EVALUATION OF SPECIFIC MEAT PRODUCTION TRAITS IN SOME POPULATIONS OF YOUNG CROSSBRED (F1) SHEEP OBTAINED BY CROSSING ȚIGAIE EWES WITH MEAT BREEDS RAMS

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Abstract

The aim of this research was to evaluate, using various methods, the degree of fattening in young crossbred (F1) sheep resulting from different crossbreeding variants between local Țigaie ewes and rams from French meat breeds. The biological material consisted of three groups of first-generation (F1) crossbred lambs obtained by mating local Țigaie ewes with rams from the Vendeen (V), Berrichon du Cher (BC), and Blanche du Massif Central (BMC) breeds. After weaning, the lambs were subjected to intensive fattening technologies, and the analysis of specific meat production traits was carried out on live animals. This involved identifying the degree of fattening through palpation of muscle-rich regions and body measurements. After the fattening process, the evaluation continued with carcass fattening assessments. Based on the analyses conducted on both live animals and carcasses, a realistic evaluation of the fattening level of the biological material under study was achieved. Compared to the crossbred groups, the Țigaie breed scored 40.90% lower than V × Ti, 45.83% lower than BMC × Ti, and 31.58% lower than BC × Ti in live animal fattening assessment. Carcasses obtained from the slaughter of fattened V × Ti lambs met the requirements for classification in the E class at a rate of 33.33%, while only 15.16% of the BC × Ti crossbreds achieved this classification. The differences observed between groups in carcass conformation assessments indicate that certain crossbred groups deviate from the standards required for the E class.

Key words: *meat sheep, carcasses, meat traits, Țigaie sheep breed*

INTRODUCTION

The data obtained are important and align with the general trend observed at both national and international levels. In 2024, Romania recorded an increase in meat production compared to previous periods. According to the National Institute of Statistics (INS), in March 2024, a total of 364,000 sheep and goats were slaughtered, nearly three times more than in the previous month (110,000 head). In March of the previous year, the number of slaughtered small ruminants totaled 276,000 (https://agrointel.ro/296741).

To a large extent, sheep meat production depends on several factors that influence the traits specific to this type of production. The traits of animals are inherited from their parents but are also influenced by them and by environmental conditions. In sheep, these traits include:

- Growth traits: e.g., growth rate, body size, volume, muscle mass development;
- Carcass traits: e.g., rib-eye area, fat tissue development, carcass dimensions;
- Health traits: e.g., susceptibility to infectious diseases;

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- Wool traits: e.g., fleece weight, fiber diameter, wool length;
- Reproductive traits: e.g., number of lambs born and weaned.

Organizing meat production based on economically viable principles represents a sustained and continuous activity focused on the systematic production of suitable (crossbred) lambs intended exclusively for fattening.

Theories and claims suggesting that the use of rams from early-maturing breeds with coarser wool on the paternal line may negatively affect other traits-particularly wool quality-are not supported in the context of meat-oriented crossbreeding. Organizing sheep meat production means systematically producing crossbred lambs intended exclusively for fattening, while meat obtained from culled adult animals should be regarded more as a by-product, and that from fattened young stock as part of a mixed-use exploitation of ewes.

In the United Kingdom, when the main objective of sheep farming is meat production, no attention is given to wool or other outputs. The main indicator of economic efficiency is the number of lambs sold or the quantity of meat delivered to the market per ewe from the breeding flock.

Over the last three decades in Romania, various industrial crossbreeding initiatives have taken place between local sheep breeds/populations and rams from specialized meat breeds. Based on the results obtained, it has been observed that local sheep have a high combining ability, and the resulting crossbreds show significantly improved growth rates and precocity, reduced specific feed consumption, and improved carcass traits.

MATERIAL AND METHOD

The research was based on the analysis of traits specific to meat production in certain populations of crossbred young sheep (F1) resulting from systematic crossbreeding between meat breed sires and local Tigaie ewes (brown variety).

The fattening period began after weaning and was carried out under stable conditions, in compliance with all animal welfare standards. The activities associated with the research objective addressed various aspects specific to sheep meat production, focusing on the application of appropriate technologies for fattening young sheep.

The biological material used in the research consisted of first-generation (F1) crossbred young sheep obtained by mating local Tigaie ewes-raised and exploited at the Research and Development Station for Sheep and Goat Breeding in Secuieni-Bacău-with rams from French meat breeds: Vendeen (V), Berrichon du Cher (BC), and Blanche du Massif Central (BMC).

