Identification of Intra-Breed Exterior-Constitutional Productive Types of Saryarka Sheep (Intra-Breed Zhanaarka Type)

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Abstract

Background: 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.

Methods: This experiment 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.

Results: 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.

Conclusion: Visual determination of the exterior-constitutional types of lambs makes it possible to indicate the level of productivity of Zhanaarka sheep at an early age, directly when they are fed from their mothers, which in turn improves the accuracy of the assessment of animals by genotype.

Keywords: Arterial hypertension, Questioning, Knowledge level, Antihypertensive therapy.

1. Introduction

Due to suitable climatic conditions, sheep have been the main supplier of protein and animal fat for the people of the world. Global changes and the trend towards industrial animal husbandry in the world have also affected the process of breeding livestock and at some points, it has turned it into a relatively uneconomical activity (1). Domesticating sheep according to the requirements of the environment and the variety of human needs has led to its adaptation over many years (2). For this reason, you can see different breeds and types of sheep in different parts of the world. The dispersion of sheep in the world is proof that wherever the geographical environment is suitable in terms of weather and humidity, herding develops more. Due to the progress of various sciences in terms of nutrition, breeding and breeding, the conditions of the sheep's environment can be

changed as desired and relatively, and types can be selected that can transmit the highest quality to the next generations (3, 4).

Currently, due to the increase in population and the ever-increasing needs of the people, man is trying to increase the amount of production as much as possible. One of the issues that are used in sheep breeding programs to improve the production status of this animal is the issue of sheep identification so that after judging the best samples can be used for further development as parents of future generations (5). Today, sheep breeding is practiced in most parts of the world in its industrial concept, and numerous breeds of sheep are scattered in different places based on their compatibility with the environment. Sheep farming, like other industries, is influenced by many factors. The most important of them are how national and international politics, supply and demand, alternative materials for wool (such as synthetic fibers), and competitions related to land, labor, and capital within a country or a region (6).

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 (7).

In terms of the 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 summer drought and winter frosts (8).

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 namely Zhanaarka and Sarysu. 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 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 (7).

Saryarka breed steadfastly transfers their biological and economically useful qualities to their offspring in pure-bred breeding and is used to improve the wool qualities of local coarse-haired sheep. They are characterized by a strong constitution, well-developed bones, regular body shapes, and strong limbs with a dense hoof horn, which is important for year-round grazing. The live weight of adult stud-rams and ewes of the breeding group is 90-110 kg, and 60-65 kg, with wool shearing of 2.8-3.0 and 2.0-2.2 kg, respectively. The young animals are rather early maturing, and 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 (9).

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 (10).

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 more purposeful and efficient use of the breed's breeding resources. The presence of types within the breed allows for maintaining its plasticity, vitality, and expands the possibility of selection work by using different selection methods, which ensures an increase in the rate of qualitative improvement of the breed (4). 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. This work aims to identify intra-breed exterior-constitutional productive types of Saryarka sheep and study their productivity.

2. Materials and methods

This experiment 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. In the first stage, the criterion for assessing and selecting animals of different types of the constitution was an eye assessment, the severity of the exterior forms of the constitution. In the second stage, the eye assessment was refined by a more objective method by taking exterior measurements and calculating body build indices according to the methodology (11). Assessment and selection were carried out under the instructions for grading fat-tailed sheep [6], as well as standard recommendations for breeding work with Saryarka sheep (Zhanaarka intra-breed type) fat-tailed breed (12, 13).

The study of productive qualities was carried out according to generally accepted methods. Age dynamics of live weight were studied by weighing sheep at 2, and 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. The wool productivity of sheep was assessed on the basis of appraisement data and individual registration of wool shearing (4, 13).

Body measurements were calculated by meter and live and wool weight were also measured by scales.

3. Statistical analysis

Data collection was processed and analyzed using Microsoft Excel and IBM SPSS Statistics 26 software. The correlation of data was calculated through Pearson's coefficient was used to evaluate the strength of the correlation between classification features.

4. Results

It was identified two exterior-constitutional types of Saryarka sheep eurisomal (broad-bodied) and leptosomal (narrow-bodied).

The appearance characteristics of the Saryarka breed showed that this animal is eurisomal (broad-bodied) with a relatively broad and deep body and well-defined muscle shapes. Abdominal overgrowth and the head and legs are average. The head of this animal is medium, with a short neck, broad and muscular back, and with separate and relatively short legs. The bones of the eurisomal breed are strong, the tail is fat and medium (Table 1).

Sheep of the leptosomal (narrow-bodied) type are distinguished by an elongated, relatively

flat body structure, and insufficient overgrowth of the belly, head, and legs. The head is muscular with an elongated neck, and the skeleton in the total mass is relatively light but strong. The animals are somewhat high-legged. As well as, the thighs are usually poorly filled with muscles, and the fat tail is mostly medium, slightly deflated.

As shown in Table 1, most measurements of both body types recorded lower records for Gimmer compared to Ewes. But Chest depth, Chest width, and Metacarpus girth were recorded different and opposite records.

