Comparative study on the average daily gain of Teleorman Black Head lambs reared on two farms in the NE of Romania

Andrei Ciobanu[1*], Mihaela Ivancia[1], Andreea D. Șerban[1], Dănuț D. Dronca[2], Răzvan Al. Popa[3], Șteofil Creangă[1]

[1] University of Life Sciences " Ion Ionescu de la Brad" Iași, Aleea Mihail Sadoveanu nr.3, Iași, 700490, România
[2] Banats University of Agricultural Sciences and Veterinary Medicine, Faculty of Animal Science and Biotechnologies, 300645, Calea Aradului 119, Timisoara, Romania
[3] University of Agricultural Sciences and Veterinary Medicine, 59 Marasti, 1 district, 011464 Bucharest, Romania

Abstract
Sheep flocks of the Teleorman Black Head breed started to grow and spread almost all over Romania since 2010 when this breed was homologated and a breeding programme was implemented to improve the productive traits of the animals within the breed, especially milk production. However, the animals of this breed have a large body size, a high growth gain for lambs and good carcass weights are obtained at slaughter. On the Romanian market, lambs that are not kept for fattening are destined for export, especially to Arab countries, or for slaughter and consumption during the period around Easter. Since average daily gain is a trait with medium heritability (h=0.16-0.45) [1], the environment in which animals are reared needs to be studied and optimized. The aim of this study is to identify the environmental factors that influenced the performance of young sheep from two farms in different areas in the NE of Romania. The biological material taken in the study was the lambs from the two farms, 277 in farm A and 380 in farm B obtained from the 2021 lambing campaign from a flock of 252 mother ewes in farm A and 376 mother ewes in farm B. The lambs were weighed according to the COP (Official Production Control) procedure, both at birth and at weaning. The average daily gain of lambs on farm A ranged from 229.5 g to 319.8 g, with an average of 273.23 g for females, and from 280.7 g to 405.7 g for males, with an average of 340.66 g, and on farm B from 243.2 to 275.2 for females, with an average of 259.43 g, and from 307.2 g to 408.5 g for males, with an average of 368.7 g.

Keywords: daily gain, lambs, Teleorman Black Head Sheep.

1. Introduction

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 [1]. 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 [2]. 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 is an indigenous breed, approved as a distinct breed in 2010 and has mixed meat-milk production, but for which a milk production improvement programme has been developed [3-4]. However, this breed, with its large body size and good daily gain in the young

* Corresponding author: Andrei Ciobanu, 0771607288, andrei.ciobanu9608@gmail.com

[5], also lends itself to producing carcasses with good slaughter weights.
According to European Commission data, in 2021, Romania ranked second in the EU in terms of the number of sheep slaughtered, after Spain, with a number of approximately 6360000 heads.
European Commission data also shows an increase in sheep meat exports from the EU to Arab countries in 2021 compared to 2020 (Figure 1).

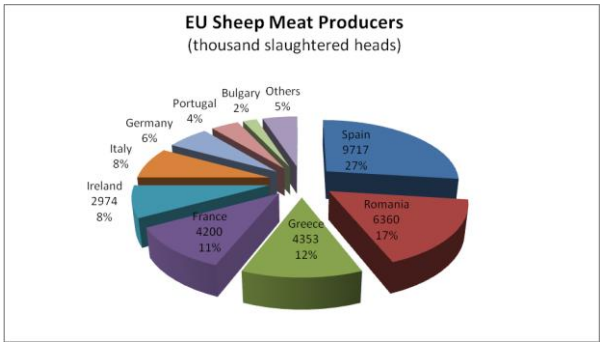

Figure 1. EU sheep meat producers [6]

It can be observed a trend of further increase in the demand for sheep meat in Romania, which determines the need to improve methods to increase this production for sheep breeds in the country.
The need for this study is based on the fact that it is important to identify and optimise the main environmental conditions that influence the expression of the average daily gain, given that the two farms studied use different rearing systems.
It is known that the average daily gain is a characteristic influenced by both internal and external factors [7-8], the present study identified only a part of the external factors, represented by feeding and the rearing system (microclimate).

