Exterior indicators and milk productivity of ewes of Assaf breed bred in the Republic of Moldova

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Abstract

The aim of the research was to study, in the natural and climatic conditions of the Republic of Moldova, local reproduction at ewes of general development in terms of physique indices, in terms of milk productivity, the study of measurements of the udder and the influence of the lactation number of ewes on milk production in the suckling, milking periods and in general for lactation, as well as the chemical composition of milk. For full lactation, 456.38 liters of milk were obtained from ewes of the third lactation, or by 60.58 liters more in comparison with ewes of the first lactation and 30.45 liters with ewes of the second lactation. Indicators for the chemical composition of milk at ewes of the third lactation are higher in relation to ewes of the first and second lactations.

Key words: ewes, body measurements, body indexes, milk productivity, lactation, chemical composition of milk

Introduction

Increasing the efficiency and competitiveness of the sheep breeding industry is associated with the most complete use of all types of products obtained from sheep of different directions of productivity.

Milk productivity of sheep bred in Moldova is not high. At the Tsigay breed of sheep, the average productivity per lactation is 105–120 liters, and at the Karakul breed, 65–80 liters (Lyuckanov et al., 2015). With this regard, in recent years, sheep have been imported from abroad for the dairy direction of productivity, at which it is necessary to conduct a comprehensive study of acclimatization and productivity. One of the valuable genetic qualities of sheep breeds is their ability to high and stable productivity in various natural and climatic environmental conditions. At the same time, further intensification of the industry will be based on the principles of adapting genotypes to the environment, assessing the adaptive norm of animals in various conditions of feeding and keeping. Such an assessment will allow taking into account the influence of the "genotype x environment" interaction on the realization of the genetic potential of productivity (Skoryh et al., 2015). One of the important features of domestic sheep is plasticity, variability and a huge potential for adaptation to various environmental conditions (Rodionov and Tabakova, 2013; Belogurova, 2015). In previous studies, some authors note that from a zootechnical point of view, the level of animal productivity and the duration of their use can serve as an indicator of adaptability (Stepanov and Rodina, 2012). Attention is focused on the fact that the assessment of the degree of acclimatization of animals should be based on comprehensive scientific data obtained

over at least four generations (Kacy, 2014). According to V. Mykytyuk, 2009, the study of acclimatization should be based on a comparison of sheep of local reproduction.

To improve the milk productivity of Tsigay sheep, in 2014 dairy sheep of the Assaf breed were brought in, whose homeland is Israel, and are mainly bred in Spain, where the climate is the same as in the southern part of Moldova, the Budjak steppe.

The aim of the research was to study, in the natural and climatic conditions of the Republic of Moldova, local reproduction at ewes of general development in terms of physique indices, in terms of milk productivity, the study of measurements of the udder and the influence of the lactation number of ewes on milk production in the suckling, milking periods and in general for lactation, as well as the chemical composition of milk.

Material and methods

Exterior indicators were studied by taking measurements of the body to calculate body indexes (Krasota and Lobanov, 1976).

Milk productivity was studied:

In the first 20 days after lambing, when the lambs reached 20 days of age, individual weighing was carried out, the growth for this period was calculated, which was multiplied by a factor of 5.35 (milk costs per 1 kg of weight gain).

From 20 days of age to weaning lambs during the sucking period and during the milking period by carrying out control milk yields in accordance with the methods specified in the Instructions for assessing the morpho-productive qualities of specialized breeds, populations, types and synthetic lines of dairy sheep in the Republic of Moldova (Maşner et al., 2017).

During the control milking period, milk samples were taken and the chemical composition of milk was studied using the Lactoscan MCC device.

The development of the mammary gland in sheep of the above genotypes was studied by the measurement method (Kirikova, 2006):

- the length of the udder from the rear convexity of the udder to the front edge at the base (compass);
- udder width - above the teats of the udder lobes (compass);
- perimeter at the base of the udder, along a horizontal line at the level of the base of the front edge of the udder (with a tape);
- udder depth - vertically from the abdominal wall to the base of the nipples (with a tape);
- udder volume - by multiplying the area of the udder (calculated through the perimeter) by its depth, expressed in cm^3;
- the length of the nipple - from their base to the tip (with calipers);
- nipple thickness - in the anterior third (caliper);

Statistical processing of the results of experiments to assess the significance of differences consisted in grouping the material, calculating the arithmetic mean (M), error (m), and significance criterion (Plohinskij, 1978).

Results and discussions

To study the exterior indicators at ewes at the age of two, three, four years, body measurements were taken (Table 1).

The obtained indicators at ewes at the age of four years for each measurement are slightly lower in comparison with measurements at ewes of two and three years of age. According to the main measurements, the height of the withers, the oblique length of the body, the width and depth of the chest at three-year-old ewes are higher in comparison with two- and four-year-olds.

