

# Study of Aptitudes for the Meat Production of the Tigaie Breed which is Being Raised in the Traditional Pools from the Eastern Part of Romania

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## Abstract

The main purpose of the conducted research was to evaluate as correctly as possible the potential that the Tigaie breed, situated in different raceways from the east part of Romania, regarding meat production. This way, knowing the level of expression of the main features on which meat production depends, positive premises are created for developing a technical frame to facilitate change in the desired direction, of the genetic potential for this production for the sheep of this breed situated in the plateau area of Moldavia. The biological material was represented by the young sheep, males and females, of Tigaie breed derived from the agricultural holdings situated in Bacau, Vaslui and Vrancea counties. The study of the obtained values shows that the best performances were made by the lambs from the Vrancea County. So, while for the lots from Vaslui and Bacau the determined daily average increase registered average values of 132 g and 156 g, the lot composed of lambs brought from the livestock units from Vrancea the indicator was of 180 g, exceeding with 12.77% the daily average of the fattened population. Also, during the entire fattening period, the lot formed by lambs from Vrancea has exceeded with 24.61% and 11.13% the total increase determined for the lots from Vaslui and Bacau.

**Keywords:** fattening, meat, Tigaie, yield.

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## 1. Introduction

The sector represented by breeding sheep is one which is in the process of transformation after Romania's accession to the European community. As a first result of the accession of our country to this space, but also because of the support of farmers, the total livestock sheep had a positive numerical evolution. Thus, in Romania, at the end of the year 2013, in different farms there is a total number of 12.710 thousands heads [1], placing Romania in the top five countries at the European level. However, farmers have quickly realized that the economic efficiency of this sector is not

obtained just by increasing the total population but on the basis of a production growth performance of specific local breeds, or on the basis of the level of production resulting from each female from production. To this end, with the financial support offered by MADR Bucharest, have initiated more research activities carried out in order to assess the real potential of the production for meat sheep production which the Tigaie breed has, situated in different traditional breeding areas in the eastern part of Romania.

## 2. Materials and methods

The biological material was represented by the sheep's youth, males and females, of Tigaie breed originated from the agricultural exploitations from

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Bacau county, Vaslui and Vrancea county. Taking over the youth was made after weaning them, being randomized selected so to represent the average populations in which it arises. In order to obtain real information and conclusive data, in research have been used modern research methods accepted in the experimental technique of profile.

So that the youth subjected to fattening to externalize its own potential for accumulation of muscle mass, the technology applied to fattening had a total duration of 85 days, of which:

- the first 10 days were accommodated with the new conditions of maintenance and feeding;
- followed the growth and fattening phase with a total length of 50 days;
- ended with a finishing phase with a total duration of 25 days.

To evaluate the intensity of growth has been used an electronic decimal scale with a low degree of deviations. For exploiting the potential for production of meat has been used the INRA system quality assessment ratio, and by administration were ensured all nutritional requirements at optimum level. For the determination of the degree of conversion of the feed was taken into account a complete weighing of the given ratio and of the remaining uneaten remnants. For the quality assessments of the housing and the masses of muscle, but also for the determination of the slaughter indices there have been carried out control slaughters. The statistical data processing was performed using the ANOVA procedure and REML (Restricted Maximum Likelihood-of plausibility of the maximum restricted) which guarantees obtaining estimates in the normal space of parameters.

### 3. Results and discussion

In the producing of sheep meat the outlined stroked trends on medium-term indicate an increase in demand for this product. Market studies carried out by the profile organizations indicates a sharper increase for the meat produced by the implementation of production systems based on fresh-grass breeding. This trend is backed by the organization for English beef and sheep industry [12], which develops technologies for the production and marketing of sheep and cattle. To sustain the previous statement is enough to remember that in 2012, seven percent of sheep meat exports from the United Kingdom were

heading to Western European markets, mainly to Belgium and France (55%), Germany (9%), and Hong Kong's market (8%) [2]. To highlight the importance of the activity and the quality of sheep meat intended for export, Jonathan Eckley - marketing manager for EBLEX export said: *"exports of sheep meat from the United Kingdom to Belgium totalled 30.6 million pounds in 2012. Belgium is a valuable market for premium meat parts and therefore represents an ideal platform for us to use"* [2].

