Scientific Papers. Series D. Animal Science. Vol. LXVIII, No. 2, 2025
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

ANALYSIS OF THE GROWTH RATE IN DIFFERENT FATTENING SYSTEMS OF F1 LAMBS OBTAINED BY CROSSING FRENCH MEAT BREED RAMS WITH LOCAL EWES FROM THE TSIGAI BREED

Ion RĂDUCUȚĂ[1], Costică CRISTIAN[2], Monica MARIN[1], Vlăduț Dragoș BULMAGA[2], Ion CĂLIN[1]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest,
59 Mărăşti Blvd, District 1, Bucharest, Romania
[2]Research and Development Station for Sheep and Goats Breeding Secuieni-Bacău,
54, Holt village, Letea Veche, Bacău, Romania

Corresponding author email: raducion@yahoo.com

Abstract

Simple industrial crossing of local sheep breeds with specialized breeds for meat production is the fastest method to increase the quantity and quality of meat production. Our research aimed to study the growth rate abilities in intensive and semi-intensive fattening system of F1 crossbred lambs obtained by crossing Tsigai sheep of the rust variety with rams of meat breeds from France, namely Vendeen, Blanche du Massif Central, and Berrichon du Cher. The experiment was carried out at the biobase of the RDSSGB Secuieni-Bacău research station during 2020-2021. At the beginning of fattening, the lambs were 60 days old and had an average body weight ranging from 14.55 kg for the Tsigai breed batch to about 18.41 kilograms for the F1 crossbred lambs. In the case of both fattening systems, the batches of crossbreds belonging to the Vendeen x Țigaie and Berrichon du Cher x Țigaie variants stand out, which recorded a delivery body weight of 40 kg at an average age of approximately 142-143 days in the case of the intensive fattening system and 166-167 days in the case of the semi-intensive fattening system.

Key words*: crossing, fattening system, French meat breeds, growth rate, meat production.*

INTRODUCTION

In Romania, most sheep flocks are made up of breeds characterized by a high degree of rusticity and great heterogeneity, with a mixed production orientation (Taftă et al., 1997; Pascal, 2015).

The increase in interest in mutton, but also in specimens that stand out through a sharp increase in growth and that offer superior quality carcasses, has generated a favorable framework for research focused on obtaining crossbreeds in order to increase meat production.

The improvement of local sheep breeds for meat production is a particularly important direction within the sheep sector in our country. The research approach of crosses between local breeds with breeds specialized for meat production is carried out in order to track the transmission of characters of interest in the offspring in order to use this information in the process of improving meat production or to reduce the fattening period by increasing the growth rate (Pop & Mireșan, 1991).

Socio-economic transformations, along with European Union requirements and regulations regarding meat valorization, as well as changes in the genetic structure of sheep populations, emphasize the importance of developing strategies to quantitatively and qualitatively improve meat production in local breeds (Răducuță, 2022).

The main objective of the breeding process is to optimize morphoproductive characteristics such as: body weight, growth rate, feed consumption efficiency, prolificacy, slaughter yields, meat-to-bone ratio and carcass tissue composition (Mochnacs et al., 1978; Taftă, 1983; Maier & Domnicar, 1989; Pascal, 2015).

Crossbreeding native breeds with breeds specialized in meat production to obtain crossbreeds with superior performance is a fast and efficient method of increasing the volume and quality of production, capitalizing on the heterosis effect (Sandu, 1993). This strategy for improving production and carcass quality has also begun to be increasingly adopted by sheep farmers in Romania (Maloș & Maloș, 2016).

The high degree of applicability and the utility, both practical and economic, of the growth rate of young sheep in semi-intensive and intensive fattening systems makes it appropriate to evaluate the productive performance of meat production for crossbreeds obtained through industrial crossbreeding (Răducuță et al., 2023).
The main goal of our research was to analyze the growth rate in intensive and semi-intensive systems of lambs obtained from the crossing of Țigaie ewes with rams from meat breeds from France, namely Vendeen, Blanche du Massif Central and Berrichon du Cher.

MATERIALS AND METHODS

The experiments were carried out within the biobase of the RDSSGB Secuieni-Bacău research station during 2020-2021. To carry out research in this direction, purebred Tsigai lambs and F1 crossbreds from 4 batches (30 heads/batch) were monitored, which were subsequently divided into two series, each series having in turn 4 batches (12 heads/batch), respectively a Țigaie batch, a V x Țigaie batch, a BMC x Țigaie batch and a BC x Țigaie batch. The two series were subsequently randomly distributed after weaning (60 days), for fattening in intensive and semi-intensive systems.

