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Carcass quality of F1 crossings of Ile de France rams with local Romanian sheep

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INTRODUCTION

The made researches are part of the wider activities, that take place in Romania for the identification of horses and effective technologies to increase meat production in sheep. The research aim was to check the level and quality of meat production from F1metis resulted from crosses between parcticate rams Ile de France with the main sheep breeds from Romania.which areTigaie and Turcana. Also there were regards on the verification and the combining of these races, and based on the obtained data we will later passe on the development of future cross schemes. The extenshion at a farm of grafics which prove to be in line with the targets set, will induce an improvement in performance and indices on which depends meat production, while reducing the total duration of fattening.

SUMMARY

The carried out research is part of a wider complex of activities run in Romania, in order to identify the best methods and technologies to improve sheep meat production. The used biological material consisted of lambs of local breeds, Tigaie and Turcana as well as F1 crossbreds between Ile de France rams and ewes of the previously specified indigenous breeds. The purpose of the investigations was to verify the growth intensity and the way how the paternal breed may contribute to achieve higher meat production of better quality. The lambs had the same age (80 days) at the beginning of fattening in order to ensure groups' uniformity and to achieve some conclusive results. Check of the fattening ability has been done by applying an intensive fattening technology, with three phases (adaptation, growing and finishing) during a period of 85 days. Based on the achieved results, it was found that, during fattening, the growing intensity was higher in the crossbred groups. While the Ile de France x Tigaie group had a live weight 15.54% higher than the group composed of pure Tigaie breed individuals, the relative difference of weight between Ile de France x Turcana group and Turcana control group was slightly over 20 %, proving that the use of industrial crossings is a solution to improve fattening performance. Concerning the average carcass weight, significant differences occurred between the investigated groups ($p > 0.01$). In Ile de France x Tigaie crossbreds, the slaughtering efficiency was over 3.5% improved, the meat yield representing 70.5% of carcass weight, while the bone: meat ratio reached 1:4.29. All results confirmed that Ile de France breed was a good improver for carcass quality and conformation.

MATHERIAL AND WORK METHOD

The biological material under investigation was the young male and female sheep of the current year, of the local breeds Tigaie and Turcan, and also half-breed of first generation produced by crossing these breeds with local breeds of rams Ile de France.

The weaning of youth sheep was performed at 80 days, and in order to compare results and determine the effect of breeder on the ability to produce meat at F1 individuals, were organized the experimental groups: group consisting of L1 youth of Tigaie breed, L2 of the lot half breed F1 Ile de France x Tigaie, L3 lot of lambs by breed group and L4 Turcan including metis F1 x Ile de France Turcan.

The fattening technology has been applied with intensive three-phase (conformation, breeding and finishing) and a total duration of 85 days, providing the same service and same type of food. During the fattening, each batch was composed of 26 individuals of which 13 females and 13 males, and at the end from each of the lots were randomized elected 6 individuals (3 females and 3 males) who were killed. To avoid calculation errors induced gastrointestinal contents, individuals have been fodder for 12 hours before slaughter.

Weaning youth sheep was performed at 80 days, and in order to compare results and determine the effect of breeder on the ability to produce meat in F1 individuals, were organized and the experimental groups: group consisting of L1 youth of race pan, L2 of the lot metis F1 Ile de France x pan, L3 lot of lambs by breed group and L4 Turcan including metis F1 x Ile de France Turcan.

The objective assessment of carcasses was carried by the following elements: mass carcass, slaughter yield, the physical structure of carcasses, the carcasses classification CALs quality according to the methods applied in the European Union and setting weight parts, based on the quality of the cut carcass. After the assessments were conducted at

the carcasses, they were cut into regions for slaughter, and then were boned vedrerea determining the ratio between bone and meat, both for total carcass and the cuting for each region.

The data processing was performed using the procedure REML (restricted maximum likelihood - maximum of plausibility restricted) guaranteeing the achievement of expected in the normal parameters.

RESULTS AND DISCUSSION

After obtaining the youth half breedpopulation, there were established experimental plots and at the end of the fattening period, to assess the performance obtained, were made slaughter inspection. The first objective considered was the determination to sacrifice efficiency and comparing results.

The **live weight** was determined by the weight of all individuals at the end of the 85 days of intensive fattening. Data analysis included in Table 1 show that the intensity of growth and fattening ability was different in the four groups formed.