After the first generations of crossbred lambs were obtained and weaned, they were subjected to intensive fattening technologies. The analysis of traits specific to meat production was conducted on live animals, involving the assessment of fattening level through palpation of muscle-rich areas and body measurements.

Following the fattening process, the evaluation continued with the assessment of fattening degree on carcasses. Based on the analyses conducted both on live animals and on carcasses, a realistic evaluation of the fattening level of the studied biological material was achieved.

The data obtained were statistically processed, centralized, and appropriately interpreted. The REML (REstricted Maximum Likelihood) procedure was used for data analysis, ensuring estimates within the normal parameter space.

RESULTS AND DISCUSSIONS

The evaluation of meat traits in fattened young sheep aimed to conduct an objective analysis of how the three experimental groups express the specific aptitudes for this type of production.

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Live Animal Evaluation. Considering the correlation between the development of body regions and the degree of muscle mass coverage, assessing the fattening degree on the live animal is a particularly important method for estimating meat production potential in all breeding improvement programs. Compared to other species, due to the presence of the fleece, determining the fattening degree in live sheep is more difficult; therefore, evaluating meat traits must be performed on shorn animals.

The control of meat production aptitude was conducted at the end of the fattening period and was based on a scoring system from 1 to 5, reflecting the degree of muscle development, prominence, and the proportion between body regions relevant for meat production (Figure 1). All obtained data are consistent with findings reported in the specialized literature [2,3,4,5,6,7].

Fig. 1. Assessment of meat production aptitudes in live animals by palpation

During fattening, an effort was made to highlight the degree of muscle development in the main anatomical regions associated with significant muscle mass proportions. The fact that the palpation scores in all three groups exceeded 20 points suggests that the muscle masses, especially in key areas, were more distinctly expressed through palpation (Table 1).

Based on the total score obtained during the evaluation at the end of the fattening process of the Țigaie breed lambs, it can be specified that in all key points, a weaker degree of muscle development was felt on palpation, especially in the haunch and shoulder areas, where the maximum score was only two points. Compared to the groups of crossbred lambs, the fattening score of the Țigaie lambs was 40.90% lower than that of the V x Ti group, 45.83% lower than BMC x Ti, and 31.58% lower than the BC x Ti lambs. In general, the trend and significance of the reference values are close to those found in various scientific articles [8,9,10].

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Table 1. Live animal fattening score evaluation (points)

Minimum requirements for score assignment	Score assignment			
	Ti	V x Ti	BMC x Ti	BC x Ti
Back and Loin - Length, width, and degree of muscle development should be easily noticeable; - On palpation, the transverse processes should be covered with muscle mass.	3	5	5	4
Shoulder - When analyzing the development of this region, the lateral prominence and the degree of muscle coverage should be assessed.	2	4	4	3
Haunch - Both hands should be used to palpate the muscle mass in the rump, hindquarters, and thigh regions, extending down to the transition toward the lower leg; - The degree of muscle development should also be assessed based on the posture and space between the hind limbs.	2	5	5	5
Chest - Prominent, descended, the deposited muscle mass is easily felt.	3	4	5	4
Palpation of handling points - Assessment of the development of handling points in characteristic regions (tail fold, loin, back, chest, and inguinal region).	3	4	5	3
Total score obtained	**13**	**22**	**24**	**19**

Evaluation of the slaughtered animal is extremely useful as it is the most complete and accurate, as all observations and determinations are based on the analysis of the carcasses obtained after animal slaughter. This evaluation also has the advantage that it does not affect the integrity of the carcass, and when carried out correctly, it provides a valuable indication in the selection work. The criteria for assessing the fattening degree in the slaughtered animal are numerous, and the application of one or another depends on the purpose and the intended use of the data and information.

Fig. 2. Carcasses of Țigaie sheep and their crossbreeds with rams from French meat breeds

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Table 2. Classification of carcasses according to EU standards

Category	Genotype			
	Ti	V x Ti	BMC x Ti	BC x Ti
Regarding the conformation (%)				
S	-	-	-	-
E	-	33.33	69.68	15.16
U	-	50.00	15.16	50.00
R	50.00	19.67	15.16	34.84
O	33.33	-	-	-
P	16.77	-	-	-
Regarding the fattening status (%)				
1	-	-	-	-
2	16.67	-	-	-
3	50.00	50.00	50.00	25.00
4	33.33	25.00	37.50	50.00
5	-	25.00	12.50	25.00

Evaluation of the degree of fattening based on carcass conformation. Based on the carcasses obtained from control slaughtering, differences were observed in both conformation and fattening status of the young sheep. The analysis conducted to evaluate carcass conformation highlighted a superior potential in the three groups of crossbreeds. According to the results obtained, classification into quality classes based on European Union standards confirms better meat production aptitude in the crossbreeds resulting from mating with Blanche du Massif Central rams.

