

# STUDY OF MORPHO-PRODUCTIVE TRAITS OF TELEORMAN BLACK HEAD SHEEP BREED COMPARED TO OTHER SPECIALIZED MEAT SHEEP BREEDS: A SYSTEMATIC REVIEW

A. Ciobanu<sup>1\*</sup>, M. Ivancia<sup>1</sup>, C. Pascal<sup>1</sup>, D. Simeanu<sup>1</sup>,  
A. Șerban<sup>1</sup>, R. Amariei<sup>1</sup>, Ș. Creangă<sup>1</sup>

<sup>1</sup>Faculty of Food and Animal Sciences, Iasi University of Life Sciences, Romania

## Abstract

The Teleorman Black Head Sheep is a native breed originating from the southern region of Romania, officially recognized as a distinct breed in 2010. It exhibits a dual-purpose production for both meat and milk. A breeding program was developed to enhance milk production, leading to an increased population throughout the country. Despite the ongoing improvement program for milk production in the Teleorman Black Head breed, it is characterized by a rectangular body shape, higher body weights compared to other native breeds, and increased average daily gain in lambs. Given these characteristics, a comparative literature study of the main morpho-productive traits of the Teleorman Black Head Sheep breed in relation to values recorded in other specialized meat-producing breeds, which are used as improvement breeds for these traits, is necessary. The collected data indicated that certain growth and body development traits (birth weight, weaning weight, average daily gain, adult weight) had values close to those recorded in specialized breeds but higher than values observed in other native breeds. This suggests the need for improved growth management and the use of this breed in breeding programs to obtain offspring with higher slaughter weights and superior carcass quality.

**Key words:** Teleorman Black Head, morphometric traits, comparative study

## INTRODUCTION

Some sources [1,2] mention that the foundation of the "Carabașe" sheep breed might have originated from the Țigaie sheep, brought to the southern part of the country from the Banat region. Through transhumance, this population of sheep came into contact with local Țigaie sheep in the north of the Black Sea, Bergamasc sheep on the Dalmatian coast, and Țigaie sheep with dark-colored wool from the Plevna region south of the Danube. The emergence of this new breed is attributed to passionate sheep breeders in the Teleorman area who cared for and selectively bred these individuals, resulting in a population of robust sheep well adapted to the conditions in the southern part

of the country. As a result, a competitive breed with mixed production capabilities has emerged, suitable for both hilly and flat regions but not well-suited for mountainous areas.

Over the past 20 years, a population of sheep with distinct external, productive, and reproductive characteristics has developed in Romania, primarily in the Teleorman region and neighboring counties. In popular terms, these sheep are referred to as "Carabașe," a term derived from Turkish meaning "black head".

In 2010, this breed was officially recognized by the National Agency for Animal Husbandry under the name "Teleorman Black Head Sheep" [3]. The

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\*Corresponding author: andrei.ciobanu9608@gmail.com

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most representative populations of this breed are found in Teleorman County. Rams and ewes were acquired from here and initially distributed to all counties in the southern part of the country, and later to Iasi, Vrancea, Covasna, Sibiu, Hunedoara, Timis, and Arad counties. They adapted well in lowland and hilly areas, but had a more challenging time acclimating to high hilly and mountainous regions, although some sources states that can adapt well in this area too [4-5].

The breed is enlisted in the national database of the genetic resources and in the FAO database for animal genetic resources [4].

With the implementation of the breeding programs and implicitly of the COP (Official Production Control) methodology for the ovine species in our country, the aim was to improve the genetic heritage and at the same time the production traits for the breeds of this species. The improvement of productive performance through the development of breeding programmes was also achieved by following the need or demand of the population for food obtained from sheep production [6]. Thus, in the case of some native breeds that have mixed production and cannot be highlighted by large quantities of a specific production, breeding programmes aimed at improving the lactogenic potential of animals of these breeds have been developed. The same has happened in the case of the Teleorman Black Head breed, which has mixed meat-milk production, but for which a milk production improvement programme has been developed [7,4].

