EVALUATION OF MORPHOLOGICAL AND REPRODUCTIVE PARAMETERS IN TIGAIA SHEEP BREED OF RUSTY VARIETY

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Abstract

The purpose of this paper is to make an assessment on the main parameters and on some reproductive aspects of morphology young and adulde sheep, belonging to race Tigaia of rusty variety. The study was conducted on a total of 130 adult sheep and 127 lambs lambed in the spring of 2010. Working methods used are specific to this type of research and refers to the weighing and body measurements, free assessments and statistical calculations. Analysis of reproductive indices show that fecundity is 95%, prolificacy 105% - 115% and 97.6% fertility. Values obtained from the measurements bodily adult animals show that the studied sheep, is characterized by a pear-shaped body form, with height 59.9 cm, rump height 62.84 cm, chest depth 28.77 cm having an average body weight 49.6 kg. Regarding the mean body size in young sheep aged 28 days, they indicate that, in the first period of life youth grow mainly in length and height and then in width. In this study, it can be concluded that Tigaia sheep bred of rusty variety, is characterized by a dolicomorf body form, with a relatively small body development, if we refer to body weight. Evaluation of breeding indices show a very good fecundity, but a reduced fecundity compared to other breeds.

Key words: sheep, morphology, reproductive parameters

INTRODUCTION

The genetic improvement of animals is generally for economic reasons. Economic and biological efficiency of livestock farms can be improved in general, by increasing the reproductive capacity [3]. Reproduction is a complex feature that includes puberty, ovulation, estrus, fertilization, embryo implantation, pregnancy, parturition, lactation, and maternal skills. Genetic effect on each component of reproduction varies [4]. Although reproductive characters are influenced by multiple genes, a limited number of major genes associated with separate components of reproduction have been reported in sheep [1; 2; 10]. Expressions of genetic effects on reproduction are affected by many environmental factors such as season, climatic conditions, management, health, nutrition, number of sheep distributed to a ram, ewe age, libido and fertility of ram.

The paper is divided into two parts, first part refers to the breeding organization, where they were studied breeding technology used in farming and breeding indices and the second part contains information on the outside of the sheep studied, namely the degree of body development young sheep and adult sheep. After body measurements were calculated body indices, and based on their body conformation was assessed.

MATERIAL AND METHODS

The biological material studied was represented by two types of sheep: adult female and young sheep lambed in spring 2010. The number of sheep studied was 130 ewes and 127 lambs of different ages (0 - 6 months), belonging to Tigaia (Tzigai) breed, Variety rusty.

Assess the degree of body development, we used biometric method that was based on direct measurement of the different regions of animal and focused mainly on mass measurements. Measurements were made in good conditions, animals being brought into a sitting position level and placed. The instruments used for making these

determinations were: compass Wilkens, zoo meter, ribbon and metric scales.

Estimation of the reproduction function in sheep populations studied was done properly based on breeding indices. Data gathered through investigations conducted were processed with Ms Excel spreadsheet application.

RESULTS AND DISCUSSION

1. Reproductive parameters. Technology applied in breeding farm in question is based on traditional elements. Thus, the SCDCOC Secuieni - Bacau, we performed controlled natural mating. Before the mating season, there was no prior preparing in the supplement feed rations.

Breeding season began, naturally, at the beginning of autumn (1 September), with decreasing light intensity. The first heat started to appear around the 15th of September. Heats were held over three months, until after 15 November.

The gestation period (150 days), the sheep did not have a care or additional feeding; animals were kept on pasture day and night in shelters in the first half of pregnancy (October-November), and permanent stalls in the winter.

Lambing began in the second half of January and was conducted by mid-April. Both before and immediately after birth, the sheep received proper care. 2 days before parturition, ewes were separated from the rest of the herd, being kept in pens with litter clean, dry and free of drafts. During calving each animal was watched, nurses, ensuring that parturition took place in normal conditions and that each lamb had access to colostrums in the first hour after birth. From birth to weaning of lambs, sheep were kept together with them.