Out of the total evaluated carcasses, 69.68% met the requirements for classification in class E, while the remaining 30.32% were equally distributed between classes U and R. This was due to the fact that these carcasses were wider, with well-defined muscle masses that were easy to observe, and a noticeable convex profile.

Carcasses from lambs fattened in the Vandeen × Țigaie (V × Ti) group met the class E criteria in 33.33% of cases, while those from Berrichon du Cher × Țigaie (BC × Ti) crossbreeds only in 15.16%. The differences in carcass conformation between groups indicate that some crossbreeds deviate from the standards required for class E classification.

Evaluation of fattening degree based on the presence of adipose tissue also revealed differences between groups. In the Țigaie group, 83.33% of carcasses met the requirements for classification in fat classes 3 and 4. In the crossbreed groups, 75% of carcasses from V × Ti and BMC × Ti fell into these classes, while in the BMC × Ti group alone, 87.50% met this standard.

Interestingly, in the group obtained with Vandeen rams, 25% of carcasses met the criteria for fat class 5, due to a more uniform distribution of subcutaneous fat. In the BMC × Ti and BC × Ti groups, carcasses showed less fat accumulation in the perirenal area, median region, and hindquarters, which resulted in only 12.5% being classified in fat class 5.

The evaluation of fattening degree based on carcass dimensions represents a biometric method used to calculate specific carcass indices. The values obtained from the measurements provide information about the overall development of the carcass and of its anatomical regions. In selection work, depending on the desired carcass type, several carcass measurements are performed, which are then used to determine the carcass indices.

The Carcass Format Index (If) highlights the ratio between the carcass width at the back leg of mutton (haunch) and the dorsal length of the carcass. The fact that the crossbreed groups recorded index values above 40 indicates that, overall, the carcasses had harmonious development. Furthermore, this index expresses the shape of the carcass and the general proportions between its length and width dimensions.

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Table 3. Indices expressing carcass development

Carcass indices (%)	Genotype			
	Ti	V x Ti	BMC x Ti	BC x Ti
Carcass shape index	38.14	46.30	49.06	40.00
Haunch shape index	77.12	92.59	89.66	80.00
Indicele de compactitate al carcasei	124.25	135.19	132.08	140.00
Carcass compactness index	59.13	79.00	69.23	90.00
Haunch development index	104.26	110.00	120.69	111.11
Thoracic depth index	41.55	46.30	47.17	50.00

The Haunch Shape Index (Ij) represents the ratio between the width of the carcass at the haunch and the external length of the leg. The fact that this value is higher in all crossbred groups compared to the Tigaie lamb carcasses (77.12%) and exceeds 80% in the three crossbred groups suggests a better development of muscle mass in the crossbreds.

The Carcass Compactness Index and the Carcass Width Index also show higher values in carcasses obtained from the slaughtering of crossbred lambs. Overall, these values highlight favorable proportions between the thoracic perimeter and the dorsal length of the haunch, and between chest width and carcass width at the haunch.

The Haunch Development Index, with values of 110% for V × Ti, 120.69% for BMC × Ti, and 111.11% for BC × Ti, indicates a favorable ratio for meat production, as the haunch perimeter and its internal length are greater, offering a larger surface area for muscle development.

The Thoracic Depth Index recorded values of 41.55% for the Tigaie breed and over 45% for the three crossbred groups. These values reflect the ratio between thoracic depth and carcass length and express the overall depth development of the body or carcass.

CONCLUSIONS

Compared to the crossbred groups, the Tigaie lambs scored lower in live fattening assessment-by 40.90% compared to V × Ti, by 45.83% compared to BMC × Ti, and by 31.58% compared to BC × Ti.

The carcasses from fattened V × Ti lambs met the requirements for EU conformation class E in 33.33% of the cases, while those from BC × Ti crossbreds did so in only 15.16%. The differences in carcass conformation among the groups indicate that certain crossbred groups display deviations from the standards required for class E.

In the Tigaie group, 83.33% of carcasses met the criteria for classification in classes 3 and 4 for fat cover. In the crossbred groups, over 75% of the V × Ti and BMC × Ti carcasses, and approximately 87.50% of the BMC × Ti carcasses, fell within these quality classes.

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