

## Economic Evaluation and Importance of Lambs Selection According to Bhi (Body Harmony Index) in Karakul Breeding

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**Abstract:** Traits that determine the macrocarpa Karakul lambs and their features are still poorly researched and debatable. Basing on the study and determination of the traits inheritance nature, which allow more objectively consider the peculiarities of macrocarpa lambs, for the first time in Karakul breeding there was developed a method of a new factory type sheep creation by applying index selection.

**Key words:** Macrocarpa · Ody Area · Live Weight · Body Harmony Index · Body Type and Selection Parameters

### INTRODUCTION

Index selection is theoretically considered an effective method of selection. It assumes, when selection is conducted on several grounds, which have a high degree of heritability, genetic correlation and economic importance, to combine them into a single index.

Karakul sheep selection is never limited to one feature. It is aimed at simultaneous improvement of breeding and sheepskin features and each goal includes several complicated features. In such circumstances, it is necessary to select by means of selection index method. In this context, the research work, aimed at working out a new method of selection at this stage of branch development, is topical.

### MATERIALS AND METHODS

The main objective of the research is to improve the breed features and to increase Karakul production, by promoting macrocarpa Karakul sheep, through targeted and sustainable use of biological features of the herd reproducing species. The problem is solved by determining the value of the lamb body harmony index, which is determined by the formula:

$$BHI = LW \frac{LW}{CG \times KTL} \times 100$$

where:

BHI: body harmony index;

LW: live weight;

CG: chest girth;

TL: trunk length;

100 : relativity indicator;

lambs with the lowest value of the body harmony index (BHI) are referred to the animals capable of potential growth of live weight in postnatal ontogenesis.

Scientific novelty of the research is confirmed by the patent. Patent 008125555 / 13 (031068)

### RESULTS AND DISCUSSION

Index selection is the most promising method in breeding work with Karakul breed, which is the total score of the complex of genetic, phenotypic and economic indicators-Alibaev N.N. [1]

Due to the research objectives, we have paid particular attention to the study and determination of macrocarpa nature and degree of inheritance and conducted a series of experiments.

According to the developed methodology in determining macrocarpa features, lambs are first distributed on live weight and body area, then using a special formula, the individual body harmony indices (BHI) are defined.

Table 1: Distribution of rams on live weight and body area at birth and BHI definition (n=41)

Live weight, kg	Body area, sq. cm.				
	900.0-1099.9	1100.0-1299.9	1300.0-1499.9	1500.0-1699.9	1700.0-1899.9
	960			1570	1750
	1070	11100		1600	1870
	1075	1110		1610	1800
	1086	1165	1400	1690	1760
	1045	1165	1460	1556	1860
	1250		1695	1850	
	1280	1360	1690	1830	
	1285	1420	1670	1810	
			1690	1800	
			1880	1840	
		1490	1575		
			1695		
			1695		
			1697		
3.8-3.99					
4.0-4.19					
4.2-4.39					
4.4-4.59	4.41	0.46			
	4.49	0.42			
	4.6; - - 4.64; 4.65	0.43	-	0.3	0.27
4.6-4.79	4.66; 4.65; 4.65; 4.7; 4.7	0.43	0.42	0.33	0.29
	4.76; 4.76; 4.75; 4.74 -	0.46	0.43	0.33	0.29
	- - - 4.7; 4.75			0.28	0.26
	4.8; 4.8; 4.8; 4.8		0.41	0.35	0.31
4.8-4.99	4.85; 4.8; 4.85; 4.85		0.42	0.34	0.29
	4.9; 4.9; 4.9; 4.95		0.39	0.33	0.29
	5			0.3	
	5			0.3	
5.0-5.19	5.1; 5.14			0.32	0.28
	5.18				0.29
	5.25; 5.25		0.41	0.31	
5.2-5.39	5.35; 5.35			0.32	0.28
	5.5; 5.5; 5.4		0.43	0.32	0.3
5.4-5.59	5.59				0.3
Total	5	7	5	13	11

Table 1 data shows that most of the lambs at birth have live weight from 4.6 to 5.6 kg and only a small part of them has a mass of about 4.6 kg. Thus, the allocation of rams on live weight and body area for the establishment of the BHI, 5 ram heads, *i.e.* 12.2% of the total lamb population are covered by the lamb group with the highest value of the index (0.42-0.46). Their body area ranged from 900.0-1099.9 sq. cm. 12 ram heads (29.3%)-to the average index value group (0.33-0.42), they had the body area ranging from 1100.0 to 1499.9 sq. cm. 24 heads (58.5 %) -are referred to the lamb group with the lowest body harmony index value (BHI) (0.25-0.32). Their body area ranged from 1500.0-1900.0 sq. cm. It was found that the lambs that have the smallest body area and relatively low body weight, have the highest index value. Lambs with low index value are of great importance in the selection.