Eurostat data [8] shows that Romania is the third country among the European member countries in terms of sheep meat production from 2018 to 2022, with 372290 tonnes carcass weight, providing 15% from the total mutton produced by EU members between 2018 and 2022. (Figure 1)

FAO data [9] shows an increase in the export of sheep meat, particularly to Middle Eastern countries. Thus, between 2018 and

2020, approximately 7,701,558 sheep were exported from Romania, ranking us second in sheep exports after Sudan. The main importers of sheep during this period were Saudi Arabia, Kuwait, and Libya.

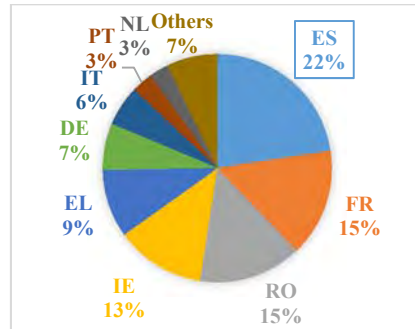


Fig. 1 Sheep meat production in EU 2018-2022 1000 Tonnes Carcass Weight

Taking into consideration these aspects, it is indeed necessary to study and promote indigenous sheep breeds with good productive capacities. This approach aims to help at maximizing their production, through breeding, thereby reducing the need for importing specialized sheep breeds. By maintaining and growing the population of indigenous breeds, Romania can continue to play an important role in the sheep meat trade within Europe and beyond. This strategy not only helps in preserving biodiversity and traditional farming practices but also ensures food security and economic stability in the country's livestock sector.

The information in this paper represents a preliminary study required for the preparation of the doctoral thesis titled "Research on the Genetic Determinism of Growth in Some Sheep Breeds".

## MATERIAL AND METHOD

In order to compile a comprehensive body of literature for this review, an extensive search was conducted across major bibliographic search engines. We relied on the expertise and coverage of well-established databases, including Elsevier, Scopus, Web of Science, and Google

Scholar, to ensure the inclusivity and thoroughness of our research.

Our approach to the search process was systematic and carefully structured, consisting of the following steps:

**Identification of Keywords:** We selected relevant keywords and phrases pertaining to our research topic. These keywords were chosen to capture a broad spectrum of literature and ensure that no pertinent studies were overlooked.

Knowing that Teleorman Black Head Sheep is an indigenous breed and relatively new formed, there are few researches made that contains the name of the breed.

**Inclusion and Exclusion Criteria:** To determine the eligibility of retrieved articles, we established clear inclusion and exclusion criteria. Articles were included if they were pertinent to our research topic, were published within a specified timeframe, and had full-text accessibility. Articles not meeting these criteria were excluded from our consideration.

The lack of a substantial number of studies related to this sheep breed necessitated the inclusion of research on other meat sheep breeds as well as other indigenous breeds to provide a clearer picture of the context in which this breed fits. This approach aims to highlight certain distinct characteristics that set it apart and that can be considered in future research to enhance the performance of this breed.

**Study Selection:** Our two-step process involved an initial review of titles and abstracts, followed by a thorough examination of full-text articles.

**Data Extraction:** The systematic extraction of data from each eligible article was conducted to compile relevant information. To maintain consistency and accuracy, we developed a standardized data extraction form. Data extraction was carried out by one researcher and cross-validated by the other researchers.

## RESULTS AND DISCUSSIONS

### The morpho-productive traits of Teleorman Black Head Sheep Breed (TBH)

The Teleorman Black Head Sheep distinguishes itself from other indigenous breeds through a series of distinctive characteristics. The head is long and straight, with a straight or slightly ram-like nose profile. Generally, they lack horns or have rudimentary ones. The head is sparsely covered with wool, and the ears are moderately long and semi-erect. The neck is of medium length, with a dewlap hanging at the anterior end [10, 7].