On this line, so the Romanian farmer can be competitive in these markets, it is essential that at national level to be developed and implemented effective improvement technologies, and for the fat lamb production to be able to certify the origin of the meat produced by technological systems based on an application of eating that includes only natural nutrition and pasture resources.

**Development of determination of weight and body mass build-up** it was an important goal of the research, whereas the pace of accumulation of muscle mass depends on the economic efficiency and the production value of a lot of characters.

Towards the intensive classic technology was applied in the process of fattening a different variant which was conducted entirely in terms of calves, being provided the same conditions of maintenance and food for each experimental lot.

The habituation phase had to accustom the youth sheep with the new environment and with the new conditions of accommodation and food. The duration of this phase was a short one, and on this backdrop and the accumulation of body mass were reduced. Studying the data presented in table 1 it can be seen that the popular group which has the greatest body weight was the one consisting of Tigaie breed lambs from the Vrancea County. And in terms of the increase of total growth this batch had the best performance. Thus, the total average increase was  $2.28 \pm 0.12$  kg, top value by about 37% compared with the increase of lambs belonging to the other two experimental lots. During the total of the accommodation phase the average daily increase had higher average values at the lot from Vrancea (0.228g) and only 0.142 g and 0.145 g for the lots from Bacau and Vaslui. Differences between groups were very significant for the statistical threshold of 5%, the exception being made by the statistical difference between the lots from Vrancea and Bacau, which were insignificant (Table 2).

Although it may seem small, all these values are within the biological limits of the race and close to other data presented in various specialized publications in our country. Captures the very good value obtained from the lambs in Vrancea, this lot having a daily increase of more than 200 g. The fact that the lambs of this lot have reacted better may be due to the fact that by the selection applied in time was managed an precocious increase, or can be a consequence of the fact that at the onset of the adaptation phase this lot had a weight with 11.39% higher compared with the lot of lambs that were from the herds in Vaslui and with 3.79% compared to the lots in Bacau. And this time the differences between the groups were very significant for  $p < 0.05$ .

Of the three groups formed we note that also at this stage the speed of growth is greater than at group consisting of lambs from the Vrancea County. This lot had a higher growth rate with 44.11% higher compared to the lot from Vaslui and with 19.11% compared to the one from Vrancea. The average daily increase registered average values between  $0.076 \pm 0.051$  g for the Vaslui lot and  $0.136 \pm 0.040$  g at the group in Vrancea. In the case of sheep lambs obtained in farms located in the Bacau County, this indicator had an average of 110 g, a value very close to the mean value of 114 g determined for all experimental lots.

