambs of Moldovan Karalul type have a silky pilose coating, consisting of valuable loops that mostly correspond (over 70%), to the inventory requirements of upper classes - elite and class I (Table1).

Table 1
 Inventory lambs ratings from IZMV flock

Inventory year, specification	n	Lambs classes					
		Elite		I Class		II Class	
		head	%	head	%	head	%
2004, total	392	80	20,4	222	56,6	90	23,0
including, light grey	160	28	17,5	83	51,9	49	30,6
2005, total	362	84	23,2	191	52,8	87	24,0
including, light grey	105	16	15,2	52	49,5	37	35,3

In 2004-2005, high classes lambs share was about 76-77% in the whole flock, 20,4-23,2% of which were of the highest class (elite). Most lambs had desired loop types: jackets (tubular) - 49.6%, costal - 18.9% and flatten - 13.9%. The unwanted types – that kaukazian had only 17.5% of lambs. Lambs at birth are well developed in size of body length and height waist. Slaughtering them, is obtained fur leather mostly of highest sorts, with a big surface, which determines their

commercial value. (tab. 2). Despite the fact that to slaughtering were delivered only lambs which hadn't met the requirements for reproduction, the fur leather share of Ist sort was quite high - about 65,5-68,5%. The average usefull surface of fur leather is over 1800 cm², which exceeds with 28.6% the standard Karakul breed (1400 cm²). Under the grading standards in force, 85.5 - 90.6% of fur leather surface is large (> 1400 cm²).

Table 2
 The quality of merchandising fur leather, obtained from Karakul lambs of Moldovan type

type, fur leather sort	Period of research					
	2003		2004		2005	
	pcs	%	pcs	%	pcs.	%
Pure Karakul	125	89,9	158	90,8	146	90,1
Including: 1st sort	87	62,6	110	63,2	107	66,0
of which: jacket type	42	33,6	35	22,2	49	45,8
1st costal type	12	9,6	27	17,1	24	22,4
1st flat type	13	10,4	30	19,0	19	17,8
1st kaukazian type	20	16,0	18	11,4	15	14,0
ON THE WHOLE	139	100	174	100	162	100
Including: 1st sort	92	66,2	114	65,5	111	68,5
Fur leather average surface, cm ²	1744±25		1677±20		1839±26	
including: big >1400	126	90,6	149	85,6	143	88,3
very big >1800	50	36	60	34,5	92	56,8
medium 900 - 1400	13	9,4	25	14,4	19	11,7
small 700 - 900	-	-	-	-	-	-

* Note: Fur leather sorting was done according GOCT requirements – 8748-70, 2865-68, 11124-65 and 10327-75

There are up to 56.8% of fur leather with very large surface (> 1800 cm²). Practically there are no fur leather with small surfaces.

Milk production

Control of milk production performance, during 2003-2005 showed that Moldovan type of Karakul sheep has an increased potential of this productive character (tab. 3).

Table 3
 Milk production of Moldovan type of Karakul sheep

Year	nb	Lactation term, days	Milk production per lactation, kg
2003	119	174,2±2,7	72,4±1,3
2004	163	171,8±1,8	78,0±1,5
2005	209	157,5±1,3	77,8±1,1
Average	491	166,3±1,8	76,6±1,3

The average milk yield of sheep per lactation with an average duration of 166.3 days was 76.6 kilograms, and in the most favorable year (2004) - 78.0 ± 1.5 kg. It is important to notice that a part of sheep (40.5%) had a milk production over 80 kg per lactation. Sheep-recorder registered with no 8846 produced during 170 days - 139 kg of milk. In the lactation diagram is registered

the maximum production of milk per day at 40-45 days after lactation (in May), and then in June, it is decreasing a little bit in August, and subsequently, in September-October is suddenly diminishing. According to chemical composition (Table. 4) and physical properties, Moldovan Karakul sheep milk has a higher value compared to other sheep breeds known throughout the world [8, 11].