The fleece is represented by white wool with black tips. Lambs are born black with some shades of brown or tan, and the black tip remains as the wool forms into a coat. It gradually turns white as the lamb grows, although a few colored fibers may remain. All members of a herd share the distinctive feature of a black-tipped fleece on the anterior end of the neck, a highly characteristic trait that is especially important for animals selected for breeding [10,7].

The Teleorman Black Head Sheep Breed is considered to be part of the semi-fat sheep category. The females weigh between 75-80 kg, with a withers height of 71-75 cm, while the rams weigh between 95-115 kg and have a withers height of 83-92 cm. The conformation of this breed is mesomorphic, presenting a correct and harmonious build with sufficiently broad and deep body shapes, a strong back, tall withers, and substantial weight [11,12].

The body is long (82-92 cm), chest width is 20-24 cm, the backline is straight, and the croup is long and wide (24-30 cm). The withers are tall (68-85 cm), with strong, high limbs featuring flexible joints and tough hooves. The udder is deeply attached to the abdomen, wider than it is high, with well-defined udder fissure and vertically positioned teats [11,12]. Comparing these data with those found in the literature for sheep breeds specialized in meat production

and used as terminal breeds for improving this trait, it can be observed (Table 1) that the TBH sheep breed is on par with the values held by the other breeds concerning the body morphometric traits of adult animals.

**Body Weight (BW):** Teleorman Black Head exhibits the highest average body weight at 69.15 kg [11-12], followed closely by Suffolk with 63.08 kg [13]. Texel and Ile de France have relatively lower body weights at 57.32 kg [13] and 55.29 kg [14], respectively.

**Height at Withers (HW):** In terms of height at withers, the Teleorman Black Head breed showcases the tallest stature at 72.66 cm [11-12], emphasizing its mesomorphic conformation. Following closely, Suffolk displays a significant

height of 67.32 cm [13]. Texel and Ile de France present relatively shorter withers at 58.97 cm [13] and 66.67 cm [14], respectively.

**Chest Width (CW):** Suffolk leads the group with the widest chest at 26.24 cm [15], followed by the Teleorman Black Head breed at 25.24 cm [11-12]. Ile de France has a chest width of 21.23 cm [14], while Texel exhibits a relatively narrower chest at 18.45 cm [16].

**Torso Length (TL):** The Teleorman Black Head breed boasts the longest body length at 82.66 cm [11-12], indicating its more extended physique. Suffolk closely follows with 78.92 cm [13], while Texel and Ile de France have shorter body lengths at 68.48 cm [13] and 74.2 cm [14], respectively.

Table 1 Morphometric traits of TBH ewes in comparison to specialized meat breeds and indigenous breeds

Morphometric traits	TBH	Texel	Suffolk	Ile de France	Țigaie	Țurcană
BW (kg)	69.15 <sup>a</sup>	57.32 <sup>b</sup>	63.08 <sup>b</sup>	55.29 <sup>f</sup>	40.67 <sup>g</sup>	45.78 <sup>i</sup>
HW (cm)	72.66 <sup>a</sup>	58.97 <sup>b</sup>	67.32 <sup>b</sup>	66.67 <sup>f</sup>	60.2 <sup>g</sup>	66.60 <sup>i</sup>
HR (cm)	74.13 <sup>a</sup>	61.81 <sup>b</sup>	70.72 <sup>b</sup>	70.2 <sup>f</sup>	62.45 <sup>g</sup>	68.67 <sup>i</sup>
TL (cm)	82.66 <sup>a</sup>	68.48 <sup>b</sup>	78.92 <sup>b</sup>	74.2 <sup>f</sup>	68 <sup>g</sup>	66.12 <sup>i</sup>
CW (cm)	25.24 <sup>a</sup>	18.45 <sup>c</sup>	26.24 <sup>e</sup>	21.23 <sup>f</sup>	18.19 <sup>g</sup>	19.51 <sup>i</sup>
RW (cm)	25.78 <sup>a</sup>	21.51 <sup>b</sup>	29.46 <sup>e</sup>	24.89 <sup>f</sup>	19.02 <sup>g</sup>	18.4 <sup>i</sup>
CD (cm)	30.8 <sup>a</sup>	31.7 <sup>d</sup>	34.5 <sup>d</sup>	35.58 <sup>f</sup>	29.35 <sup>h</sup>	39.15 <sup>i</sup>
CG (cm)	104.7 <sup>a</sup>	89.06 <sup>b</sup>	100.68 <sup>e</sup>	90.98 <sup>f</sup>	82.46 <sup>g</sup>	82.98 <sup>i</sup>
CBC (cm)	8.34 <sup>a</sup>	10.3 <sup>d</sup>	8.5 <sup>d</sup>	7.6 <sup>f</sup>	7.14 <sup>g</sup>	4.37 <sup>i</sup>