Based on the research objectives in the process of manufacturing experience there were studied fundamental indices of lamb growth and development at different periods of post-embryonic development, depending on the BHI value. For this purpose, while forming experimental groups, the first included rams with the highest (0.42-0.46) and average (0.33-0.42) index values and the second group-rams with the lowest (0.25-0.32) body harmony index value (BHI).

Live weight at birth and at subsequent age periods is the animal adaptability indicator to the environment. According to N.P. Aratyunova's data [2], Karakul lambs live weight is inherited intermediately only in good conditions of their embryonic development. And genetic conditionality equally depends on hereditary inclinations received from the father and mother.

Table 2: Dynamics of the ram live weight depending on the BHI values, kg

Groups	Age	N	Ram Live Weight M ±m	C v,%
I	At birth	17	4.8±0.10	7.8
	10-15days		10.5±0.11	9.1
	30 days		13.5±0.13	9.7
	At weaning		29.9±0.61	10.1
II	At birth	24	4.99±0.11	7.9
	10-15 days		10.9±0.09	9.7
	30 days		14.8±0.12	9.7
	At weaning		32.7±0.70	11.1

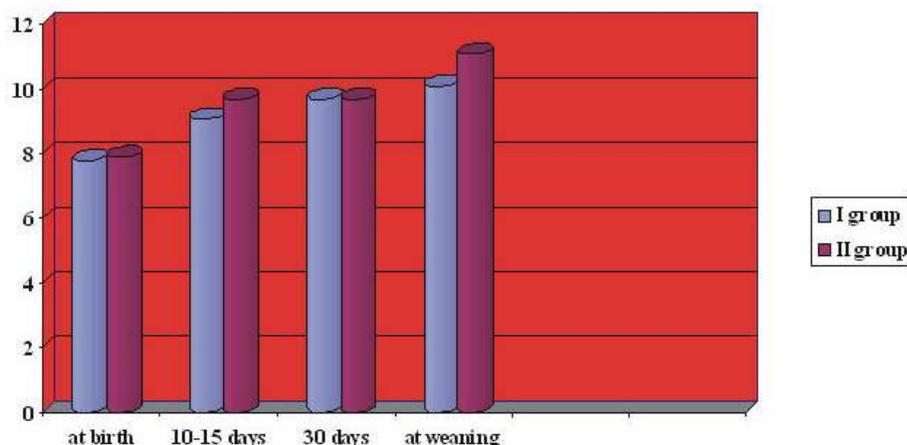


Fig. 1: Dynamics of the rams live weight depending on the BHI values, kg

A number of researchers have noted that the lambs with a large live weight at birth have an advantage for the better development in future, M.D. Tavitov, Ch.K. Kucherbayev [3].

Accordingly, the research of the lamb live weight and exterior articles dynamics of the genetic group is of great interest.

Thus, significant differences in the ram body weight at birth and 10-15 days aged were not found between the groups and were, respectively, 4.8, 10.5 and 4.99, 10.9 kg. And by the time of their evaluation at the age of 30 days, the second group lambs had predominant superiority and a live weight of 13.5 kg, respectively, while the second-14.8 kg. By the time of weaning, the first group lambs had a comparatively lowest live weight. These figures were 29.9 versus 32.7 kg respectively (Figure 1).

Dynamics of separate measurements: For complete characterization of young animal biological growth, depending on the index values, supervision over them continued by examining the exterior selected articles measurements from birth to weaning them from their mothers.

Our observations showed that all the body measurements, except height at the withers and the width of the chest for the fixed age period, the second group rams exceeded peers of the first group lambs. For example: the excess of the body slanting length at birth ranged from 1.9 to 2.5 cm and in cases where the difference is greater than 1.3 cm, it was reliable. This difference was also observed in the age of 4 months. According to other measurements in different age (10-15 days, 30 days and at weaning) difference ranged from 0.3-2.6 cm.

A clearer idea about the ram body structure peculiarities and exterior features inheritance give body indices (Table 3).