Table 4
 Chemical composition and physical properties of Moldovan Karakul sheep milk

Color of sheep pilose coating	n	Quantitative indicators (M±m)						
		Milk production per lactation, kg	Fat %	Total of protein, %	Casein %	Total of dry substance, %	Acidity °T	Density °A
Black	46	80,9±3,5	7,5±0,4	5,2±0,3	4,0±0,2	18,3±0,7	21,7±0,8	35,2±0,8
Light grey	37	77,9±4,5	7,8±0,4	5,6±0,3	4,3±0,3	18,8±0,5	21,2±0,9	35,0±0,5
Grey	17	95,4±5,8	7,9±0,4	5,3±0,3	4,2±0,2	18,2±0,5	21,9±0,8	33,8±0,9

Content of dry matters is on average 18,2-18,8%, exceeding average sheep species with 5,1% [11], including fat content with 14,9%. The content of dry substances varies from 16,0-17,4% - in the first half of lactation and up to 19,4-20,4%, in second half of lactation. Fats are on average 7.5 - 7.9%, with a lowest level (6,4-6,8%) in the first half of lactation and higher (8,2-9,3) in the second half. Total protein in milk is on average 5,2-5,6%, with deviations from 4,3-4,8%, in the first half of lactation and 5,6-6,4% in the second half, from which the caseins in lactating are on average 4,0-4,3%, with variation of 3,5-3,7% in the first half of

lactation and 4,4-4,9% in the second half. Average acidity per lactation is 21,2-21,9°T, the density 34,0-35,2 ° A. From Karakul sheep milk is prepared Moldovan traditional cheese, with increased content of dry nutrients and with delicious specific taste qualities.

Body development and meat production

Results of body measurements show certainly (tab. 5) that the new created type is a part of sheep population with high waist, with back height of 76.8 ± 1.8 cm for rams and 64.6 ± 0.4 cm for sheep.

Table 5
 Body measurements of Moldovan Karakul sheep, cm (M±m)

Specification	New type rams		New type sheep (N=20)	New type ewes (N=23)	Asian type sheep (N=35)
	Breeders (N=10)	Rams of 18 mths (N=4)			
Hight at the top	76,8±1,8	69,7±1,5	**64,6±0,4	60,1±0,4	61,6±0,3
Hight at the croupe	80,8±2,0	77,0±1,7	***69,9±0,7	64,7±0,5	66,9±0,5
Chest depth	37,3±0,8	34,3±3,7	***33,1±0,4	29,7±0,4	29,8±0,3
Chest width	25,3±0,8	24,7±3,7	*21,1±0,3	18,8±0,2	20,3±0,2
Chest perimeter	100,5±1,7	92,3±0,7	***86,9±0,9	77,4±0,9	77,7±0,5
Oblique length of the trunk	90,7±1,8	86,0±1,5	***81,9±0,7	76,2±0,5	65,7±0,3
Width at hips groats	20,8±0,3	17,3±0,3	19,0±0,2	15,5±0,2	-
Groat width at makloks	15,2±0,5	14,3±0,9	12,7±0,3	10,5±0,2	-
Whistle perimeter	11,3±0,2	11,3±0,3	8,3±0,1	7,8±0,1	7,9±0,2

P≤0,01; *P≤0,001

Thorax is sufficiently developed with a clear superiority of depth. Chest perimeter is 100.5 ± 1.7 cm for rams and 86.9 ± 0.9 cm for sheep. The body is rather long, at both males and females. Body length for rams is

90.7 ± 0.3 and 81.9 ± 0.7 cm for sheep. The posterior train is also well developed. Width groats at the hips for rams is 20.8 ± 0.3 cm, and for sheep - 19.0 ± 0.2 cm. Thus, Moldovan Karakul sheep is significantly

higher compared to Asian Karakul sheep on top - with 4.9% ($P \leq 0.01$), the rump - with 4.0% ($P \leq 0.01$) have a more developed and extensive thorax, and the perimeter - with 9.2 cm ($P \leq 0.001$). The most pronounced superiority of the new type of sheep is

manifested by body length. Thus, the new type of sheep are longer compared to Karakulul Asian sheep with 16.2 cm ($P \leq 0.001$). The sheep body conformation is a dolicomorf type, specific to this breed.

