



## The productivity of different exterior - constitutional types of sheep of the saryarka breed (intra-breed zhanaarka type)

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### Abstract

The study of the biological and economic characteristics of various sheep breeds shows that within each of them there are animals that are heterogeneous in productivity, morphological and physiological characteristics, and constitute intra-breed types. The presence within the breed of several different constitutional-productive types, each of which has a number of valuable features, enriches the breed as a whole, while maintaining valuable biological properties for the entire breed. The aim of this work is to identify intra-breed exterior-constitutional productive types of Saryarka sheep and study their productivity.

The article presents the results of studying the productivity of the Saryarka breed of sheep of various exterior-constitutional types.

It was found that broad-bodied rams exceeded narrow-bodied animals in live weight and wool shearing by 8.1 and 14.2%, and ewes by 8.8 and 19.0%, respectively.

Visual determination of the exterior-constitutional types of lambs makes it possible to predict the level of productivity of Zhanaarka sheep at an early age - directly when they are beaten off from their mothers, which in turn increases the accuracy of the assessment of animals by genotype. This is one of the simplest and most affordable phenotypic methods for selecting animals in a production environment. It allows to reduce the interval between the next selection in generations and to provide for the costs of raising different groups of young animals, considering their breeding and economic value.

**Keywords:** genotype, exterior, constitution, intra-breed type, phenotype, live weight, productivity, eurisomal, leptosomal type

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### INTRODUCTION

The most important branch of the agrarian sector of the Republic of Kazakhstan is traditionally sheep breeding, including fat-tailed sheep. The development of the leading animal husbandry industry in the republic is facilitated by the presence of extensive natural agricultural land located in the desert and semi-desert zone with an area of 222.3 million ha, about 84% of which are natural pastures, where the inception, formation and development of modern domestic fat-tailed sheep breeding took place (Sadykulov, et al. 2011).

In terms of effective use of pastures, the most profitable, in contrast to other types of farm animals, is the breeding of fat-tailed sheep. They are distinguished by exceptionally high meat content - as if by nature itself, they were created to provide humanity with essential products - meat and lard. They have significant reserves

of fat in the fat tail, which serves as a reservoir, which accumulates under favorable nutritional conditions - in spring and autumn, and is consumed during the period of summer drought and winter frosts (Adykanova, 2010; Fidelis, et al, 2019).

In this aspect, the Saryarka coarse-haired fat-tailed sheep breed, which was approved by the Ministry of Agriculture of the Republic of Kazakhstan in 1999, including two intra-breed types - Zhanaarka and Sarysu, is of certain interest. The proportion of animals of the first type is the main part (about 90%) of this breed, which played a decisive role in its approbation. The Saryarka breed is the first domestic breed of fat-tailed sheep with white and light gray coarse wool, adapted for breeding

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in extreme conditions of steppes, deserts and semi-deserts. These sheep surpass local coarse-haired sheep by 8-10% in terms of meat and lard productivity, and are not inferior to local Kazakh coarse-haired sheep in terms of wool productivity.

Animals of the Saryarka breed steadfastly transfer their biological and economically useful qualities to their offspring in pure-bred breeding and are used to improve the wool qualities of local coarse-haired sheep. They are characterized by a strong constitution, well-developed bones, regular body shapes, strong limbs with a dense hoof horn, which is important for year-round grazing. The live weight of adult stud-rams of the breeding group is 90-110 kg, ewes - 60-65 kg, wool shearing - 2.8-3.0 and 2.0-2.2 kg, respectively. The young animals is rather early maturing, the live weight of rams at the age of 4 months during the milk period of development, depending on the climatic conditions, is 36-38 kg and 18-20 kg of slaughter weight (Adykanova, et al. 2019).

The study of the biological and economic characteristics of various sheep breeds shows that within each of them there are animals that are heterogeneous in productivity, morphological and physiological characteristics, and constitute intra-breed types. The presence within the breed of several distinct from each other constitutionally productive types, each of which has a number of valuable features, enriches the breed as a whole, while maintaining valuable biological properties for the entire breed (Sadykulov, Adykanova, 2014).

At present, in the practice of sheep breeding, work with constitutional intra-breed types of animals has not yet been sufficiently mastered. So, experts note that in selection and breeding work, the inclusion in the structure of the breed of such an important link as intra-breed types is still poorly used. Meanwhile, breeding work with intra-breed types is necessary for a more purposeful and efficient use of the breed's breeding resources. The presence of types within the breed allows maintaining its plasticity, vitality, expands the possibility of selection work by using different selection methods, which ensures an increase in the rate of qualitative improvement of the breed.