Animal feeding and maintenance

During the lactation period, the lambs benefited from maternal milk and permanent access to combined starter feed (18% crude protein), the best quality alfalfa hay, water and mineral blocks for licking.
The *intensive fattening system* adopted consisted of maintaining the young sheep immediately after weaning in collective pens with access to the paddock, watering being ensured with constant-level drinkers (watering front of 2 linear meters), feeding with concentrates was carried out in high feeders to eliminate waste and facilitate ingestion, hay was administered in grate feeders (feeding front of 3 linear meters on each side), ensuring the necessary feeding front per animal.
After weaning, lambs were fed ad libitum with a complete granulated compound feed for fattening lambs containing 16.8% crude protein, alfalfa hay and water.
Each batch was also given mineral lick blocks throughout the fattening period.
The semi-intensive fattening system adopted consisted of keeping the young crossbred on pasture for 10 hours/day with the help of electric fencing. The lambs were gradually acclimatized to grazing, starting with a grazing period of 2 hours per day until reaching 10 hours per day. The grazing time on a plot was 6 days.
During fattening, the young sheep fattened in the semi-intensive system additionally received, at their discretion, granulated combined feed for fattening lambs with a content of 16.8% crude protein, 6.2% crude cellulose, 2.8% crude fat, 5.3% crude ash, 0.74% Ca, 0.28% P, 0.54% Na, 0.27% Mg and 2680 kcal/kg metabolizable energy.
Also, all batches of lambs were given, at their discretion, water and mineral blocks for licking throughout the fattening period.
The health status of the fattening animals was constantly monitored throughout the experiment, with all necessary diagnostic, treatment, deworming and vaccination actions being performed.

Monitoring of growth and body development.

In order to determine the growth rate of the four types of lambs raised in the two intensive and semi-intensive systems, weighing was done at the beginning of fattening and at different ages during fattening in order to calculate the age at which the lambs reaching the 40 kg weight were weighed. Therefore, the purpose of monitoring the 8 batches was to determine the age at which the lambs subjected to fattening in the intensive and semi-intensive system reach the delivery weight of 40 kg.

Statistical data processing. The data recorded following the observations and the determinations made were processed using modern statistical processing methods. Microsoft Office Excel 2016 was used to calculate all statistical parameters (mean, standard deviation, coefficient of variability and standard error of the mean) and the Tukey test to determine the significance of the difference between the mean values of the analyzed traits.
Differences were considered statistically significant at $P<0.05$ and indicated by specific signs of differentiation. The results obtained for all analyzed attributes were then presented in the form of tables and graphs, and their interpretation was made by comparing them with data from the specialized literature.

RESULTS AND DISCUSSIONS

Since birth, the body development of the Tsigai lambs and the F1 crossbreds obtained from the application of first-generation industrial crosses between rams from French meat breeds (Vendeen, Blanche du Massif Central, Berrichon du Cher) and ewes from the Tsigai breed, the rust variety, was monitored.

At the time of weaning, the Tsigai lamb batch recorded an average weight of 14.55 kg with limits between 11 and 17.5 kg, lower body weight than the crossbred batches that recorded average values of 16.43 kg for the Vendeen x Tsigai batch, 16.24 kg for the Blanche du Massif Central x Tsigai batch and 18.41 kg for the Berrichon du Cher x Tsigai batch (Table 1).

Table 1. Body weight of lambs at weaning (60 days)

Lots	n	$\bar{X}$	$\pm s\bar{x}$	s	CV %	Min.	Max.
Tsigai	30	14.55	0.446	2.442	16.790	11	17.5
Vendeen x Tsigai	30	16.43	0.600	3.288	20.012	11	25.5
Blanche du Massif Central x Tsigai	30	16.24	0.432	2.369	14.592	11.50	19.87
Berrichon du Cher x Tsigai	30	18.41	0.640	3.506	19.046	15.5	26

After weaning, each batch of 4 was divided into two, one being subjected to intensive fattening and the other to semi-intensive fattening, consequently forming 8 batches, four raised in an intensive system and four in a semi-intensive system.

Following the analysis of the data and the calculation of the age required for the young fattened in an intensive system to reach a live weight of 40 kg, it was found that the batch of purebred Tsigai reaches this weight at an average age of 175 days, respectively approx. 5.8 months (Table 2 and Figure 1).