2. Materials and methods

The biological material used was represented by two flocks of lambs from two different farms in the NE area of Romania, one from Iași county (farm A) and one from Botoșani county (farm B).
For the elaboration of this study, it was considered necessary to identify the systems of breeding and exploitation of the mother ewes from the two farms and the zootechnical records in terms of pedigree.
In farm A, the rearing system is extensive, where ewes were grazed all summer and during the lambing period, being given concentrates only in winter, during the stabling period. On farm B, a semi-intensive rearing system is applied, where the grazing period is alternated with periods of stabling in which the ewes are fed hay and concentrates. Also, on both farms, during the lambing period, mother ewes receive supplements of concentrated feed. Ewes on farm A are given concentrate feed made from a mixture of maize and sunflower cob as early as two weeks after lambing. In the case of farm B, lambs are fed at discretion with commercial concentrate feed intended specifically for lambs which also contains vitamin-mineral premix.
As for the pedigree of the sheep on the two farms, they have been enrolled in the productive performance control since 2017 and comply with the Teleorman Black Head breed improvement programme [9].
Following the 2021 lambing campaign, 277 offspring were obtained in farm A, of which 203 females and 74 males from 252 ewes and 11 rams, and 380 offspring were obtained in farm B, of which 180 females and 200 males from 376 ewes and 14 rams. The flocks of lambs on the two farms were grouped according to sex and suckling period, in accordance with COP methodology, which requires young sheep to be weaned between 50 and 80 days after lambing.
For birth weight and weaning weight, their values were averaged for all individuals by sex and the weaning period they were placed in: 50–60 day, 60-70 day and 70-80 day, respectively.
Determination of body weights of lambs was carried out according to the COP procedure by weighing them both at birth and at weaning. The data obtained were centralised in the informatic programme of the genealogical register of the Teleorman Black Head breed (https://rg.registrulgenealogic.ro). These data were then statistically processed and compared with the t-test for the average daily gain recorded on the two farms.

3. Results and discussion

In the flock of lambs on farm A, for both females and males, the average weaning weights and lambing weights were determined and the average daily gains were calculated for each group based on the lactation period (Table 1).

Table 1. Birth weight, weaning weight and daily gain averages for lambs from farm A

Farm A - Iași						
Sex	**n**		**Suckling period (days)**	**Average**		**Daily gain (g)**
				Birth weight (kg)	**Weaning weight (kg)**	
F	203	45	50-60	4.33	22.5	319.8
		85	60-70	4.33	22.3	270.4
		73	70-80	4	22.34	229.5
M	74	25	50-60	4.96	26.96	405.7
		22	60-70	4.87	26.09	335.6
		27	70-80	4.81	26.81	280.7

Average birth weights on farm A ranged from 4 to 4.33 kg for females and 4.81 to 4.96 kg for males (Figure 2). Weaning weights ranged from 22.3 to 22.5 for females and 26.09 to 26.96 for males (Figure 3). In terms of daily gain, for females, the highest value was recorded in the 50-60 days old weaned category, where the average daily gain had a value of 319.8 g. The same was observed for males, where the average daily gain had the highest value in the category nursed between 50-60 days i.e., 405.7 g (Figure 4).

For farm B, the same values were determined as for farm A (Table 2).

Table 2. Birth weight, weaning weight and daily gain averages for lambs from farm B

Farm B - Botoșani						
Sex	**n**		**Suckling period (days)**	**Average**		**Daily gain (g)**
				Birth weight (kg)	**Weaning weight (kg)**	
F	180	36	50-60	4.5	20.1	275.2
		86	60-70	4.86	22.13	259.9
		58	70-80	4.8	22.57	243.2
M	200	34	50-60	4.75	27.19	408.5
		113	60-70	4.91	26.85	390.4
		53	70-80	4.87	25.9	307.2

Average birth weights on farm B ranged from 4.5 to 4.86 kg for females and 4.75 to 4.91 kg for males (Figure 2). Weaning weights ranged from 20.1 to 22.57 kg for females and from 25.9 to 27.19 kg for males (Figure 3). In terms of daily gain, for females, the highest value was recorded in the 50-60 days weaned category, where the average daily gain had a value of 275.2 g. The same was observed for males, where the average daily gain had the highest value in the category nursed between 50-60 days i.e., 408.5g (Figure 4).

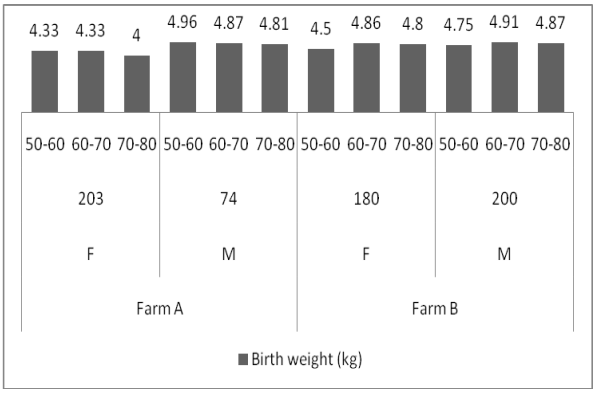

Figure 2. Comparison between the two farms on birth weight

The lowest values were recorded for females in farm A for the category fed 70-80 days i.e., 4 kg, and the highest value was recorded for males in farm A, 4.96 kg for the category fed 50-60 days. Notable differences between the two farms exist for females in all categories.