In this regard, the study of the productive qualities of sheep of different exterior-constitutional types of the Saryarka breed is of scientific and practical interest, thereby representing its relevance.

The aim of this work is to identify intra-breed exterior - constitutional productive types of Saryarka sheep and study their productivity.

## MATERIAL AND RESEARCH METHODS

The experimental part of the work was carried out in the conditions of the breeding plant "Zhenis", Zhanaarka district of the Karaganda region, where the best gene

pool of the Saryarka breed of the intra-breed Zhanaarka type is concentrated.

The identification of exterior-constitutional types among the selection part of the herd of the breed was carried out according to a set of characters in two stages. At the first stage, the criterion for assessing and selecting animals of different types of constitution was an eye assessment, the severity of the exterior forms of constitution. At the second stage, the eye assessment was refined by a more objective method - taking exterior measurements and calculating body build indices according to the methodology (Adykanova, Sadykulov, & Smagulov, 2014; Ahmadinejad and Talebi Trai, 2019).

Assessment and selection were carried out in accordance with the instructions for grading fat-tailed sheep, (Kolesnik, 1960), as well as our recommendations for breeding work with Saryarka sheep (Zhanaarka intra-breed type) fat-tailed breed (Instruction for grading fat-tailed sheep. Taldykurgan. 2017; Seyednejhad eta l., 2020).

The study of productive qualities was carried out according to generally accepted methods.

Age dynamics of live weight was studied by weighing sheep at 2, 18 months of age. In adult rams and ewes also in autumn, after feeding. Exterior features were determined by taking body measurements and calculating body build indices.

Wool productivity of sheep was assessed on the basis of appraisal data and individual registration of wool shearing.

## RESULTS

At the same time, two exterior-constitutional types of Saryarka sheep were identified: eurisomal (broad-bodied) and leptosomal (narrow-bodied).

Many authors point out that there is a definite relationship between body type and level of productivity.

The study of the exterior features of sheep of different constitutional types of the Saryarka breed showed that animals of the eurisomal (broad-bodied) type are characterized by a rather wide and profound body, well-defined muscle forms and overgrowth of the belly, head and legs. The head is medium, the neck is short, muscular, the back is broad, straight, the legs are set wide apart and short in relation to the body, the bones are strong, the fat tail is mostly medium in size, pulled up to the level of the back.

Sheep of the leptosomal (narrow-bodied) type are distinguished by an elongated, relatively flat body structure, insufficient overgrowth of the belly, head and legs. The head is dry with an elongated neck, the skeleton in the total mass is relatively light, but strong, the animals are somewhat high-legged, the thighs are usually poorly filled with muscles. The fat tail is mostly medium, slightly deflated.

**Table 1.** Exterior measurements of the body of sheep of different types of constitution, cm

Measurements	Gimmer				Ewes			
	Broad-bodied (n=324)		Narrow-bodied (n=318)		Broad-bodied (n=354)		Narrow-bodied (n=220)	
	X ±m	C <sub>v</sub>	X ±m	C <sub>v</sub>	X ±m	C <sub>v</sub>	X ±m	C <sub>v</sub>
Live weight	31,2±0,85	12,4	27,6±0,76	13,1	62,8±0,74	6,5	56,8±0,56	7,0
Height at the withers	59,6±0,52	6,3	57,6±0,45	5,1	65,3±0,15	5,8	64,7±0,21	4,2
Height at hips	60,1±0,35	7,0	59,0±0,68	6,8	67,2±0,18	4,5	66,6±0,18	4,3
Chest depth	57,9±0,84	8,2	55,5±0,65	6,7	30,5±0,10	4,9	27,6±0,96	4,8
Chest width	79,8±1,01	9,5	73,6±1,84	9,1	22,4±0,24	9,9	20,5±0,21	9,5
Oblique body length	26,9±0,32	9,7	25,5±0,48	9,6	67,5±0,23	9,6	67,3±0,21	8,4
Chest girth	9,1±0,06	6,2	7,2±0,04	6,0	88,6±0,44	5,8	88,4±0,37	5,6
Width at hips	16,7±0,34	5,5	13,1±0,28	5,3	20,2±0,09	7,6	18,±0,09	7,9
Metacarpus girth	18,9±0,23	6,3	15,4±0,41	5,6	8,1±0,07	5,7	7,9±0,05	4,6