Regarding the crossbred lots, the youth belonging to the Vendeen x Tsigai and Berrichon du Cher x Tsigai crossbreds stand out, which recorded a body weight of 40 kg at an average age of 142 days and 143 days respectively, which represents approximately 4.75 months, thus being 18.3% and 18.9% lower than the native breed (Table 2).

Table 2. Age of reaching body weight of 40 kg for intensively fattened youth

Lots	n	$\bar{X}$	$\pm s\bar{x}$	s	CV %	Min.	Max.
Tsigai	12	175[a]	6.054	20.97	11.981	131	214
Vendeen x Tsigai	12	143[b]	5.748	19.91	13.921	96	176
Blanche du Massif Central x Tsigai	12	160[a,b]	7.283	25.23	15.765	106	200
Berrichon du Cher x Tsigai	12	142[b]	5.740	19.88	14.002	98	179

[a,b]Within a column, means without a common superscript differ (P<0.05).

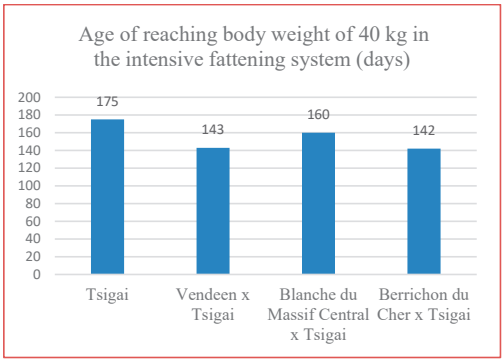

Figure 1. Age of reaching body weight of 40 kg for intensively fattened youth

The Blanche du Massif Central x Tsigai crossbred lot reached a weight of 40 kg at an average age of 160 days, which represents approximately 5.33 months, being 8.6% lower than the Tsigai breed.

In order to ascertain the gain through the heterosis effect and the combinability of the breeds involved in the crossbreeding program, the performances of the crossbreds were compared with the performances of the purebred Tsigai breed, the rust variety, being subjected to fattening under the same environmental conditions.

Table 3. Absolute and percentage difference in the age of reaching 40 kg weight in intensively fattened lots

Lots	Days	Absolut difference (days)	Percentage difference (±%)
Tsigai	175	-	100
Vendeen x Tsigai	143	32	-18.3
Blanche du Massif Central x Tsigai	160	15	-8.6
Berrichon du Cher x Tsigai	142	33	-18.9

After testing the differences between batches in intensive fattening regarding the age of reaching the delivery body weight of 40 kg, it was found that between the batches of Berrichon du Cher x Tsigai and Vendeen x Țsigai and the purebred Tsigai there are significant differences (P<0.05), and between the batch of Blanche du Massif Central x Tsigai and the Tsigai batch the differrences are insignificant (P>0.05). Also, between the batches of crossbreeds the differences are insignificant (P>0.05).

It can thus be concluded that, if the aim is to quickly reach a delivery weight of 40 kg in young sheep subjected to intensive fattening (approx. 5 months), the Berrichon du Cher x Tsigai and Vendeen x Tsigai variants should be preferred in exploitation by farmers in the Moldavian Plateau area.

Following the data analysis and calculation of the age required for young animals fattened in a semi-intensive system to reach a live weight of 40 kg, we observe that the purebred Tsigai group reaches this weight at an average age of 215 days, or approximately 7.17 months (Table 4 and Figure 2).

Table 4. Age of reaching body weight of 40 kg for young fattened in semi-intensive system

Lots	n	$\bar{X}$	$\pm s\bar{x}$	s	CV %	Min.	Max.
Tsigai	12	215[a]	7.404	25.65	11.931	189	261
Vendeen x Tsigai	12	166[b]	6.143	21.28	12.822	122	209
Blanche du Massif Central x Tsigai	12	173[b]	7.863	27.24	15.745	132	216
Berrichon du Cher x Tsigai	12	167[b]	7.376	25.55	15.302	121	207

[a,b]Within a column, means without a common superscript differ (P<0.05)

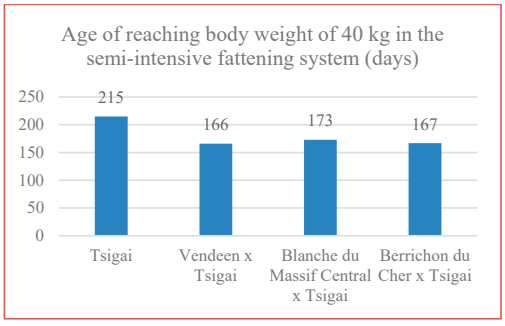

Figure 2. Age of reaching body weight of 40 kg for semi-intensive fattened youth

The semi-intensive system used led to good weight gains in crossbreds, reaching a weight of 40 kg at an average age of 173 days (5.77 months) for the Blanche du Massif Central x Tsigai lot, at 166 days (5.53 months) for the Vendeen x Tsigai lot and at 167 days (5.57 months) for the Berrichon du Cher x Tsigai lot (Figure 3).