**Table 1.** The body weight dynamics for lambs of the Tigaie breed

Fattening phase (days)	Lot	n	Initial weight (kg)	Final weight (kg)	Total growth increase (kg)	Average daily gain (g)
			$\bar{X} \pm s \bar{x}$	$\bar{X} \pm s \bar{x}$	$\bar{X} \pm s \bar{x}$	$\bar{X} \pm s \bar{x}$
Adaptation (10 days)	Bacău	6	15.20 ± 0.83	16.62 ± 1.07	1.42 ± 1.07	0.142 ± 0.014
	Vaslui	6	14.00 ± 0.98	16.28 ± 0.71	2.28 ± 0.12	0.228 ± 0.021
	Vrancea	6	15.80 ± 0.70	17.25 ± 1.07	1.45 ± 0.70	0.145 ± 0.047
	<b>Total</b>	18	15.00 ± 0.85	16.38 ± 0.90	1.38 ± 0.69	0.138 ± 0.082
Growth and fattening (50 days)	Bacău	6	16.62 ± 1.07	22.12 ± 1.62	5.50 ± 0.98	0.110 ± 0.071
	Vaslui	6	16.28 ± 0.71	20.08 ± 1.40	3.80 ± 0.55	0.076 ± 0.051
	Vrancea	6	17.25 ± 1.07	24.05 ± 1.55	6.80 ± 0.39	0.136 ± 0.040
	<b>Total</b>	18	16.38 ± 0.90	22.08 ± 1.52	5.70 ± 0.66	0.114 ± 0.077
Finishing (25 days)	Bacău	6	22.12 ± 1.62	27.73 ± 1.95	5.61 ± 0.15	0.224 ± 0.041
	Vaslui	6	20.08 ± 1.40	24.63 ± 1.56	4.55 ± 0.09	0.182 ± 0.014
	Vrancea	6	24.05 ± 1.55	30.20 ± 2.38	6.15 ± 0.19	0.246 ± 0.061
	<b>Total</b>	18	22.08 ± 1.52	27.62 ± 1.96	5.54 ± 0.65	0.221 ± 0.062
Total period (85 days)	Bacău	6	15.20 ± 0.83	27.73 ± 1.95	12.53 ± 0.11	0.156 ± 0.25
	Vaslui	6	14.00 ± 0.98	24.63 ± 1.56	10.63 ± 0.78	0.132 ± 0.75
	Vrancea	6	15.80 ± 0.70	30.20 ± 2.38	14.10 ± 0.54	0.180 ± 0.65
	<b>Total</b>	18	15.00 ± 0.85	27.62 ± 1.96	12.62 ± 0.35	0.157 ± 0.75

**Table 2.** The difference and its significance of the accumulations of body mass during fattening

Specification	d ±	Statistical significance
<b>Acomodation</b>		
Vrancea - Vaslui	+ 1.97	- F (2.3343) < Fa (4.9646) for 0.05**
Vrancea - Bacău	+ 0.63	- F (0.2847) < Fa (4.9646) for 0.05
Bacau - Vaslui	+ 1.34	- F (0.9044) < Fa (4.9646) for 0.05**
<b>Fattening</b>		
Vaslui - Vrancea	- 3.97	- F (3.6013) < Fa (4.9646) for 0.05**
Vrancea - Bacau	+ 1.93	- F (0.7376) < Fa (4.9646) for 0.05**
Bacau - Vaslui	+ 2.04	- F (0.9065) < Fa (4.9646) for 0.05**
<b>Finishing</b>		
Vaslui - Vrancea	- 5.57	- F (3.8194) < Fa (4.9646) for 0.05**
Vrancea - Bacau	+ 2.47	- F (0.6402) < Fa (4.9646) for 0.05**
Bacau - Vaslui	+ 3.10	- F (1.5400) < Fa (4.9646) for 0.05**

The finishing phase ended the fattening cycle, the planned mission duration being of 28 days. Compared with the classical technology, the

research team opted on its five days shortening, the motivation being based on economic realities. In the existing conditions to extend this phase can

make it easier for larger deposits of fat and not of muscle one and would generate additional costs.

Analyzing the total average increase weight gain during this period it can be seen that the lot which has a more intense pace is also the one obtained by the biological material in Vrancea County. This batch has exceeded the performance of the other groups with 26% in the case of consignment of Vaslui and with 8.78% those obtained from lambs from Bacau.

Determination of statistical parameters indicates that these differences have had a high degree of significance in terms of the thresholds for statistical count. During the whole technology of fattening, the obtained values study highlights, once again, better performance of the lambs in Vrancea. While for the batches of Vaslui and Bacau the determined average daily increase was of 132 g and 156 g, at lot of lambs brought in from livestock units in Vrancea this indicator was 180 g, surpassing with 12.77% the average values of the fattened population.