**Table 2.** Live weight of sheep, kg

Constitution type	Sex	n	Live weight		Wool shearing	
			X±m	C <sub>v</sub>	X±m	C <sub>v</sub>
Broad-bodied	Rams	40	110,5±2,4	9,5	3,2±0,25	6,7
	Ewes	250	67,9±0,45	8,2	2,5±0,07	5,5
Narrow-bodied	Rams	28	102,2±2,1	8,9	2,8 ±0,19	5,6
	Ewes	285	62,4±0,38	8,0	2,1±0,06	5,0

It is known that the main leading indicators of the development and type of constitution of animals are body measurements and indices of their constitution.

As it is known, the effectiveness of improving farm animals will be noticeably higher when the selection criteria are established at an earlier age.

According to many experts, in farm animals, starting from 3 months of age, it is possible to distinguish between broad-bodied and narrow-bodied ones.

According to our long-term observations, in Saryarka sheep, such a difference is observed at the early stage of postnatal ontogenesis - starting from 2.5 months of age, which is confirmed by the actual data of their exterior measurements (**Table 2**).

In our studies, broad-bodied and narrow-bodied gimmers at the age of 2.5 months in the size of some basic body measurements had approximately the same differences as in adult ewes.

At the same time, the advantage in broad-bodied gimmers is in body measurements, which characterize the development of the meatiness of the animal, namely, in girth and width of the chest, width in the hips, respectively, 1.9 cm, or 26.4%; 6.2 cm or 8.4% ( $P > 0.999$ ), and 3.6 cm, or 27.5%), by live weight 3.6 or 13.0%. Broad-bodied animals are also distinguished by a fairly large physique. As evidenced by measurements: height at the withers, height at the hips, oblique body length, for which the advantage is: 3.5; 1.9; 5.4% respectively.

Scientists noted that in any direction of using sheep, first of all, their value matters, since live weight gives a more objective idea of the amount of expected meat productivity during the life of an animal, therefore, great importance is attached to its determination.

Scientists' studies have shown that animals of the same breed, but of different constitutional types in the same conditions of feeding and keeping, differ significantly in terms of live weight.

The constitutional features of the Saryarka sheep determined their significant differences in live weight (**Table 2**).

It has been established that animals of a broad-bodied type, both rams and ewes, in terms of live weight, exceed their peers of a narrow-bodied type. Thus, broad-bodied rams exceeded narrow-bodied animals in live weight and wool shearing by 8.1 and 14.2%, and ewes by 8.8 and 19.0%, respectively. It should be added that the proportion of animals with a high live weight among broad-bodied sheep turned out to be significantly higher than among narrow-bodied animals. So, broad-bodied ewes, meeting the requirements of the standard, for animals of the elite class amounted to 74%, and narrow-bodied - 26%.

Thus, for animals of a broad-bodied type of constitution, a large size, compact type of constitution of the animal is characteristic, which is distinguished by the best development of the chest and pelvis, well-defined meat forms.

Comparison of the data obtained by us with the average indicators for the herd of the breeding part of the breeding stock showed that broad-bodied ewes in live weight exceed these data by 3.6 kg or 5.4%, and narrow-bodied ones were inferior by 2.7 kg or 5.0%.

It is characteristic of broad-bodied sheep that among them there are significantly more animals with the highest wool productivity for the herd than narrow-bodied ones. So, broad-bodied ewes for wool shearing, meeting the minimum requirements for animals of the desired type were 56.5%, and narrow-bodied - 43.6%.

It should be noted that broad-bodied animals have greater vitality and better adaptive qualities to the conditions of their breeding zone. In this connection, they have a higher level of productivity in comparison with narrow-bodied animals.

## CONCLUSIONS

The conducted studies and the results obtained make it possible to visually determine the exterior-constitutional types of young animals, to predict the level of productivity of Zhanaarka sheep at an early age - directly when they are beaten off from their mothers, which in turn increases the accuracy of assessing

animals by genotype. This is important for practical breeding and is one of the simple and affordable phenotypic methods for selecting animals in a production environment. It allows to reduce the interval between the next selection in generations and to provide for the costs of raising different groups of young animals, considering their breeding and economic value.

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