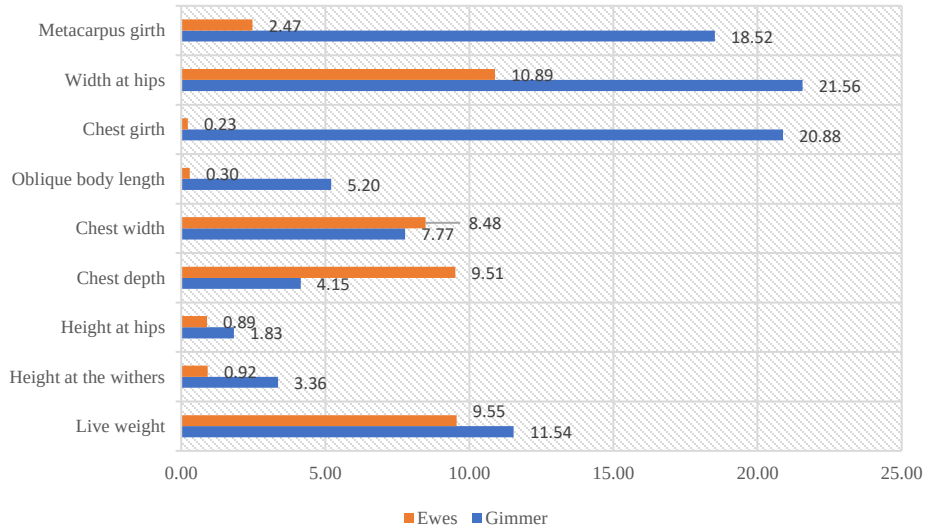
The difference percentage of the traits measured in Gimmer showed that Chest girth, Width at hips, and Metacarpus girth had the largest differences and were 20.88, 21.56, and 18.52, respectively. But the results of Figure 1 revealed that this measurement for Ewes was for Width at hips (10.89%), Chest depth (9.51%), and Chest width (8.48%).

Table 1 External body measurements of sheep of different structure (cm)

Measurements	Gimmer				Ewes			
	Broad-bodied (n=324)		Narrow-bodied (n=318)		Broad-bodied (n=354)		Narrow-bodied (n=220)	
	Mean±SD	CV	Mean±SD	CV	Mean±SD	CV	Mean±SD	CV
Live weight	31.20±0.85	12.40	27.60±0.76	13.10	62.80±0.740	6.50	56.80±0.56	7.00
Height at the withers	59.60±0.52	6.30	57.60±0.450	5.10	65.30±0.15	5.80	64.70±0.21	4.20
Height at hips	60.10±0.35	7.00	59.00±0.68	6.80	67.20±0.18	4.50	66.60±0.18	4.30
Chest depth	57.90±0.84	8.20	55.50±0.65	6.70	30.50±0.10	4.90	27.60±0.96	4.80
Chest width	79.80±1.01	9.50	73.60±1.84	9.10	22.40±0.24	9.90	20.50±0.21	9.50
Oblique body length	26.90±0.32	9.70	25.50±0.48	9.60	67.50±0.23	9.60	67.30±0.21	8.40
Chest girth	9.10±0.06	6.20	7.20±0.04	6.00	88.60±0.44	5.80	88.40±0.37	5.60
Width at hips	16.70±0.34	5.50	13.10±0.28	5.30	20.20±0.09	7.60	18.00±0.09	7.90
Metacarpus girth	18.90±0.23	6.30	15.40±0.41	5.60	8.10±0.07	5.70	7.90±0.05	4.60

Gimmer: A ewe between its first and second shearing, SD: Standard deviation, CV: Coefficient of variation

Figure 1 The difference in external body measurements of sheep (%)



Gimmer: A ewe between its first and second shearing

The results in Table 2 exhibited that 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 of 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, and oblique body length, for which the advantage is 3.5, 1.9, and 5.4% respectively.

In addition, the constitutional features of the Saryarka sheep determined their significant differences in live weight (Table 2).

Table 2 Live weight of sheep (kg)

Constitution type	Sex	n	Live weight		Wool shearing	
			Mean±SD	CV	Mean±SD	CV
Broad-bodied	Rams	40	110.50±2.40	9.50	3.20±0.25	6.70
	Ewes	250	67.90±0.45	8.20	2.50±0.07	5.50
Narrow-bodied	Rams	28	102.20±2.10	8.90	2.80±0.19	5.60
	Ewes	285	62.40±0.38	8.00	2.1±0.06	5.00

Gimmer: A ewe between its first and second shearing, SD: Standard deviation, CV: Coefficient of variation

Table 3 Pearson's correlation coefficient between live weight and wool shearing

Trait	Live weight	Wool shearing
Live weight	1	
Wool shearing	0.9377406	1

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 8.10 and 14.20%, and ewes by 8.80 and 19.00%, 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%).

The results of Table 3 showed that there is a positive and significant correlation between live weight and wool shearing. Therefore, an increase in body weight means an increase in body surface and, as a result, more wool production.

5. Discussion

Researchers have shown that there is a clear relationship between body type and the level of animal productivity (14, 15). 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 (4, 16).

As it is known, the effectiveness of improving farm animals will be noticeably higher when the selection criteria are established at an earlier age. In farm animals, starting from 3 months of age, it is possible to distinguish between broad-bodied and narrow-bodied ones. According to 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 (4, 17, 18).

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 (19, 20).

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 (4).

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 (21).

6. 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 fed by 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 selections in generations and to provide for the costs of raising different groups of young animals, considering their breeding and economic value.

Conflict of Interest

The authors declare that they have no conflict of interest.

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