Note: Data from [11, 12]<sup>F</sup>; [13]<sup>F</sup>; [16]<sup>F</sup>; [17]<sup>F</sup>, [15]<sup>P</sup>, [14]<sup>F</sup>, [18]<sup>F</sup>, [19]<sup>F</sup>, [20]<sup>F</sup>

**Height at Rump (HR):** Teleorman Black Head again exhibits a value of 74.13 cm [11-12]. Suffolk follows closely with a significant height of 70.72 cm [13], while Texel and Ile de France have relatively lower heights, at 61.81 cm [13] and 70.2 cm [14], respectively.

**Rump Width (RW):** Suffolk showcases the broadest rump, measuring 29.46 cm [15]. Teleorman Black Head follows with a rump width of 25.78 cm [11-12], while Texel and Ile de France exhibit narrower

rumps at 21.51 cm [13] and 21.4 cm [14], respectively.

**Chest Depth (CD):** Chest depth for Teleorman Black Head has a value of 30.8 cm [11-12]. Ile de France stands out with a significant chest depth of 35.58 cm [14], followed by Suffolk with 34.5 cm [17] and Texel with 31.7 cm [17].

**Chest Girth (CG):** Teleorman Black Head presents the largest chest girth at 104.76 cm [11-12], followed closely by

Suffolk at 100.68 cm [15] and Ile de France 90.98 cm [14].

Texel exhibit relatively smaller chest girth measurements at 89.06 cm [13].

Cannon Bone Circumference (CBC): Teleorman Black Head has a cannon bone

circumference of 8.34 cm [11-12], while Suffolk presents a relatively bigger measurement at 8.5 cm [17]. Biggest cannon bone circumference recorded between these breeds was for Texel, 10.3 cm [17] and smallest for Ile de France, 7.6 cm [14].