On the basis of the obtained data on the measurements, the physique indices were calculated (Table 2).

Of the calculated 6 physique indices at ewes of four years of age, the indicators are lower by four indices in comparison with two- and three-year-old ewes. In comparison with ewes of two years of age: transverse by 1.7%; massiveness by 2.1%; for thoracic by 6.5% and consistency by 5.6%, and in comparison with ewes of three years of age, respectively by: 2.7%; 1.5%; 6.0% and 1.5%.

The stretch index in relation to the same groups is slightly higher by 2.1% and 0.1%. The bone index for ewes of two years of age is lower by 0.2% and at the level of three years of age.

At the second–third month of lactation, the development of the mammary gland was studied at 5 ewes at the age of two, three and four years, which corresponds to lactations I, II and III (Table 3).

At ewes of the second lactation, the length, width and depth of the udder are higher in relation to the same measurements in the groups of the first and third lactations. In comparison with the first lactation, the length of the udder is big-

Table 1. Body measurements of Assaf ewes, cm

Indicators	Age, M ± m		
	2 years	3 years	4 years
Withersheight	75.20 ± 0.74	75.40 ± 1.52	73.20 ± 1.19
Height at the sacrum	74.20 ± 0.42	74.20 ± 1.47	72.00 ± 1.77
Chest Width	25.40 ± 1.35	26.20 ± 0.74	23.40 ± 1.15
Chest depth	35.20 ± 1.02	36.40 ± 0.57	35.40 ± 0.57
Oblique torso length	69.00 ± 1.54	70.60 ± 1.35	68.60 ± 0.91
Bust	105.2 ± 1.64	105.0 ± 1.97	101.0 ± 2.74
Pastern girth	10.00 ± 0.50	9.80 ± 0.22	9.40 ± 0.57

Table 2. Body indexes of Assaf ewes, %

Indicators	Age, M ± m		
	2 years	3 years	4 years
Stretching	91.73 ± 1.35	93.69 ± 1.69	93.79 ± 1.91
Transverse	33.82 ± 2.00	34.77 ± 0.94	32.12 ± 1.30
Massiveness	140.0 ± 3.14	139.4 ± 2.70	137.9 ± 1.73
Thoracic	72.53 ± 5.28	71.98 ± 1.73	66.01 ± 2.33
Consistency	152.9 ± 5.76	148.8 ± 2.89	147.3 ± 4.32
Bonyness	9.52 ± 0.54	9.25 ± 0.26	9.29 ± 0.36

Table 3. Udder measurements of Assaf ewes, cm

Measurements	I lactation, age 2 years, M ± m	II lactation, age 3 years, M ± m	III lactation, age 4 years, M ± m
Udder:			
length	17.20 ± 0.82	19.60 ± 1.04	18.60 ± 0.45
width	15.20 ± 0.82	17.00 ± 0.00	16.20 ± 0.65
depth	18.20 ± 0.74	21.00 ± 0.35	19.60 ± 0.57
girth	43.40 ± 0.67	45.60 ± 0.67	48.80 ± 0.96
volume, cm^3	2731 ± 145	3474 ± 86	3717 ± 170**
Nipples:			
length	4.64 ± 0.50	3.48 ± 0.38	4.48 ± 0.49
diameterl	2.50 ± 0.11	2.18 ± 0.24	2.92 ± 0.37
Udder length ratio to:			
width	1.15 ± 0.10	1.15 ± 0.06	1.16 ± 0.07
depth	0.95 ± 0.07	0.93 ± 0.05	0.95 ± 0.02

***(P ≤ 0.01)*

ger by 2.4 cm or 14.0%, the width is bigger by 1.8 cm (11.8%), the udder depth is bigger by 2.8 cm (15.4%). Ewes of the third lactation compared to the first lactation have an udder girth by 5.4 cm (12.4%) bigger and a volume higher by 986 cm^3 (36.1%), the difference is significant ($P \leq 0.01$).

The length and diameter of the teats meet the requirements for the provided parameters for use during the period of milking sheep by one of the promising mechanized methods.

In accordance with the "Instruction for assessing the morphological and productive qualities of specialized breeds, synthetic populations, types and lines of dairy sheep in the Republic of Moldova" [9], from the moment of lambing of ewes and until the last day of the milking period, milk productivity for full lactation was studied (Table 4).

