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PRELIMINARY RESEARCH ON THE PHENOTYPIC CHARACTERIZATION OF THE TSURCANA BREED, FOR PRODUCTION AND TYPE TRAIT

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Abstract

The aim of the present paper is the phenotypic characterization of the varieties of the Tsurcana sheep breed, for exterior and production characters, in order to answer the question of whether or not these herds represent different subpopulations of the same sheep breed. The study was conducted on a flock of 1165 Tsurcana sheep breed, within the DACIA Association located in several farms in the country, structured on four varieties: Oacheșă, Belă/Bălă, Breazăă, Bucălae, 7 exterior characters (height at withers, average width of chest, average length of rump, oblique length of trunk, chest depth, perimeter of the whistle) and 2 production characters (wool weight and average daily weight gain) were analysed. Simple population statistics (arithmetic mean, standard deviation, coefficient of variability) were used for phenotypic characterization. The results obtained on comparison pairs revealed, in most characters, very significant differences between the four varieties. To the extent that the experimental results will show that the four varieties are also significantly different from the genomic point of view, for the future the possibility of developing separate breeding programs for each variety will be considered.

Key words*: breeding program, phenotypic characterization, production traits, type traits, variety.*

INTRODUCTION

Sheep breeding is an important component of the livestock production sector in Romania, contributing, through the variety of productions made, to ensuring the food security of the population. The ovine sector can also supply significant quantities of products for export to countries with a tradition of sheep meat consumption.

After 1990, as a result of the dramatic decrease in the price of wool, subsidized by the state in the past socio-economic system, there was a reorientation of the directions of exploitation of sheep, towards milk and meat production. In this context, sheep breeding programmes have been reorganised on new bases to meet the demands of the market economy.

The Tsurcana breed is distinguished by its middle waist and dolicomorph or dolicomorph-mesomorph body format, presenting specific characters of rustic and late sheep, with a height at the rake between 55-68 cm in sheep and between 59-75 cm in rams, and the length of the trunk between 56-69 cm in sheep and 64-74 cm in rams. The head is elongated and relatively narrow, with the profile straight to sheep and slightly convex to rams, the ears are small and thin. In general, sheep are horned and only 10-15% have small horns, instead the rams have large and strong spiral twisted horns with the tips pointing outwards. The neck is long and thin, the rake, the spine and the shawls are relatively narrow, the croup is narrow, short and oblique, the thighs and buttocks are poorly developed, the chest tight, the limbs relatively long, thin, but very strong. The trunk has an average development, and the abdomen is bulky, facilitating the attachment of a globular mammary gland. Wool is characteristic of the breed, being coarse, with very long strands (about 20-30 cm) and a wide base that narrows to the tip. Incidentally, the name "turkey" comes from the appearance of a fleece strand similar to an icicle (Taftă, 2008).

The Tsurcana breed adapts well to different environments, having the best adaptation to mountain conditions. However, it can also be

grown in hill and lowland areas, and even in plain areas in summer. This breed is difficult to withstand heat in dry years, preferring to rest in sheds or shaded areas during high-temperature hours. Grazing is carried out, in particular, in the cooler hours of the day, and in the summer periods, it is recommended to graze at night, between 20:00 and 06:00. Remarkable resistance to weathering is given by the thick and long wool of the breed, which facilitates the drainage of water. In cold conditions, the nails have a strong consistency and the Tsurcana sheep has an increased resistance to respiratory diseases. In the autumn period, this breed accumulates internal fat deposits of about 20 kg, which it uses during periods of stabulation as an energy reserve. Compared with fine wool breeds, the maintenance costs in the winter period are two to three times lower (Camalesa, 1975).

Tsurcana lends itself to long transports and can be maintained outdoors in plain areas, even in winter, until close to the calving period.

The Tsurcana breed is mined mixed in different regions, depending on the priorities of breeders, such as milk, meat and wool production. In Sibiu, Brasov and Caransebes areas, the focus is on meat and milk, while in Alba, Hunedoara and Gorj, it focuses on meat and skin. In the area of Moldova, the breed is valued mainly for the production of milk and wool, depending on the specialization of breeders. Tsurcana has an average milk production potential of about 100 +/- 40 litres for primiparous sheep and 150 +/- 50 litres for tweens calving sheep, for a period of 200 days of lactation. The fat content in milk is about 7-8%, and the protein content is about 6%. Tsurcana milk is very good for the production of white cheese, yogurt, cheese and fatty cheese used in pizza preparation. At birth, lambs weigh about 3-4 kg. At 30 days, their weight is 9-12 kg, and at 90 days they reach 20-25 kg (Pădeanu, 2014).