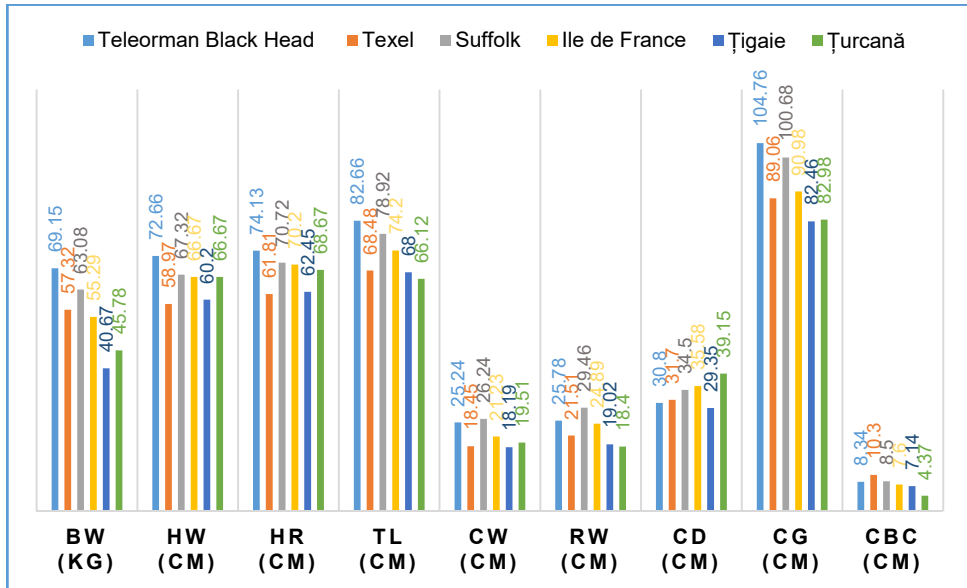


Fig. 2 Morphometric traits of TBH ewes in comparison to specialized meat breeds and indigenous breeds

The comparison made with the native sheep breeds Țigaie [18,19] and Țurcană [20] demonstrates that the Teleorman Black Head (TBH) breed exhibits superior values for all conformation and body constitution traits. This makes TBH a more suitable breed for crossbreeding to produce meat hybrids in all aspects of conformation and body constitution traits. (Table 1)

From a body index perspective, [12] has stated that the population of sheep in the Teleorman Black Head breed exhibits a robust bone structure, an ascending anteroposterior topline, and a hypermetric conformation with brachymorphic tendencies. All these characteristics recommend this breed for use in the production of commercial meat crossbreeds.

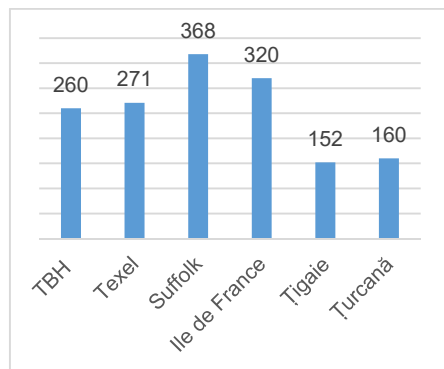


Fig. 3 Average daily gain for lambs between 30-90 days (g)

Another important trait monitored in the selection of sheep for meat production is the average daily weight gain. From the collected data [21, 22], the values for this trait within the Teleorman Black Head

(TBH) breed have been recorded in the range of 240-330 g/day. These values are lower compared to some specialized meat breeds but are superior when compared to other native sheep breeds (Figure 2)

Comparing the data regarding this trait, the heighest ADG (average daily gain) was recorded in the Suffolk lambs, with 368 g [23], followed by Ile de France, 350 g [24] and also Texel with 271 g [25]. As for the Țurcana and Țigaie breeds, the literature is showing values for ADG of 160 g and 152 g respectively.

Regarding the traits related to carcass, among the studied breeds, TBH stands out with the lowest carcass weight, averaging 10.14 kg [26]. In comparison, specialized meat breeds such as Suffolk and Texel exhibit significantly higher carcass weights, Suffolk breed with 17.2 kg [27], followed closely by Texel at 16.89 kg [28] and Ile de France [29]. In contrast, indigenous breeds

like Țigaie and Țurcană present substantially lower carcass weights in comparison to their specialized counterparts, with Țurcană being the lightest at 6.71 kg [30] (Table 2).

The data also reveals notable variations in slaughtering yield percentages among these breeds. TBH shows a slaughtering yield of 47.21% [26], indicating a lower proportion of live weight is converted into carcass weight. On the other hand, specialized meat breeds, including Texel, Suffolk, and Ile de France, demonstrate significantly higher slaughtering yields, with Texel leading at 58.3% [28], followed by Suffolk with 57.3% [31] and Ile de France with 56.49% [32]. Indigenous breeds, such as Țigaie and Țurcană, also exhibit lower slaughtering yields (42.33% and 37.78% respectively) [30] compared to the specialized meat breeds (Table 2).