According to the obtained results, before slaughter lambs belonging to two groups consisting of individuals F1 had the highest body weight. Thus, while the L2 group had a higher live weight compared with 15.54% of the lot consists of individuals of clean Tigaie brees, the relative weight between L3 and L4 was slightly over 20% showing so that the cross with sheep breed Turcan ensure.at the metis population, better performance at fattening.However, changes in body weight achieved during the fattening of the two metise lots confirmed both hybrid force of them and that in both cases the use of rams of Ile de France race may be a practical and effective way to increase the quantity of sheep meat. Between lots , the differences of weight in determining the results of live weight before slaughter were significantly distinct for p> 0.01. The results are higher than values given in various literature sources [1, 2, 6, 7, 9, 10] but other specific groups of metis, but closer to those determined by C. Pascal [14, 15] in other research conducted in 1996 on metis obtained using pedigree Texel rams and Ile de France with the same maternal breeds.

The **carcass weight** is an important indicator in evaluating the animals used for meat production. In general, this indicator is strongly influenced by a whole series of factors among which the most important are: sex, live weight, condition of fattening, age group, the fattening.technology applied etc.

In the investigations it was found that the most heavier casses result from the animals with the highest live weight. Between batches there were noted that differences in terms were statistically significant for p> 0.01, except the notted difference thae makes the difference between the average weight of carcasses obtained from the batches L1 and L2, which has had the same degree of significance for statistical thresholds taken consuderare (table 2).

Table 1. Body weight at the end of fattening, carcass weight and yield at slaughter

Specification	Statistics	Genotype			
		Tigaie (L 1)	IF x Ti (L 2)	Turcana (L 3)	IF x Tu (L 4)
Live weight (kg)	$\overline{X} \pm s_{\overline{X}}$	32.750 ± 0.378	38.780 ± 0.637	27.250 ± 0.925	34.130 ± 0.885
	s	0.21	0.26	0.24	0.21
	minimum	29.50	35.00	20.50	30.00
	maximum	34.00	42.00	26.00	38.00
Carcass weight (kg)	$\overline{X} \pm s_{\overline{X}}$	15.380 ± 0.271	19.203 ± 0.020	12.519 ± 0.461	15.110 ± 0.443
	s	0.16	0.12	0.19	0.14
	minimum	13.75	18.00	10.00	15.50
	maximum	16.25	21.80	13.00	19.55
Slaughter house output(%)	$\overline{X} \pm s_{\overline{X}}$	49.977 ± 0.803	55.527 ± 0.705	45.942 ± 1.647	52.274 ± 0.429
	s	0.27	0.22	0.25	0.26
	minimum	43.57	52.25	41.90	49.85
	maximum	51.25	58.15	48.15	53.50

Table 2 Statistical significance of the difference constatae for weight at slaughter and carcass weight (kg)

	Tukey Test	L1	L2	L3	L4	
Lvie weight	L 4	1.38**	4.48**	6.78**		Casrcass weight
	L 3	5.50**	11.53**		2.59**	
	L 2	6.03**		6.68**	4.09**	
	L 1		3,82**	2,86**	0,27 n.s	

For live weight
*Significant at the 0.05 level (w = 1.01)
**Significant at the 0.01 level (w = 1.19)
n.s: not significant

For carcass weight
*Significant at the 0.05 level (w = 0.976)
**Significant at the 0.01 level (w = 1.960)
n.s: not significant

Also, terhe was found that phenotypical speaking, the differences between groups were evident in the sense that metis individuals were better comply, and the appearance of the body was compact and cylindrical, like meat breeds. This is extremely important for improving production of meat because between weight and quality of the case there is a positive correlation with the actual growth trends with advancing age. This is supported by results published in the special literature and which shows that while between the carcass weight and quality the phenotypic correlation calculated at 120 days is r = + 52 to 170 days of age the correlation increases to r = + 70 [13, 14]. For the same age groups Nevill, GW, Chapman AB, Pope, in 1958, determined that the age of 120 days between the live weight of youth and quality of carcass weight r = + 55 and Gjedrem quoted by Mochnacs M (1978) shows that the degree of correlation increased to r = + 0.75 at the age of 165 days. These values show that choosing the optimal timing for slaughter lambs fattened very quality makes the carcasses obtained.

The **output at slaughter** was determined based on obtained values, at weighing the carcasses were present the suet. The average highest were recorded in case of calculations performed on the carcasses from the slaughter of sheep fattening youth belonging to metise lots. Thus while in group L1 the average output slaughter was 49.977%, at L2 metis value of this indicator increased to 55.527%. The same effect of the average obtained values are reported and when they look up batches using local Turcana breed. In this case the expression of difference is over 6 percentage points for all metis L3 batch. The average values of specific yield determined for the local breeds are slightly lower than other determinations made by the same breed. Thus, in 2008, C. Pascal [12] determines the average yield at slaughter of 44.40% for 44.10% for the Turcana breed.