Table 3: Changes in lamb indices from birth to weaning, %

Measure (cm)	I group		II group	
	At birth			
Lengthiness	86.5		93.8	
Solidity	91.9		98.3	
Blockiness	104.6		106.2	
Sucking	80.5		90.3	
At weaning				
Lengthiness	97.1		105.2	
Solidity	118.2		123.8	
Blockiness	117.7		121.8	
Sucking	75.9		88.3	

Table 4 : Selection economic efficiency

Indicator	I group	II group	A herd average indicator
Live weight at weaning, kg	29.9	32.7	27.4
The average selling price for 1 kg of live weight including subsidies	445.0	445.0	445.0
Selling price of one head	13305.5	14551.5	12193
Cost of one head	10173.0	-/-	-/-
1 head sale profit	3132.5	4378.5	2020.0
The difference in profit comparing with the herd average indicator in tenge and in %	1112.5	155.07	2358.5
Profitability level	2020.0	100.0	216.8
	30.8	43.0	19.9

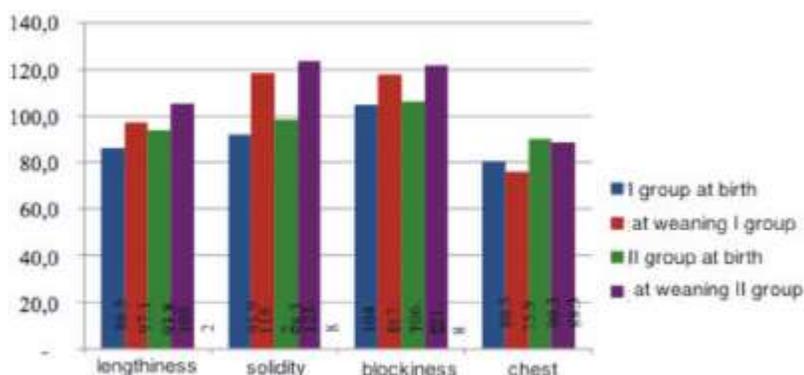


Fig. 2: Changes in lamb indices from birth to weaning, %.

Our findings in this regard have shown that in the Karakul sheep inheritance such exterior measurements as body slanting length, chest girth dominate and are mostly expressed.

Table 3 data shows that the lengthiness and solidity indices, characterizing the relative body development increased more during the period of suckling development.

Thus, lengthiness index for the suckling development period in the second group of rams progresses and increases to 105.2 %. And this figure in the first group of rams was equal to 97.1 %. By solidity index one can see that the first group rams were relatively narrow-chested as at birth and at weaning from their mothers at the age of 4 months. These indicators at birth were respectively 91.9 and 98.3%. During the suckling development period the first group rams increased it to 118.2 % and the second group rams-to 123.8 %. So the domination of the breast gap is clearly expressed here (Figure 2).

Blockiness index, being a good indicator of the highest value body weight development, reaches 121.8 % in the second group of rams. The indicator was 106.2 % in the first group of rams.

Sucking index is complemented by solidity and blockiness indices in breast development characterization. These data suggest that aging lambs develop breast part in depth. This figure ranged respectively from 80.5 to 90.3% at birth and 75.9-88.3 at weaning.

In general, we can assume that macrocarpa lambs have a more developed breast system and lengthy body, compared with lambs of the original group.

Research economic efficiency: Economic aspects of highly productive animals breeding in general, Karakul breed in particular, are determined primarily by market factors. The main Karakul breeding consumers are the breeding animal buyers purchasing them as a breeding material.

Research economic efficiency is calculated from the actual prime cost developed in economy and the cost of sales for the fiscal year.

Comparative analysis of lamb selection by BHI showed economic expediency of its holding. Table 4 data shows that the greatest profit from the sale of high value lambs was received at the sale of group I and II lambs. Profitability level ranged from 30.8 to 43.0%. A herd average indicator was 19.9%.

### CONCLUSION

Thus, based on the large population experiments results, we can conclude that the directed selection and selection of breeding couples by BHI-is one of the most important conditions for macrocarpa lambs increasing and creation of the new type sheep highly productive herd.

Animal selection according to body harmony index (BHI) allows determining in advance the potential large individuals to use them widely in breeding. Therefore, there is the possibility of a more targeted couple selection to produce offspring with the desired body type.

Recommended features (BHI) are a new selective parameter and their use in Karakul sheep selection increases the branch efficiency.

Karakul breeding needs to include it into the selected features as a compulsory element of Karakul sheep selection.

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