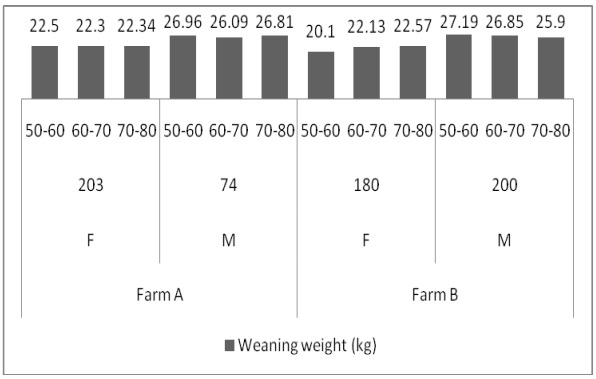

Figure 3. Comparison between the two farms on weaning weight

The lower value of weaning weight (20.1 kg) was recorded for females in the 50-60 days of feeding category on farm B, and the higher value was recorded for males on farm B in the 50-60 days of feeding category. Significant differences existed between females in the 50-60 days feeding category.

The lowest value obtained for the average daily gain belongs to females in the category fed 70-80 days (229.5 g), and the highest value was recorded for males in farm B in the 50-60 days category (408.5 g). In comparison, females from farm A have higher average daily gains than females from

farm B, and males from farm B have higher daily gains than males from farm A.

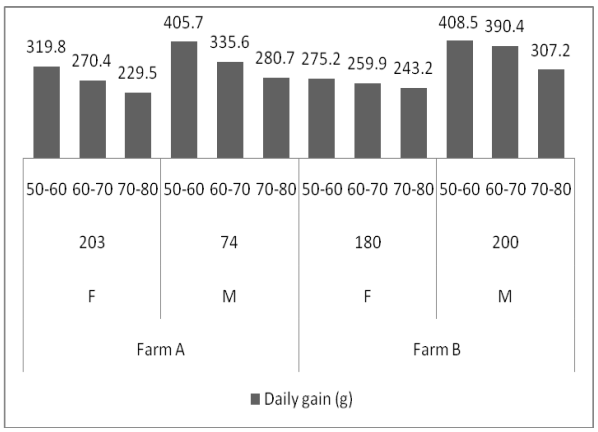

Figure 4. Comparison between the two farms on average daily gain

However, the t-test showed that there were no major differences between the two farms (p=0.62) (Figure 5).

t-Test: Paired Two Sample for Means

	Variable 1	Variable 2
Mean	306.95	314.0666667
Variance	3752.195	4851.662667
Observations	6	6
Pearson Correlation	0.874758	
Hypothesized Mean Difference	0	
df	5	
t Stat	-0.51646	
P(T<=t) one-tail	0.313777	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.627553	
t Critical two-tail	2.570582	

Figure 5. t-Test for highlighting if there are differences between farms

Comparing the data obtained with those in the literature (Table 3), the differences between the values of the present study and the values obtained by two other authors for the same breed and age category were observed.

Large differences appear in the case of males, where the values for the average daily gain in the farms studied were higher than those obtained by [10] and [11]. In the case of females, the values were close to those obtained by the other two authors.

Table 3. Comparison with the literature

Average daily gain (g)				
	Our data		Pelmus, R. S et al., 2013 [10]	Lazar, C et al., 2015 [11]
Sex	Farm A	Farm B		
F	273.23	259.43	220-270	200
M	340.66	368.7		260

4. Conclusions

The data obtained shows that there is no major influence of the two external factors feed and microclimate on the expression of the average daily gain trait, but the comparison of the data from the two farms showed that in the case of farm B, the application of additional and good quality feed as well as improved microclimate conditions for both lambs and ewes lead to an increase in the average daily gain for lambs. Also, the higher values of birth weight and weaning weight obtained in lambs from farm B highlight the influence of the discussed external factors on the growth character of the average daily gain. The number of researches on qualitative and quantitative traits for meat production on the Teleorman Black Head breed is small, which shows that the genetic potential of this breed cannot be fully highlighted. The study of all internal and external factors influencing the expression of traits related to growth and meat production, as well as the calculation of heritability coefficients for these traits is the way to highlight the genetic potential and to use the individuals in breeding works to improve the performance of this breed.

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