Carcasses structure. The analysis of structure and composition of carcass is an extremely important criterion and frequently used in the work of improvement, because they involve both physical composition analysis and tissue analisys of the carcase, and also the chemical composition of meat [10, 11, 19, 16]. In terms of physical structure the carcass macrostructure, according to general commercial cutting, contains the following parts: neck and shoulder, head and chest meatloaf, steak I and II and jigoul. Values of these parts are dependent on many factors among which the most important are: race, age, sex and state of fattening. Tissue structure is the ratio of meat, fat and bones and makes the direct value of the meat quality [15, 17, 18]. The muscle masses involved more carcass weight, or a cut region, the commercial value is higher.

Like the physical structure, the tissue is dependent on the same factors, but by some authors state that the fattening conditions in a greater extent than the tissue race (Calatoiu A., quoted by A. Ionescu, 1994). According to several studies [3, 16] at the fattened the frequently deposition of fat and the biger are subcutaneus, while the adult sheep and reconditioned with the state of good maintenance, the most consistent depositions are arranged under form of deposits, called maniament points.

In the research quality assessment was based on carcass weight tissue assessment basic component of the physical and the amount of muscle mass, bone quantity and amount of adipose tissue, both determinations being made for the case in full and for the cut portions.

The analysis conducted on the carcasses integral highlights different values of the major tissues. Obviously, the weight of the muscle mass is superior at the heavier carcasses. This aspect is supported by that obtained from carcasses at slaughter metis F1 resulting from crossing rams Ile de France x pan muscle mass is 70.5% of carcass weight and the ratio between bone and meat is 1 to 4.29.

Table 3. The phisical structure of the carcass and the weight of the cut carcass pieces

Specification	U. M.	Tigaie	IF x Ti	Turcana	IF X Tu
		$\overline{X} \pm s_{\overline{X}}$	$\overline{X} \pm s_{\overline{X}}$	$\overline{X} \pm s_{\overline{X}}$	$\overline{X} \pm s_{\overline{X}}$
Meat from carcass	kg	11.108 ± 0.124	13.339 ± 0.252	7.223 ± 0.480	10.960 ± 0.435
Bone carcass	kg.	3.147 ± 0.105	3.350 ± 0.105	1.970 ± 0.105	2.840 ± 0.081
Carcass fat	kg.	1.125 ± 0.045	2.514 ± 0.084	2.326 ± 0.019	1.310 ± 0.017
Carcass without fat	kg.	14.255 ± 0.211	16.689 ± 0.034	10.193 ± 0.595	13.800 ± 0.394
Bone/meat report	-	1 : 3.52	1 : 4.29	1 : 3.715	1 : 3.85
Nek and omoplat	kg	4.270 ± 0.069	4.530 ± 0.088	2.665 ± 0.165	3.701 ± 0.086
-meat	kg	3.263 ± 0.041	3.622 ± 0.066	2.021 ± 0.133	2.890 ± 0.102
-bones	kg	1.007 ± 0.032	0.908 ± 0.29	0.644 ± 0.031	0.811 ± 0.021
-bone/meat report	-	1 : 3.24	1 : 3.98	1 : 3.13	1 : 3.56
-carcass participation	%	29.95	27.18	26.14	26.81
Chest head with rib	kg	3.732 ± 0.054	4.433 ± 0.077	3.039 ± 0.188	3.558 ± 0.105
-meat	kg	3.010 ± 0.041	3.556 ± 0.059	2.444 ± 0.134	2.814 ± 0.089
-bones	kg	0.722 ± 0.025	0.877 ± 0.024	0.595 ± 0.025	0.744 ± 0.016
-bone/meat report	-	1 : 4.16	1 : 4.05	1 : 4.10	1 : 3.78
-carcass participation	%	26.18	26.60	29.81	25.80

Chop		2.186 ± 0.049	2.645 ± 0.047	1.816 ± 0.095	2.675 ± 0.086
-meat		1.698 ± 0.037	2.131 ± 0.050	1.436 ± 0.059	2.200 ± 0.765
-bones		0.488 ± 0.029	0.514 ± 0.018	0.380 ± 0.005	0.475 ± 0.013
-bone/meat report	-	1 : 3.47	4.14	1 : 3.77	1 : 4.63
-carcass participation	_	15.34	15.87	17.46	19.38
Jigoul	kg	4.067 ± 0.070	5.081 ± 0.118	2.673 ± 0.135	3.866 ± 0.129
-meat	kg	3.137 ± 0.069	4.030 ± 0.079	2.062 ± 0.176	3.056 ± 0.102
-bones	kg	0.930 ± 0.034	1.051 ± 0.037	0.611 ± 0.023	0.810± 0.028
-bone/meat report	-	1 : 3.37	1 : 3.83	1 : 3.37	1 : 3.77
-carcass participation	%	28.53	30.35	26.22	28.01