At 150 days, their weight is about 30 kg. If lambs are fed with additional feed from the age of 10 days, they can reach a weight of 15-17 kg in about 45 days, with an average daily increase of about 250-275 g (Pascal, 2004).

In the case of maintenance of mother sheep and lambs on pasture, the average daily growth is between 150-180 g, under optimal conditions. Weaned lambs at the age of 2.5-3 months and intensively fattened can reach a weight of about 40-47 kg at 7-8 months (Pascal, 2004).

The meat-fat ratio is about 3:1. Tsurcana meat is higher in fat, but it contains significant amounts of conjugated linoleic acid (CLA), around 5.5 milligrams per gram of fat, which has a beneficial effect on the endothelium of human blood vessels, in contrast to cholesterol-rich pork fat. The slaughter yield is about 42-45% in adults and 50-52% in fatted lamb. The weight of adult sheep varies depending on the ecotype. In the areas of the Apuseni Mountains, Maramures and the hilly areas of Moldova, Tsurcana sheep have a small body weight, about 30-45 kg for sheep and 50-70 kg for rams, and, while in the areas of Mures, Brasov and Vrancea body weight is average, between 40-50 kg for sheep and 60-80 kg for rams. The greatest weights are found in the early Tsurcana sheep from the Sibiu, Alba and Jiu Valley breeding basins, where the sheep can reach 45-60 kg, and the rams at 70-100 kg, with records of 110-120 kg. The slaughter yield is lower, about 48-52% in fattened lambs and only 40-44% in adults (Taftă et al., 1998). Another undesirable aspect in meat production, especially in adults, is the large proportion of fat in the carcass, with a meat-fat ratio of 2:1 to 3:1, which is not, versus 5:1 in meat breeds. The low slaughter yield and the high proportion of fat in the carcass, associated with a higher specific feed consumption per kilogram of growth, are characteristics that require improvement (Neață & Vintilă, 2023).

Tsurcana sheep produce an average of 2-4 kg of wool, while rams produce between 4-6 kg. The length of the wool strand is about 25 cm. Wool fibres have different thicknesses: long fibres of 50-100 microns, intermediate fibres of 35-45 microns and lengths of 12-15 cm, and short fibres of 25-35 microns and length of 9 cm. This variety of wool fibres is suitable for making oriental carpets.

The Tsurcana breed, through its outstanding performance in the direction of milk production, and its satisfying growth spores, can be a valuable genetic resource in the direction of increasing milk and meat production, with various specialized breeds, on the English model of ecological layering (Pascal, 2004).

However, in order to participate in such an improvement programme, there is a need for

selected populations in endogamy in order to strengthen the desired genetic characteristics.
In this context, the present paper is also included, which aims to proceed to the phenotypic characterization of the four varieties of the Tsurcana (Oacheșă, Belă/Bălă, Breazăă, Bucălae), which, to determine whether or not they are different.
The existence of significant differences between these varieties will create the premises for their consideration as distinct subpopulations, with the elaboration of separate breeding programs for each variety (Neață & Vintilă, 2023).

MATERIALS AND METHODS

In order to achieve the proposed objective, the study was carried out on a herd of 1165 sheep belonging to the Tsurcana breed, registered in the genealogical register, within the Dacia Association, Hunedoara, located in several farms in different counties of the country, structured on the four varieties mentioned above:
a) Tsurcana Bălă (570 animals)

Figure 1. Turcană Bălă variety (Taftă, 2008)

The Bălă Variety, has the head and limbs with white wool or sometimes small black spots near the lips or eyes, without staining their face and turning them into white sheep with splashed face. They have a coarse and very long wool (30-35 cm) with an optimal structure between the fibres. They are harmonious sheep with a medium body weight (sheep 50-60 kg and rams 78-100 kg) and mixed productions (Neață & Vintilă, 2023).

b) Tsurcana Breazăă (279 animals).

Figure 2. Tsurcana Breazăă variety (Taftă, 2008)

The feature of this subpopulation is the distinctive design of the face, with cheeks of dark brown to glossy black colour framed by a narrower or wider white gap in the form of the letter "V" or imperfect triangle, with a base in the forehead area (horns) that descends to the edge of the upper lip. It is very important to note that the characteristic gap, correlated with high milk production, above the population average in animals retained for breeding, has over time created a positive correlation between phenotypic appearance and milk production (Neață & Vintilă, 2023).
c) Tsurcana Oacheșă (200 animals).