The efficiency of sheep, regardless of operating system, depends largely on the value of specific indices of breeding activity. Analysis of this activity is based on actual values of the breeding indices obtained following each breeding season. Increasing indices of breeding has special significance because the profitability of sheep depends on their size. For breeding efficiency rating, using the following indices: the index of fecundity, the index of prolificacy, fertility index, birth index [4; 8].

Framing fecundity index in normal limits is where, at the end of the plan, it exceeds 95% of the total herd. In the population studied, the average value of this index is 97.6%, slightly higher than that reported by the literature for the same race [9] (Table 1).

Table 1. The main breeding indices specific to rusty Tzigai bred sheep depending on age

Specification	Unit	Sheep age at birth (years)				Total
		3	4	5	6	
Number of ewes assigned for mating	Heads	33	27	20	50	130
Number of ewes mated		33	27	19	47	126
Number of ewes aborted		2	1	1	2	6
Number of ewes that have lambed		31	26	17	43	117
Number of lambs lambed		35	27	18	43	123
Number of non-viable lambs		0	0	0	0	0
Number of lambs dead		0	0	0	0	0
Number of aborted fetuses		2	1	1	2	6
Fecundity index	%	100	100	94.7	95.7	97.6
Prolificacy index		113	103.8	105.9	100	105.1
Birth index		93.9	96.3	89.5	91.5	92.9
Fertility index		106.1	100	94.7	91.5	97.6

Although the twins and multiple births are hereditary, however, this physiological trait is strongly influenced by diet, which is the decisive factor in the action. Given that the population studied, no flushing nutrition was applied, the values of the fecundity index was one pretty good. Also, this index is not the same throughout the animal's life, it decreases as aging animal. Prolificacy of sheep studied, developed in inverse proportion to age of the sheep. Thus, the highest value was recorded in sheep of the youngest (3 years) respectively 113% and decreased with age of sheep, up to a value of 100% for the six years of age.

Mean fertility index in sheep studied was approximately 93%. Because the percentage of abortions was relatively small (about 5% of ewes mated), this led to the recording of good values of the birth index for three and four years old sheep (approximately 94% and 96%). Although the index values for sheep aged five and six years was lower (about 90% and 92%), they were not caused by a significant number of abortions, but by non-fertility of ewes. The data presented above, it can be concluded that in terms of function breeding sheep studied are characterized by high fertility and prolificacy, but also a good fertility and birth rates for this species, which highlights an improved breeding, applied on the farm.

2. Morphological aspects. Peculiarities of the outer body are some of the most important components of sheep breeding process, operating in different directions. It covers a specific body conformation, determined by the degree of development and how d body regions merge, which reflects some productive capacity, a consequence of genetic and environmental factors working together, and some defects and qualities [7].

Body measurements in adult sheep showed that size is medium (59.90 cm) rear leg is more developed (rump height of 62.84 cm) than the foreleg. The chest is broad enough and deep (chest depth being 28.77 cm), abdomen well developed, ribs are short and curved. Rump length values and widths of the basin shows a very good development in sheep studied, which allowed a normal intrauterine fetal development. Also, adult females was determined by weight, during lactation (44.7 kg) before calving (49.6 kg) and two weeks after birth (42.73 kg), after which there was an increase until lambing weight (about 5 kg) and after lambing animals lost on average 7 kg (Table 2).

The values obtained for the most studied body size were similar to those reported by other researchers, the studies done on other flocks of sheep belonging to the same populations [5; 6].

Table 2. The main body size specific for adult sheep in Tzigai race

Specification	$\bar{X} \pm s\bar{x}$	V%	Limits	
			Minimum	Maximum
Height at withers (cm)	59.90 ± 0.67	4.06	56	64
Height at rump (cm)	62.84 ± 0.59	4.05	60	67
Oblique body length (cm)	60.27 ± 1.07	6.39	52	67
Chest depth (cm)	28.77 ± 0.38	4.74	27	31
Rump length (cm)	21.77 ± 0.52	8.62	19	26
Rump wide at hip (cm)	21.69 ± 0.41	8.44	15	22
Rump width at Ischia (cm)	16.30 ± 0.43	9.49	13	18
Chest width (cm)	20.44 ± 0.36	8.12	18	21
Thoracic perimeter (cm)	89.69 ± 0.69	2.78	86	93
Tarsus bone perimeter (cm)	8.19 ± 0.20	9.05	6.5	9.2
Body weight (kg)	44.7 ± 0.55	6.12	39	49.5
Body weight before lambing (kg)	49.6 ± 0.70	4.48	45	53
Body weight after lambing (kg)	42.7 ± 0.95	8.02	38.5	47

Following statistical analysis of data on the main body size, we can notice a relatively small variability between individuals in populations analyzed, which can be explained by the fact that the adult sheep body development is a character with high heritability.