Table 2 Carcass traits at 60 days slaughtering

Carcass traits	TBH	Texel	Suffolk	Ile de France	Țigaie	Țurcană
Carcass weight (kg)	10.14	16.89	17.2	14.63	8.1	6.71
Slaughtering yield (%)	47.21	58.3	57.3	56.49	42.33	37.87

**Milk production**

Determining milk production using the Fleischmann method revealed a modest average production of 120 kg over 165 days of lactation. [12]

The lactation curve shows a good start, beginning in the second month, followed by a continuous decline (Figure 4), with an average daily performance of 0.745 kg. The chemical composition of the milk recorded a fat content of 7.1% and a protein content of 5.54%.

These values indicate good efficiency in dairy product manufacturing [12].

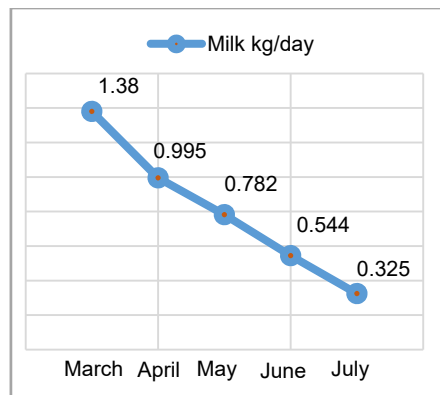


Fig. 4 Average milk production [12]

**Reproductive traits**

According to the literature [33, 34], it is mentioned that some reproductive traits, such as prolificacy, fecundity, and precocity,



have values ranging from 110% to 130%, 95%, and early sexual maturity, with mating starting at the age of 7-10 months.

In males, both testicles are descended and normally developed, uniform in size, with an elastic and well-attached scrotum, and the prepuce is evident, elastic, and mobile. The udder is deeply attached, with

a well-marked udder fissure and long, vertically positioned teats [3].

### Longevity

The average productive lifespan of a ewe is approximately six years before being culled, and the heritability determined for this trait by [35] is 0.097, making longevity a challenging trait to improve.

Table 3 Prolificacy of Teleorman Black Head breed in comparison to other sheep breeds

Trait	TBH	Texel	Suffolk	Ile de France	Țigaie	Țurcană
Prolificacy (%)	110-130	150	160-170	172	115 -120	100- 115
Reference	[34]	[36]	[37]	[24]	[38]	[39]

### Genetic research

Studies conducted on the Teleorman Black Head sheep breed [5] have shown significant differentiation in terms of genetic diversity compared to other indigenous breeds, such as Țurcana, Țigaia, and Rațca. Over time, gene exchange between these breeds and the Teleorman Black Head breed has been limited.

Research on gene polymorphism influencing milk production in this breed [40] has identified a positive association between the LGB gene (beta-lactoglobulin) and milk quantity and composition. This discovery indicates the potential of this gene as a marker gene in future marker-assisted genetic selection programs (MAS). Additionally, the PRL gene (prolactin) has been associated with increased milk production. [40]

Studies on the myostatin gene (MSTN), which is an inhibitor of skeletal muscle development, in this breed [41] have identified two genotypes, mm and Mm, in the analyzed sheep population. However, no significant associations were observed between MSTN genotypes and weight at one year of age. Previous studies have indicated significant effects of different MSTN genotypes on other traits such as birth weight and average daily gain. Additionally, a Hardy-Weinberg imbalance was observed in the distribution of MSTN

genotypes in the Teleorman Black Head sheep population [41].

### CONCLUSIONS

The literature data highlights good performance in terms of body development, some carcass traits, and strong reproductive capabilities for the Teleorman Black head breed. This breed approaches, or in some cases surpasses specialized meat production breeds in some body development traits. (BW, HW, TL, CG).

In comparison to indigenous breeds like Țurcana and Țigaia, TBH stands out with superior body development, higher average daily gains in lambs, and better carcass yield.

The data strongly supports the need for further research. Using the TBH breed in crossbreeding and selection alongside specialized meat production breeds could lead to hybrids with superior body development traits.

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