It is thus found that the crossbred lots reached a weight of 40 kg with 23.1% faster compared to the native breed in the case of crossbreds with the Vendeen breed, 22.3% faster in the case of crossbreds with the Berrichon du Cher breed and 19.5% faster in crossbreds obtained with the Blanche du Massif Central breed (Table 5).

Table 5. Absolute and percentage difference in the age of reaching 40 kg weight in groups fattened in a semi-intensive system

Lots	Days	Absolute difference (days)	Percentage difference (±%)
Tsigai	215	-	100
Vendeen x Tsigai	166	49	-23.1
Blanche du Massif Central x Tsigai	173	42	-19.5
Berrichon du Cher x Tsigai	167	48	-22.3

Figure 3. Semi-intensive fattening with electric fencing (orginal)

After testing the differences between batches in semi-intensive fattening regarding the age of reaching the delivery body weight of 40 kg, it was found that between the batches of Vendeen x Tsigai and Berrichon du Cher x Tsigai and the purebred Tsigai there are very significant differences (P<0.001), and between the batch of Blanche du Massif Central x Tsigai and the

Tsigai batch the differences are distinctly significant (P>0.01). Between the batches of crossbreeds the differences are insignificant (P>0.05).

From the analysis of these results it emerges that if the aim is to quickly reach a delivery weight of 40 kg in young sheep subjected to semi-intensive fattening (approx. 5.5 months), the Vendeen x Tsigai and Berrichon du Cher x Tsigai crossbreeds should be preferred as a priority for exploitation by farmers in the plateau area of Moldova. The Blanche du Massif Central x Tsigai crossbreed can also be chosen for exploitation, but not before the previously mentioned variants.

CONCLUSIONS

The fastest and most efficient technical solution for a quantitative and qualitative increase in sheep meat production is represented by the practice of industrial crossbreeding with specialized breeds for meat production.

After testing, in both fattening systems, the differences in growth rate between the 3 variants of the resulting F1 crossbreeds and the local breed, it is found that in terms of genetic combinability, the Berrichon du Cher and Vendeen breeds obtain the best results by crossing with the local Tsigai breed, the F1 crossbreeds resulting from these breeds having significantly superior performance.

The results obtained when applying the intensive and semi-intensive fattening system of F1 crossbreeds within the framework of this research showed that the fattening duration was considerably reduced compared to classic fattening technologies, and can be taken over and applied in large practice by sheep breeders in the plateau area of Moldova in case the rapid delivery of young crossbreed sheep is desired.

REFERENCES

Maier, R., & Domnicar, A. (1989). Phenotypic and genotypic results in the crossbreeding of Tigăi sheep with Romney-Marsh rams. *Lucr. Şt. Palas*, VI, 73-77.

Maloş, I.G., & Maloş, G. (2016). Quality product – history or reality. *Scientific Papers. Series D. Animal Science,* LIX, 299-301.

Mochnacs, M., Taftă, V., & Vintilă I. (1978). *Sheep genetics and breeding.* Bucharest, RO: Ceres Publishing House.

Pascal, C. (2015). *Treated for raising sheep and goats*. Iasi, RO: "Ion Ionescu de la Brad" Publishing House.

Pop, A., & Mireşan, E. (1991). *Guide for raising and fattening young sheep*. Bucharest, RO: Ceres Publishing House.

Răducuță, I. (2022). *The design and development of sheep farms.* Iasi, RO: Cermi Publishing House.

Răducuță, I., Cristian, C., Bulmaga, V.D., & Paiu, A.G. (2023). Research on the fattening aptitudes of crossbreds obtained by crossing Tsigai sheep with French meat breed rams. *Acta Agricola Romanica - Animal sciences and veterinary medicine*, 5(5.3.), 98-107.

Sandu, G. (1993). *Sheep farming engineering*. Bucharest, RO: Alutus-D Publishing House.

Taftă, V. (1983). *Growing and intensive exploitation of sheep*. Bucharest, RO: Ceres Publishing House.

Taftă, V., Vintilă, I., & Zamfirescu, S. (1997). *Production, breeding and reproduction of sheep*. Buchreats, RO: Ceres Publishing House.