Figure 3. Tsurcana Oacheșă variety (Taftă, 2008)

The sheep of the Oacheșă variety have a circular outline around the eyes. This population was created over time by careful selection of rams with the same characteristics, which were paired with sheep that had the same pattern of distribution of black spots (Neață & Vintilă, 2023).

d) Tsurcana Bucălae (116 animals)

Figure 4. Tsurcana Bucălae variety (Taftă, 2008)

The Bucălae Variety of the sheep breed Tsurcana has hair on the front of the head and extremities of the limbs of darker or lighter black colour. Lambs at birth are smoky in colour, and at the age of 5-6 months they become white, except for the extremities that remain chestnut. Lambs that at birth are dark smoky in colour at birth have black hairs in wool at maturity, which is a selection defect for wool production and are removed from breeding (Neață & Vintilă, 2023).

Thirteen outdoor characters were analysed (height at the withers, height at the croup, chest width, length of the groove, oblique length of the trunk, thorax depth and perimeter of the tibia, udder depth, udder perimeter, udder length, distance between nipples, nipple perimeter and length of the nipples) and two production characters (wool weight and average daily weight gain).

For phenotypic characterization were used simple population statistics (arithmetic mean, standard deviation, coefficient of variability as follows:

- **Average** ($\bar{X}$): $\bar{X} = \frac{\Sigma(X_i)}{n}$
- **Variation** (S^2): $S^2 = \frac{\sum\left(X_i - \overline{X}\right)^2}{n-1}$
- **Standard deviation** (S): $S = \sqrt{S^2}$
- **Media error** ($s_{\bar{X}}$): $s_{\bar{X}} = \sqrt{\frac{S^2}{n}} = \frac{s}{\sqrt{n}}$
- **Coefficient of variability** (CV %): $CV(\%) = \frac{S}{\overline{X}} \cdot 100$

in which "n" represents the number of animals with performances and X_i, the character analysed, to the individual "i".

RESULTS AND DISCUSSIONS

The obtained results are structured on couples of varieties of the breed Tsurcană (Oacheșă-Bălă, Oacheșă-Brează, Oacheșă-Bucălae, Bălă-Brează, Bălă-Bucălae și Brează-Bucălae), for tree character categories: a) exterior characters describing the overall body conformation (height at the withers, height at croup, chest width, groove length, oblique trunk length, chest depth and whistling perimeter); b) exterior characters describing udder conformation (depth of udder, udder perimeter, udder length, nipple distance, nipple perimeter and nipple length) and c) production characters (wool weight and average daily weight gain).

Table 1. Average performance of the Tsurcană population for outdoor characters describing overall body conformation

Varity (couple)	N	Character						
		Height at the withers (cm)	Height at the croup (cm)	Chest width (cm)	Length of the groove (cm)	Oblique length of the trunk (cm)	Thorax depth	Perimeter of the tibia (cm)
Oacheșă-Bălă	150-211	74.62±0.368 72.51±0.310 t=4.37***	73.57±0.272 70.28±0.181 t=10.061***	23.96 ±0.152 27.39±0.212 t=13.141***	23.90±0.142 26.92±0.176 t=13.362***	70.12±0.434 81.53±0.307 t=21.447***	40.68±0.317 42.02±0.296 t=3.094**	9.10±0.061 9.41±0.046 t=4.025***
Oacheșă-Brează	150-193	74.62±0.368 76.41±0.300 t=3.77***	73.57±0.272 74.15±0.248 t=1.576^{NS}	23.96±0.152 29.87±0.189 t=24.13***	23.90±0.142 29.65±0.224 t=21.616***	70.12±0.434 87.44±0.498 t=26.084***	40.68±0.317 40.75±0.259 t=0.171 ^{NS}	9.10±0.061 9.13±0.078 t=0.303 ^{NS}
Oacheșă-Bucălae	150-116	74.62±0.368 73.30±0.381 t=2.49*	73.57±0.272 66.76±0.397 t=14.158***	23.96±0.152 34.38±0.290 t=31.768***	23.90 ±0.142 36.87±0.413 t=29.679***	70.12±0.434 88.15±0.739 t=21.038***	40.68±0.317 47.07±0.156 t=9.328***	9.10±0.061 9.05±0.061 t=0.574 ^{NS}
Bălă-Brează	211-193	72.51±0.310 76.41±0.300 t=9.03***	70.28±0.181 74.15±0.248 t=12.56***	27.39±0.212 29.87±0.189 t=8.73***	26.92±0.176 29.65±0.224 t=9.578***	81.53±0.307 87.44±0.498 t=10.085***	42.02±0.296 40.75±0.259 t=3.231**	9.41±0.046 9.13±0.078 t=3.111**
Bălă-Bucălae	211-116	72.51±0.310 73.30±0.381 t=1.60^{NS}	70.28±0.181 66.76±0.397 t=8.073***	27.39±0.212 34.38±0.290 t=19.470***	26.92±0.176 36.87±0.413 t=20.772***	81.53±0.307 88.15±0.739 t=8.264***	42.02±0.296 47.07±0.156 t=14.820***	9.41±0.046 9.05±0.061 t=4.736***
Brează-Bucălae	196-116	76.41±0.300 73.30±0.381 t=6.47***	74.15±0.248 66.76±0.397 t=15.79***	29.87±0.189 34.38±0.290 t=13.03***	29.65±0.224 36.87±0.413 t=15.041***	87.44±0.498 88.15±0.739 t=0.795 ^{NS}	40.75±0.259 47.07±0.156 t=12.185***	9.13±0.078 9.05±0.061 t=0.808 ^{NS}

The conformation and production characteristics of the udder were not measured and recorded for the Tsurcana Bucălae variety.