Body development of lambs after the first month of life was highlighted by body measurements of growth. At birth, height and tarsus perimeter are greater than the length and width, which means that their conformation at this time is different from an adult animal, regardless of race. Body and head are short, shallow body, high narrow feet, where it appears that the growth of body region are conducted in an uneven pace. Values for height at withers (45.4 cm) and rump (46.8 cm) shows that the top line is an upward trend, from front to rear, as with adult females (Table 3).

Table 3. The main body size of young sheep of Tzigai race at the age of 30 days (cm)

Specification	n	$\bar{X} \pm s\bar{x}$	V%	Limits	
				Minimum	Minimum
Height at withers	25	45.4 ± 1.5	7.40	41	50
Height at rump	25	46.8 ± 1.41	6.78	42.5	51
Oblique body length	25	46.8 ± 1.56	7.46	43	50
Chest depth	25	17.8 ± 0.86	10.8	15	20
Chest width	25	14.6 ± 0.71	9.65	12	15
Rump wide at hip	25	11.6 ± 0.19	3.66	11	12
Rump width at Ischia	25	6.9 ± 0.17	12.7	5	8
Thoracic perimeter	25	56.7 ± 1.34	5.27	51.5	59
Tarsus bone perimeter	25	6.6 ± 0.18	6.34	6	7

n – Number of heads

Oblique length of the trunk (46.8 cm), shows a fairly large-sized animal, while the width, more modest, characteristic of increasing youth.

Regarding the development of the basin, it is narrow, as indicated by the values of the hip rump width and rump width of the Ischia bone, which were close in value (11.6 cm, 6.9 cm respectively).

Tarsus perimeter had a mean of 6.6 cm, a value that reflects a frame developed that will provide resistance to grazing animals in hilly and mountainous areas.

Determination of growth and physical development of young sheep is of particular importance, especially economically, more precisely, wants an increase based on higher growth rate of sheep breeding and accelerate body growth and development. Thus, it is desirable that, at the age of six months, sheep are expected to reach about 60% of adult weight [7].

Main body dimensions were assessed and young sheep, aged six months. The dimensions of height at withers and height at rump, increased 7.25 cm and 6.8 cm respectively, compared with the same size at one month lambs, values representing 88% and 85% of body size values of adult females.

If in adult sheep oblique length of the trunk was higher than the height at withers in young sheep aged 6 months have seen a lower value of this dimension.

Tarsus perimeter at this age, represented 83.4% of the adult and chest area, only 68.3%, confirming that young sheep first increase in the lengths and heights and then in width (Table 4).

Table 4. The main body size of young sheep of Tzigai race at the age of 6 months (cm)

Specification	n	$\bar{X} \pm s_{\bar{x}}$	V%	Limits	
				Minimum	Minimum
Height at withers	25	52.65 ± 0.64	6.1	47	58
Height at rump	25	53.62 ± 0.44	4.1	50	56
Oblique body length	25	50.27 ± 0.66	6.57	47	57
Chest depth	25	21.17 ± 0.3	7.07	18	25
Chest width	25	17.85 ± 0.24	5.36	16	19
Rump wide at hip	25	19.21 ± 0.14	6.36	10	12
Rump width at Ischia	25	10.20 ± 0.20	4.38	10	11
Thoracic perimeter	25	61.21 ± 0.99	8.07	51	68
Tarsus bone perimeter	25	6.83 ± 0.08	5.97	6	7

n – number of heads

For a more efficient exploitation of data derived from body measurements taken, we calculate the body indexes. Values obtained by calculating these indices, provided relevant information relating to the harmonious development and the morph-productive type that characterize sheep studied. The body indexes covered these determinations are those which are commonly used in the practice of livestock in this species, indices that gave information on the format of the body, and the proportion of muscle mass developed regions.