Also, during the entire fattening period, the lot formed by lambs from Vrancea has exceeded with 24.61% and with 11.13% the total average determined for the batched from Vaslui and Bacau.

All values obtained in researches carried out are within the limits of the Tigaie breed and are close to that amount of data included in the specialized publications in our country. As a whole, these values do not have the quality to satisfy the farmer when the primary purpose of breeding Tigaie sheep is for the production of meat. In this case, to record an increase of performance, should apply a selection based on the reproducers being based on the performance of the ascendants, but taking into account the selection and live weight at birth, at weaning and the intensity of growth during which is framed at the youth categories.

When meat production is a by-product obtained from sheep bred for milk production, the obtained data from fattening can be regarded as satisfactory as it can contribute to a higher efficiency on the farm. As a general recommendation, it would be more appropriate for the Tigaie breed to be subject to a progressive directional selection for both meat and milk, but the flocks must be distinct. By proceeding in this way, and having as technical support a lengthened and sustained selection, over a period of no more than 6 generations, will shape,

within the breed, two types of sheep: *meat and milk*.

The success of this plan and its extension to other flocks at other raceways may satisfy the farmer, as happened in France with the Lacaune breed. In the case of this breed, through the selection applied for 40 years, has outlined a kind of meat with outstanding performances and a type of milk that provides the farmer more than 400 l milk on the interval of a normal lactation.

**Determination of the quality of housing and slaughtering indices.** At the end of fattening technology, control slaughters were carried out in order to characterisation the batches in terms of their suitability for meat. To remove the influence of the gastrointestinal mass in determinations, the slaughter was carried out after a post for 6 hours, interval in which the access to food and water was restricted.

**Slaughter yield**. During slaughtering weighings of internal organs were performed, including parts of internal organs and those that are not included in yield (Table 3). Considering the fact that the biological material was represented by youth sacrificed sheep older than 200 days in the yield was not included the weight of the head, internal organs and limbs from the knee and knuckle down. The determination of this indicator, extremely important in assessing the capacity of fattening and of indexes slaughtering, indicates low values for all batches, average values being situated around 40%. This value is an unacceptable level in the case of sheep breeding for meat production and is far from the specific one for the meat breeds, when the average yield exceeds 58%.

For every lot, the classification of the yield average value at slaughter between 37.50% and 40.41% denotes the late character of the Tigaie breed for meat production and the lack of selection for this character. However, the determinant average values can be considered within the normal range for this breed and comparable with a lot of data cited by literature in our country for this breed [3-6]. There are also data indicating that the yield at slaughtering of male from the Tigaie breed can reach even 44.4% [7, 8].

**The carcass weight** was assessed by weighing at 2 hours after slaughter, time during which the blood finished to flow and a semi-dried was made. In these circumstances, the carcasses had a higher

weight at lambs from the Vrancea lot, the average value being higher by 11% compared with the carcasses mass obtained from the Bacau lot and more than 20% compared to those resulting from Vaslui.

**The appreciation of the carcasses quality** to represent an important aspect of the research planned at this stage. In order to assess the quality, several actions were applied which revealed the level at which this feature is found at the Tigaie breed. Assessing the quality of carcasses, in their integral condition, was finalized with the appreciation of the way in which they are satisfied the minimum requirements specified in the European standards of enclose of the quality class. According to the minimum requirements specified in the European standards of assessment and classification, the carcasses included in the **S** - class are of high quality and must be free from any defect of the essential parts, and the **E**-class are included the carcasses with an excellent conformation and must not show any defect in the essential parts.

Quality classes according to conformation **U**, **R**, **O**, **P**, include the carcasses which do not have an appearance too homogeneous at the level of the three essential parts, the class establishment being made after the level in which two of the three essential parts are enclosed. Given these requirements, after a semi-drying of the carcases they started to analyse the way in which the main elements that form the basis of the hierarchy

classes of quality, the final results being centralized and presented in table 4.