Note: IFxTI = Ile de France x Tigaie; IFx Tu = Ile de France x Turcana

The same made analysis but at the L4 batch made from half breedIle de France x Turcana shows us the fact that throught the medium total weight of the muscle mass that go over 70% from the total carcass and throught the fact that the report between bones and meat is 1 to 3.8 it is registerred a considerable improvement of the carcass quality at the half breedpopulation.

The statistical processing of data confirms the existence of lots of differences with a high level for p> 0.01 for the characters represented by the carcass weight and muscle mass quantity in the whole carcass (Table 3).

Table 4. The statistical signification of the constant diferences between the carcass weighht without fat and the quantity of the carcass meat. (kg)

	Tukey Test	L1	L2	L3	L4	
Carcass weight without fat	L 4	0.45 n.s.	2.89**	3.60**		The carcass meat weight
	L 3	4.06**	6.49**		3.73**	
	L 2	2.43**		6.11**	2.37**	
	L 1		2.23**	3.88**	0.14 n.s	

For the weight of the carcass without fat
*Significant at the 0.05 level (w = 1.060)
**Significant at the 0.01 level (w = 1.860)
n.s: not significant

For the meat weight of the total carcass
*Significant at the 0.05 level (w = 0,078)
**Significant at the 0.01 level (w = 0,091)
n.s: not significant

Neck and shoulder regions that were analyzed as slaughter cut from carcasses, highlights that in terms of percentage participation in the total carcass weight of muscle mass in half blood values are higher and therefore the bone and meat report has the best values at half bloods. Compared with the plots consist of two lambs belonging to the maternal breed metis increase muscle mass at the region with over 11% in L2 and by about 30% at L 4.

Head of the breast, meatloaf and steak, are the upper regions of slaughter, the meat can attend between 60% and 80% of them. Analyzing the share that holds the head and chest meatloaf in the average weight of carcasses obtained if it is found that the racial group of the pan value is 26.18% at Turcan increased to 29.81%. In other studies and research carried out on the race celeaşi finds that these portions have cut about 26% breed in the pan and Turcan [11, 12] and increase the share to 28% of the carcasses produced by metis slaughter lambs produced from mating with Texel Breed females from the same local population in Romania [15]. At steak would be noted that while the tests carried out on the carcasses obtained from slaughter lambs metis report of bones and meat values are 1 to 4.14 to L2 and from 4.63 to 1 L 4 lots maternal values obtained are lower.

The ***leg of mutton,*** from a commercial point of view, is the slaughter of the most appreciated of all sheep carcass. Share of participation of this region in total carcass greutatatea especially affect the overall value and contribute to enhancing carcass quality in terms of trade. Linked to this issue in France are seen as inadequate to the share of carcasses in carcass weight of half a post (screw leg of mutton +) have up to 38% being ideal pondrea over 48% (Oltofth, JC, 1991, quoted by Sandu, Gh, 1993). Also Frederiskhen JN, quoted by C. Pascal [12], shows that the share of the leg of mutton participation in the carcass weight ofTexel lambs often exceeds 36% for youth intensive fattening.

In other researches conducted in Romania [11, 12, 14, 15] it was found that the share of the leg of mutton participation in the total carcass weight was different depending on lots belonging to a certain breed or a certain group of metis and the total weight of the carcass. Value, the share of participation in jigoului total carcass weight, was between 31.65% at the Texel x Merinos of Palas half breeds and 26.37% at Turcan breed. Other studies by Taft V and colaborators (1983) show that the carcasses from the killing of youth by race merino Palas jigourile have a weight of 4.85 kilograms of meat was 78.55%, 21.45% bones, resulting in a ratio of 1: 3, 66; the youth of the same race pan cut weighing 4.78 kilograms of which were 77.82% of muscle mass and bone meal 22.18%, resulting in a bone / meat, 1: 3.5.