Table 20
 Body clues of Moldovan Karakul sheep, %

Body clu	Breeding rams (n=10)	Rams Ewes (n=4)	Sheep (n=20)	Ewes (n=23)
Body format (obl. length/ top height) x 100 %	120,2±4,4	123,6±4,6	126,9±1,2	127,9±1,9
Robustness (chest perim./obl. length) x 100 %	110,6±2,7	107,4±1,5	106,4±1,5	97,6±4,0
Thorax (thor. width/tor. depth) x 100 %	67,8±2,3	71,8±10,0	63,8±1,1	63,4±0,6
Skeleton (whistle perim./ top height) x 100 %	14,8±0,3	16,3±0,5	12,8±0,2	13,0±0,2

Body size has a rectangle shape at rams and trapeze at ewes, with width, depth and length good emphasized. Thus the oblique trunk length exceeds the height values at top with 20.2% - for rams, and 26.9% - for sheep. The same thing is observed at young sheep. Thorax clu has high values: at rams - $67.8 \pm 2.3\%$ at ewe lambs - $71.8 \pm 10.0\%$, at sheep - $63.8 \pm 1.1\%$ and at ewes - $63.4 \pm 0.6\%$. These, generally, reflect a large

habitus, big and long body, which obviously correlates with positive potential of meat production of the animal.

New type sheep are quite precocious, starting even from intrauterine development stage. It was found that young sheep body mass, at all ages, overcome that of standard Asian Karakul breed (tab. 6).

Table 6
 Dynamic of body weight development at Moldovan Karakul lambs, kg

Young sheep age	Breed standard	2003 (N=210)		2004 (N=164)		2005 (N=193)	
		M±m	Cv, %	M±m	Cv, %	M±m	Cv, %
At birth	4,0	4,5±0,1	17,5	4,4±0,1	19,3	5,2±0,1	19,7
At 20 days	7,5	7,7±0,3	24,7	7,9±0,2	21,5	9,1±0,2	20,3
At 3 months (weaning)	15,0	19,8±0,7	23,4	22,4±0,6	21,2	23,7±0,4	16,5

Body mass of lambs (2005) was: at birth 5.2 ± 0.1 kg, at the age of 20 days - 9.1 ± 0.2 kg, at 3 months - 23.7 ± 0.4 kg, by this clu exceeding Asian Karakul lambs, respectively with 30.0, 21.3 and 58.0.

At the age of 6 months new type Karakul lambs reach body mass of 35 - 40 kg and ewe lambs 32 - 35 kg (Table 7).

At the age of 18 months, ewe rams has a body mass of 65 - 70 kg and the ewes weighing 45 - 50 kg, what is more than the standard race, with 27 and respective with

19%. The intensity of relative growth of young sheep from birth to the age of 20 days was (2005) 75.0%, from age of 20 days to weaning (3 months) -157%, from age of 3 months up to 6 months -- 48%, from 6 months up to 18 months - 52%.

Rams-breeders had over the years (2003-2005), average body mass of 91.9 ± 3.3 kg, ranging from 88.2 up to 98.5 kg, adult sheep - 52,9-57, 2 kg, rams of 18 months - 69,6-73,3 kg.

Table 7
 Body mass of Moldovan Karakul sheep (M±m), kg

Specification	Year						Average M±m
	2003		2004		2005		
	n	M±m	n	M±m	n	M±m	
Rams breeders	15	88,2±3,0	11	89,0±2,2	9	98,5±2,9	91,9±3,3
Sheep	543	52,9±0,5	493	57,2±0,4	496	55,5±0,3	55,2±1,3
Rams of 18 mths	6	73,3±1,9	4	70,0±2,1	5	69,6±1,7	71,0±1,2
Ewes of 18 mths	286	49,0±0,5	245	52,1±0,5	178	49,3±0,4	50,1±1,0
Lambs of 6 mths	6	43,0±1,2	5	40,0±3,1	7	41,2±2,6	41,4±0,9
Ewe lambs of 6 mths	283	30,1±0,3	232	34,4±0,4	287	32,5±0,3	32,3±1,2

Body mass of 18 months ewes was on average 49.0, 52.1, and 49.3 kg properly. Lambs of 6 months selected for breeding, had body mass of 40.0 - 43.0 kg. Body mass of 6 months ewe lambs ranged on average

from 30.1 ± 0.3 up to 34.4 ± 0.4 kg. New type Karakul sheep have a well developed body and respectively a high potential of meat production (tab. 8).