The external characteristics describing the overall body conformation

Table 1 shows the average performance of the Tsurcana population for outdoor characters describing the overall body conformation. From the results presented in Table 1, by comparison couples (Oacheşă-Bălă, Oacheşă- Breazăă, Oacheşă-Bucălae, Bălă-Breazăă, Bălă-Bucălae and Breazăă-Bucălae), it is noted that in most characters there are very significant differences between the four varieties, which reveals that the four varieties are different taxonomic units.

The results obtained are consistent with other results cited in literature (Camalesa, 1975; Taftă et al., 1998; Taftă, 2008). An udder as harmonious as possible in its entirety. To achieve this goal, it is required that the udder has certain dimensions in terms of depth, perimeter, width, distance between nipples, perimeter and length of nipples.

From the data presented in Table 2, it is noted that there are very significant differences at all characters and couples of varieties, with the exception of the length of the nipples, which proved to be insignificant, between the varieties Oacheşă and Bălă.

Table 2. Average performance of the Tsurcană population for outdoor characters describing udder conformation

Variety (couple)	N	Character (cm)					
		Udder debth	Udder perimetr	Udder length	Nipples distance	Nipples perimetr	Nipples length
Oacheşă-Bălă	150-111	11.84±0.190 14.60±0.032 t=14.375***	34.01±0.422 41.86±0.183 t=17.065***	15.71±0.074 16.65±0.097 t=7.704***	10.31±0.122 8.49± .081 t=12.465***	4.101±0.005 5.772±0.006 t=17.62***	4.956±0.006 6.680±0.006 t=1.627 ^{NS}
Oacheşă-Breazăă	150-160	11.84±0.190 16.18±0.195 t=15.955***	34.01±0.422 36.69±0.525 t=3.976***	15.71±0.074 14.57±0.169 t=6.368***	10.31±0.122 13.75±0.230 t=13.180***	4.101±0.005 6.909±0.007 t=23.73***	**150-86** 4.956±0.006 5.8255±0.005 t=5.847***
Bălă-Breazăă	111-160	14.60±0.032 16.18±0.195 t=7.979***	41.86±0.183 36.69±0.525 t=9.298***	16.65±0.097 14.57±0.169 t=10.947***	8.49±0.122 13.75±0.230 t=21.557***	5.772±0.006 6.909±0.007 t=10.27***	6.680±0.006 5.825±0.014 t=6.043***

Characters of production

For the character of the wool weight, the results showed very significant differences between the three varieties of the Tsurcana breed (Oacheşă, Bălă and Breazăă).

As for the average daily gain, there were very significant differences between the Oacheşă-Bălă and Bălă-Breazăă varieties but insignificant between the Oacheşă-Breazăă varieties (Table 3).

Table 3. Wool weight and average daily spore in the breed Tsurcana

Varity (couple)	N	Character	
		Wool wight	Average daily gain
Oacheşă-Bălă	50-359	4.01±0.031 3.37±0.035 t=12.83***	230.93±2.181 200.67±2.798 t=8.531***
Oacheşă-Breazăă	50-86	4.01±0.031 3.70±0.026 t=6.93***	230.93±2.181 239.86±2.031 t=2.99^{NS}
Bălă-Breazăă	359-86	3.37±0.035 3.70±0.026 t=7.1***	200.67±2.798 239.86±2.031 t=11.33***

Following the statistical analysis of the experimental data, the following conclusions were highlighted:

1) Most of the differences observed between the four varieties of Tsurcana breed, for the characters of the overall body conformation, are very significant;

2) For all udder conformation characters, the differences between varieties are very significant, except for the length of the nipples;

3) For the wool weight and the average daily growth spore, the differences proved to be very significant, except for average daily gain between the varieties Oacheşă and Breazăă.

CONCLUSIONS

The results obtained from the point of view of the phenotypic characterization of the Tsurcana breed represent a part of a larger study, which will be completed with the genomic characterization of the breed.

To the extent that the experimental results will show that the three varieties are also significantly different from a genomic point of view, the possibility of developing separate breeding programmes for each individual

variety will be considered for the future, compared to the current situation, where only one breeding programme is applied for the entire Tsurcana super-race.

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