In the made study, by posting of the leg of mutton from the carcass was found that differences between groups for significant statistical thresholds considered except the difference between lots L4 and L1 who had no degree of statistical significance for the two thresholds. The same is true if calculations performed for total meat jigou (table 5). The analysis

results confirmed the top of the carcasses from metis, supported the assertion that while the use of race in Ile de France ewes mating with pan induces an increase in meat jigou by about 28% to metisii with Turcan muscle masses have an average weight higher by 16.64% compared to values calculated for maternal race.

Table5 The statistical signification of the constant diferences between the leg of mutton weight and the meat quantity from this area (kg)

	Tukey Test	L1	L2	L3	L4	
Leg mutton weight	L 4	0,20 n.s.	1.21**	1.19**		Leg mutton meat weight
	L 3	1.39**	2.40**		0.38*	
	L 2	1.01**		0.99**	0.97**	
	L 1		0.84**	1.07**	0.08 n.s	

For the leg mutton weight
*Significant at the 0.05 level (w = 0.35
**Significant at the 0.01 level (w = 0.41)
n.s: not significant

Form the leg mutton meat weight
*Significant at the 0.05 level (w = 0.34)
**Significant at the 0.01 level (w = 0.40)
n.s: not significant

Evaluation of quality and conformation carcasses was conducted in accordance with the European legislation, the assessment has taken account of carcass conformation and degree of fattening found. In comparison with other data cited in special literature for several populations of sheep in Romania [16, 18] the results demonstrate the limited possibilities of the two breeds in Romania to produce high quality carcasses. If the two groups formed by individuals witness, the local breeds have not been made specific requirements for conformation first three classes, respectively S, E and U. In appreciation of the obtained carcasses, in these investigations it was found that while half breeds obtained with Tigaie the most cases (50%) were classified as class A in conformation, obtained by the use of race crosses Turcan (about 80% of carcasses rated) meeting the requirements specified for class U, O and R.

After the fattening the carcasses distribution on the five quality categories is presented in Table 6. Regarding the distribution of fat on the external surface of carcasses was found that while the local breeds tesutuul fat was thicker in the posterior area and virtually absent in the area earlier on the sides, the slaughter carcasses obtained by metis individuals registering a smoothing of fat and total coverage of the case with this tissue.

Table 6 Carcasses classification according to EU standards (% of carcasses)

Category	Genotype			
	Tigaie	IF X TI	Turcana	IF x Tu
After conformation				
S	-	-	-	
E	-	16.67	-	-
U		33.33	-	16.67
R	50,00	50.00	33.33	33.33
O	33.33	-	50.00	33.33
P	16.67	-	16.77	16.67
After fattening rank				
1	-	-	-	-
2	-	33.33	-	16.67
3	50.00	33.33	16.67	33.33
4	33.33	16.67	66.66	33.33
5	16.67	16.67	16.67	16.67

Note: IFxTI = Ile de France x Tigaie; IFx Tu = Ile de France x Turcana

The classification of the carcasses in quality classes standard applied by the European Union show that by using crosses industry is a considerable improvement in both the carcass conformation and meat for the skills and the degree of fattening sheep tineretuul metis. Regarding the effect hibridarii quality carcasses are given similar results with other studies at European level [1, 2, 3, 4, 5, 6, 7] are justified, depending on the objectives envisaged in industrial practice crosses sheep.

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CONCLUSIONS

1. Upper body weight carried by the two lots half-breed hybrid force confirmed both of them and that in both cases the use of race rams Ile de France may be a practical and effective way to increase the quantity of sheep meat, as illustrated through hardships higher caracselor obtained.

2. Output to slaughter improved considerably when the lots to confirm metise measured values is around 50% and to consist of lots of breeds lamb tongues this indicator has values close to 42%.
3. By muscle mass exceeding 70% of total carcass and that the ratio between meat and bones are close to the values 1 to 4 can be said that metis is a considerable improvement of the quality of carcasses.
4. Cutting carcasses confirm that metisare takes place through an increase in the share of regions with mass butcher quality muscle weight jigoului grow by about 2% in both types of mating.
5. The analysis results confirm that while the use of race in Ile de France ewes mating with pan induces an increase in meat jigou by about 28% at Turcan metisii with muscle mass have a higher average weight of 16.64% compared to values calculated for maternal race.
6. Increased quality carcasses from metis use race Ile de France crosses the industrial of the two races when Romania expects a rapid increase in quantity and include this race in a scheme to produce hybrids when meat is and increasing the production of quality meat.

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Fig. 1. Local breeding carcasses (Tigaie and Turcana)

Fig. 2. Half-breed fattening lambs carcasses (IF x Turcana)

Fig. 3. Half-breed fattening lambs carcasses (IF x Tigaie)