Table 8
 Values of main slaughtering clues of Moldovan Karakul sheep

Specification	Adult sheep (reformed)		Lambs of 6 mths	
	M ± m	% at BM before slaughter	M ± m	% at BM before slaughter
Body mass before slaughtering, kg	64,6±1,1	100	35,8±0,3	100
Carcass weight, kg	32,3±1,0	50,0	16,6±0,3	46,7
Internal fat	2,97±0,4	4,6	0,32±0,1	0,87
Yield of cutting, %	54,8		47,5	

At adult sheep slaughtering reformed with body mass before slaughtering of 64.6 ± 1.1 kg, were collected carcasses weighing 32.3 ± 1.0 kg, which is 50.0% of weight before slaughtering. Carcasses were covered with a uniform layer of fat. At halfcarcasses could be observed a good developing longitudinal muscle. The meat is dark brown color. Return to slaughter (which includes the carcass with kidney and internal fat), at slaughtered sheep was - 54, 8%, which could be compared with other famous sheep breeds in the world [12, 13].

At the slaughtering of 6 months lambs with body weight of 35.8 ± 0.3 kg, was obtained carcasses with average weight of 16.6 ± 0.3 kg. Percentage report of carcass from the mass of slaughtering of lambs is 46.7%. Yield of cutting of slaughtered lambs is 47.5%, exceeding the metis breeds for meat [5]. Young sheep meat, at this age, has a pale red color, with moderate saturation of

intramuscular fat, which has aspecific and juicy delicious taste, buttocks are well developed, with considerable fat deposits what is specific to Karakul breed.

Regarding general appearance of sheep and lambs carcasses, both are long, the main parts muscles are sufficiently developed, having a layer of pericorporal fat, with a well commercial appearance what is important to make growth the Karakul sheep in Moldovan economic conditions in present and for the future.

Intrasial type of Moldovan Fat Karakul sheep was ratified by the Board Member and approved by order of the Ministry of Agriculture and Food Industry No.. 238 of 23. 12. 2007 as achieved selection.

CONCLUSIONS

1. In Republica of Moldova was created and ratified a new sheep type „Big Moldovan Karakul”.

2. Karakul sheep of moldovan type differ from classical Karakul breed of Asian type by more developed body mass and increased milk production, they also have a better resistance to some diseases and pedo-climatic calamities, yielding up a little for their fur leather qualities.

3. Compared with Tsushca sheep breed, Karakul of Moldovan type have a bigger body development, much better fur leather, but yielding up a little for their milk production.

4. Share of higher class lambs (elite and 1st class) is on average per flock 76-77% , from them is obtained fur leather of 1st sort, 88,3-90,6% of which have a large surface. Average fur leather surface is 1839.2 cm².

5. New type young sheep is quite precocious, reaching an average body mass at birth - 5.2 ± 0.1 kg, at the age of 20 days - 9.1 ± 0.2 kg, 3 months - 23.7 ± 0.4 kg lambs of 6 months - 41.4 ± 0.9 kg, ewe lambs of 6 months - 34.4 ± 0.4 kg, rams of 18 months - 71.0 ± 1.2 kg, ewes of 18 months - 50 , 1 ± 1.0 kg.

6. Adult rams have an average body mass of 98.5 ± 2.9 kg, adult sheep - 55.5 ± 0.3 kg, exceeding the classical Karakul breed representants, with respectively 51.5 and 23.3%.

7. New type of sheep have increased skills for meat production. Mass of 6 months lambs carcasses is 16.6 ± 0.3 kg, of reformed sheep after the fattening - 32.3 ± 1.0 kg, the yield of cutting presents respectively 47.5 and 54.8%.

8. Karakul sheep of Moldovan type have a good milk production which is on average per lactation 76.6 ± 1.3 kilograms, exceeding the classical Karakul breed with 53.2%. Milk is distinguished by increased content of dry substances - 18,2-18,8%, including fats - 7,5-7,9%.

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