Milk productivity in the first 20 days after lambing is the highest 55.96 ± 2.07 liters at ewes after the third lactation. Ewes have 20.74 liters less in the first lactation ($P \leq 0.001$) and 16.06 liters in the second lactation ($P \leq 0.05$) in relation to ewes in the third lactation. During the suckling period at ewes in the third lactation, milk production, as in the first 20 days after lambing, is the largest 240.94 liters. In relation to the first lactation it is 49.22 liters higher and to the second lactation by 34.14 liters. The duration of the milking period is 135 days, during which at ewes of the first lactation were milked 204.08 liters, for the second lactation 219.12 and at the ewes of the third lactation 215.25 liters. In general, for lactation, 456.38 liters of milk were obtained from ewes of the third lactation, or by 60.58 (15.3%) liters more in comparison with ewes of the first lactation and 30.45 (7.2%) liters with ewes of the second lactation. For ewes of three lactations, fat yield, protein yield, and fat + protein yield was calculated. At ewes, in the third lactation, the fat yield was 35.51 kg, which is higher in comparison with the first lactation by 7.96 kg (28.9%), with the second lactation by 6.33 kg (21.0%), in terms of yield protein is respectively higher by 2.86 kg (17.8%) and 1.73 kg (10.1%). In all the studied periods, the indicators of ewes of the third lactation are better in comparison with the indicators of the first and second lactations.

To study the chemical composition of milk from ewes of the studied groups, milk samples were taken and the amount of fat, protein, lactose, SOMO, salts and its density were determined using the Lactosan MCC device (Table 5). Sheep milk, depending on lactation, differs in composition. At ewes for the third lactation, the indicators are higher in comparison with ewes for the first and second lactations. In relation to the first lactation, the difference is higher: fat

Table 4. Milk productivity of Assaf breed sheep per lactation

Indicators	I lactation, M ± m	II lactation, M ± m	III lactation, M ± m
Uddervolume, cm^3	2731 ± 145	3474 ± 86	3717 ± 170
Sucklingperiod, days	91.60 ± 1.68	87.00 ± 9.37	84.60 ± 4.64
Milk productivity in the first 20 days of lactation, l	35.22 ± 1.09***	39.90 ± 6.59*	55.96 ± 2.07
Milk productivity in the suckling period, l	191.72 ± 8.76	206.80 ± 11.30	240.94 ± 20.72
Milkingperiod, days	135.0 ± 0.00		
Milk productivity in the milking period, l	204.08 ± 11.39	219.12 ± 16.76	215.44 ± 11.03
Lactationperiod, days	226.60 ± 1.68	222.00 ± 9.37	219.60 ± 4.64
Milk production per lactation, l	395.80 ± 10.92	425.92 ± 23.44	456.38 ± 30.98
Average daily milk yield, ml	1747.0 ± 49.0	1922.4 ± 92.0	2073.2 ± 103.3
Fatyield, kg	27.55	29.18	35.51
Proteinyield, kg	16.03	17.16	18.89
Yield: fat + protein, kg	43.58	46.34	54.40

*$P \leq 0.05$; ***$P \leq 0.001$

by 0.82%, protein by 0.09%, lactose by 0.09%, SOMO by 0.19%, salt by 0.01% and density by 0.12 A°, in relation to the second lactation is also higher, respectively, 0.93%; 0.11%; 0.1%; 0.23%; 0.01% and 0.18 A°.

Before the start of the breeding campaign, the ewes were weighed (Table 6).

The live weight of ewes ranged from 66.03 kg to 71.28 kg. The obtained results indicate that Assaf breed sheep are well acclimatized in the conditions of the Republic of Moldova and this breed can be further bred in peasant and farm enterprises.

Conclusions

In general, for full lactation, 456.38 liters of milk were obtained from ewes of the third lactation, or by 60.58 liters more in comparison with ewes of the first lactation and 30.45 liters with ewes of the second lactation.

Indicators for the chemical composition of milk at ewes of the third lactation are higher in relation to ewes of the first and second lactations.

Based on the data obtained, it can be concluded that the sheep of the specialized dairy breed Assaf have acclimatized to the growing conditions in the Republic of Moldova and can be successfully used in breeding.

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Table 5. Chemical composition of Assaf sheep milk, (%)

Indicators	Lactation, M ± m		
	first	second	third
Fat	6.96 ± .11	6.85 ± 0.31	7.78 ± 0.21
Protein	4.05 ± 0.06	4.03 ± 0.05	4.14 ± 0.06
Lactose	3.83 ± 0.06	3.82 ± 0.05	3.92 ± 0.06
SOMO	8.54 ± 0.12	8.50 ± 0.11	8.73 ± 0.13
Salt	0.62 ± 0.01	0.62 ± 0.01	0.63 ± 0.01
Density, A°	27.94 ± 0.39	27.88 ± 0.64	28.06 ± 0.66

Table 6. Autumn weighing of ewes

Indicators	Age 2 years	Age 3 years	Age 4 years
M ± m	67.88 ± 1.90	71.28 ± 1.77	66.03 ± 1.45
σ	6.01	7.69	6.66
Cv, %	8.86	10.80	10.08
n	11	20	22

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