Although the housings belong to the same breed, and the fattening was made in the same conditions of maintenance and feeding, the conformation analysis highlights major differentiations of the general appearance of the carcasses. According to the data obtained it can be seen that, at those obtained from the slaughter of the lambs picked up from units located in Vrancea county, the number of those which meet the specified requirements for the **U** and **R** classes was 10% and 34%. These data are superior with 7 and respectively 12 percentage points compared to the results obtained in the evaluation of the lambs from Bacău and Vaslui. The housings obtained from the fattened lambs originating from Vaslui units had the lowest values, sign that the farmers concerns are directed to other productions specific to the Tigaie breed.

Evaluation of the housings after a degree of fattening was done taking into account the existing layer of tallow on the external surface and of the degree of development of the adipose tissue in the abdominal and chest areas, and depending on the findings the carcasses were graded in five classes. Data analysis and the obtained results highlight the qualitative superiority of the carcases obtained by sacrificing lambs from Vrancea. For this batch 45% of the carcasses were placed in classes of quality 2 and 3, the same weight being class 4.

**Table 3.** Results obtained from the slaughter and cutting of carcasses (n=12)

Specification	UM	Bacău	Vrancea	Vaslui
Weight before slaughter	kg	26.40 ± 0.28	29.20 ± 0.39	24.00 ± 0.54
Housing	kg	10.50 ± 0.21	11.80 ± 0.62	9.00 ± 0.38
Yield at slaughtering	%	39.77 ± 0.84	40.41 ± 0.55	37.50 ± 0.62
Skin	kg	2.40 ± 0.12	3.20 ± 0.15	1.90 ± 0.23
Feet	kg	0.60 ± 0.08	0.61 ± 0.06	0.60 ± 0.03
Head	kg	1.15 ± 0.32	1.25 ± 0.24	1.20 ± 0.22
Visceral mass	kg	9.05 ± 0.66	9.04 ± 0.54	8.32 ± 0.51
Lungs	kg	0.35 ± 0.14	0.42 ± 0.31	0.45 ± 0.41
Heart	kg	0.11 ± 0.07	0.13 ± 0.03	0.11 ± 0.2
Liver	kg	0.40 ± 0.01	0.43 ± 0.04	0.52 ± 0.05
Spleen	kg	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
Kidney	kg	0.16 ± 0.04	0.23 ± 0.08	0.19 ± 0.06
Testicles	kg	0.30 ± 0.02	0.31 ± 0.04	0.15 ± 0.05
Blood	kg	1.00 ± 0.12	0.80 ± 0.18	0.80 ± 0.17
Gastrointestinal content	kg	0.31 ± 0.08	0.91 ± 0.07	0.69 ± 0.07

**Table 4.** Classification of the Tigaie housing in relation to the area from which the fattened lambs arise (%)

Carcass enclosure	Area of origin		
	Bacău	Vrancea	Vaslui
<b>After conformation</b>			
S			
E			
U	3	10	
R	22	34	20
O	65	51	63
P	10	5	17
<b>After fattening degree</b>			
1			
2	5	11	2
3	28	35	21
4	50	45	55
5	17	9	22

Also, low values for most traits on which depends the quantitative and qualitative meat production indicates that the Tigaie breed was not subject to systematic selection and activities for these characters. Significant differences between groups for most of the characters also indicate the existence of a high degree of corporal variability, variability due in a large part to the fact that the flock are reared under different conditions and also benefit from maintenance and a different diet, sometimes under optimal values.

**The conversion of food or specific consumption** is an extremely important indicator for all who have as a main activity in animal productions. The degree of transformation of the diet given in unit depends on economic efficiency. Versus monogastric, at ruminants the cost for product unit should be lower since the rations often include by-products of plant origin. Duration of fattening in the managed structure were included categories specific for small ruminants, rations for each technological phase were made, including: alfalfa hay, grain maize, breach of beans and a premix for sheep. Feeding was done at discretion, but to determine the daily specific consumption was weighed the administered feed and the remaining uneaten scraps.