In the case of sheep studied, *body-side index* had a value of 100.6%, the value of this index is greater than 100, indicating that body size is rectangular (length of the body representing the large size). This indicates a mixed production type with specific values for Tzigai race.

The low *transverse body index* (34.12%) provide relevant information according to which, Tzigai breed sheep are morph-productive type of milk.

Croup index had a value close to 100, reflecting a particularly developing croup width, indicating the possibility of adequate fetal development during pregnancy (Table 5).

Table 5. Bodily indices specific for adult sheep in Tzigai bred

Specification	%
Body-side index	100.6
Transverse body index	34.12
Croup index	99.6
Skeleton index	9.13
Massive index	149.7

Skeleton index calculated at a value of 9.13%, show that sheep studied presents a well-developed frame, specific for animals specialized in milk production.

The value obtained by calculating *massive index* (149.7%), give us information indicating that, Tzigai sheep breed is characterized by a relatively large massively, reflecting a strong skeleton.

Values of body format in young sheep have varied according to age.

Index of body-side format on a month-old lambs was 2.5% higher than the value recorded for adult sheep, and at age six months, the value of this index decreased to 95.48% (Table 6).

Table 6. Bodily indices of young Tzigai sheep at different ages

Specification	1 month	6 months
Body-side index	103.1%	95.48%
Transverse body index	32.16%	33.9%
Croup index	11.64%	11.16%
Skeleton index	126.8%	116.26%

As with adult sheep, the *transverse body index* was specific to breeds for milk production skills. Value of the *massive index* increases in the life of sheep from birth to adult age and then remains constant.

CONCLUSIONS

Analysis of reproductive indices, show that sheep bred Tzigai of rusty variety is characterized by a fecundity approaching 100%, but with a relatively low and decreasing prolificacy with the age of sheep.

Data on their morphology highlight a medium body, a pear-shaped body-form and a robust constitution, specific to animals resistant in poor environmental conditions.

REFERENCES

Journal articles:

[1] Bradford, G.E., Quirke, J.F., Sitorus, P., Inounu, I., Tiesnamurti, B., Bell, F.L., Fletcher, I.C., Torell, D.T. 1986 - Reproduction in Javanese sheep: evidence for a gene with large effect on ovulation rate and litter size. Journal of Animal Science. Vol. 63: pp. 418 - 431.

[2] Davis, G.H., McEwan, J.C., Fennessy, P.F., Dodds, K.G., Farquar P.A., 1991 - Evidence for the presence of a major gene influencing ovulation rate on the X chromosome of sheep. Biology of Reproduction, vol. 44, pp. 620 - 624.

[3] Dickerson, G.E., 1970 - Efficiency of animal production-molding the biological components. Journal of Animal Science, vol. 30, pp. 849 - 859.

[4] Safari, E., Fogarty, N.M., Gilmour, A.R., 2005 - A review of genetic parameter estimates for wool, growth, meat and reproduction in sheep. Livestock Production Science, vol. 92, pp. 271 - 289.

Books:

[5] Mochnacs, M., Taftă, V, Vintilă, I., 1978 – Genetica şi ameliorarea ovinelor. Editura Ceres, Bucureşti.

[6] Pascal, C., 2007 – Creşterea ovinelor şi caprinelor. Editura PIM, Iaşi.

[7] Taftă, V., 2008 - Creşterea ovinelor şi caprinelor. Editura Ceres, Bucureşti.

[8] Tănase, D., 1995 – Biologia şi patologia reproducţiei animalelor. Editura Ion Ionescu de la Brad, Iaşi.

[9] Ştefănescu, C., Ciolcă, N., Taftă, V., 1973 – Zootehnia României. Ovine. Editura Republicii Socialiste România.

Article in book:

[10] Piper, L.R., Bindon, B.M., 1982 - Genetic segregation for fecundity in Booroola Merino sheep. In: Genetics of Reproduction in Sheep. R. A. Barton and D. W. Robinson, eds. Butterworths, London. Page 159 – 168.