The valorisation degree of the fodder for the sheep youth depends on many factors but largely on the

energy-protein level of feed structure and on the mode of their administration [8, 9], and the centralization of the data and a specific calculation highlights the differences between groups in terms of specific consumption achieved (Table 5). Analysis of the obtained data indicate a specific lower consumption in the first part of the fattening, between 5.15 UFC for the lot in Bacau and 5.51 UFC at the one form of the lambs originating from Vaslui. This was due in large part to a lower consumption after the first part after building the lots, period when an adaptation of the lot took place, to the new conditions of fattening as well as with the new diet.

In the fattening phase the specific consumption was between 5.96 at the lot from Vrancea and 6.63 UFC at the one from Vaslui. The lot formed from lambs from units located in Bacău County achieved a one kilogram increase with 6.31 UFC and with 820 PDIN. In the finishing phase the specific consumption was between the limits of 5.96 and respectively 6.63, and throughout the period of the fattening the lowest achieved consumption was found in the lot formed by lambs from Vrancea and had a mean value of 5.86 UFC, and at the other two lots the consumption was higher than 6 UFC.

**Table 5.** The valorification degree of fodder on each phase and total fattening period

Lots	Specific consumption per technological phases and total period							
	Acomodation		Fattening		Finishing		Total period	
	UFC	PDIN	UFC	PDIN	UFC	PDIN	UFC	PDIN
Lot Tigaie Bacau	5.15	663	5.95	842	6.31	820	6.31	808
Lot Tigaie Vaslui	5.51	710	6.03	853	6.63	862	6.35	813
Lot Tigaie Vrancea	5.19	669	5.81	822	5.96	775	5.86	750

The determined values are in line with the skills of the breed, but high compared with the average consumption registered at precocious breeds, or at the fattening of various categories of half breeds. From this point of view it can be concluded that Tigaie is a semi-late breed with moderate skills for the production of meat. In the case of researches carried out in Romania on different breeds, varieties and local populations of sheep [3, 5, 6, 8-12] is highlighted the fact that local breeds show in their great majority good skills for production of meat, but do not meet entirely the current requirements of quality in terms of the carcasses conformation.

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#### 4. Conclusions

Daily average increase determined throughout the period of the fattening underline better performance obtained by lambs from Vrancea. Thus, if for the lots from Vaslui and Bacau, the determined daily average increase has registered average values of 132 g and 156 g, at the lot of lambs from Vrancea this indicator was 180 g, being superior with 12.77% over the average value of the entire population which was being fattened.

Enclosing the average value of the yield at slaughter between 37.50 and 40.41 denotes the tardy character of the Tigaie breed for meat production and the lack of selection for this character.

The obtained carcasses had a higher weight at the lot from Vrancea, with 11% compared to the mass of carcasses derived from the lot from Bacau, and more than 20% compared to those resulting from the Vaslui lot.

By evaluating the carcasses in relation with the specified requirements by the degree of fattening for those obtained from the batch from Vrancea, about 45% of the carcasses were placed in quality classes of 2 and 3.

All obtained values denote a reduced potentially for the Tigaie breed towards meat production and confirmed that this was not selected also on the basis of skills on which the production of meat depends.

During the fattening the lowest specific consumption obtained on the spore unit was found in the lot formed by the lambs from Vrancea, the average value being of 5.86 UFC; for the other two batches the consumption was higher than 6UFC.

The existence of some significant statistical differences and better values recorded for the qualification assessment of meat production for the lot formed with individuals from Vrancea, denotes an insular development of the breed.

At the current level, the Tigaie breed does not correspond to the increased mainly for meat, which is why this breed must be the subject to some actions supported to amend, for the wanted purpose, the potential for meat.

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