

# RESEARCHES REGARDING THE INDUSTRIAL CROSSING EFFECT BETWEEN DIFFERENT SHEEP BREEDS OVER THE GROWING INTENSITY AND THAT OF THE SLAUGHTER INDICATORS

C. Pascal<sup>1\*</sup>

<sup>1</sup>University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

## Abstract

The aim of the research was to explore new solutions to produce increased quantities of sheep meat. The opportunity to carry out these surveys is because Romania has a very good position among the countries with large herds of sheep and that the European Union level requirements for sheep meat are not fully insured. Biological material intended for fattening of lambs was represented by half breed sheep coming from the crossing of mixed F1 females (Bluefaced Leicester x Merinos de Palas and Tigaie) with Suffolk rams. In the statements made to avoid calculation errors induced by intestinal content slaughtered individuals were not fed with 12 hours prior to slaughter. The objective assessment of the carcasses was done by determining the following elements: chassis, yield to mass slaughter, the determination of the physical structure of the carcasses, carcass classification graded by quality according to the method applied in the European Union and cut the carcass portions depending on quality. After the assessments carried out on the bodies, they were cut into regions for slaughter then were boned to determine the bone/meat ratio, both for the carcasses and for each region cut. The results obtained confirm and justify the application of cross-breeding when the main activity is represented by meat production.

**Key words:** sheep, sheep meat, Tigaie, Romanian breeds

## MATERIAL AND METHODS

The biological material which was used in research was represented by several batches of hybrids produced from crosses of sheep half breed mothers mixed with rams belonging to breed with very good skills for the production of meat. In order to assess the skills for the production of meat, the performance made by half breeds were compared with those recorded in batches made up of youth belonging to the maternal breeds, subject to the same conditions of fattening by feeding and maintenance.

Control batches belonged to local breeds Merino de Palas (M1) and Tigaie (M2) and the experimental batches consisted of tri-racial lambs hybrids resulting from the crossing of the breed Suffolk with hybrid F1 females Bluefaced Leicester x Merinos de Palas (L1) and Suffolk with F1 hybrid females Bluefaced

Leicester x Tigaie (L2). The weaning of the individuals was performed at the age of 85. The technology applied for fattening was intensive, with a total duration of 90 days and had three phases (adaptation, breeding, fattening and finishing). During the fattening ration an optimal structure was given so that the fattened youth to externalize the productive performance. To determine the specific daily consumption, the feed was weighed before administration stuffs and also the debris remaining uneaten. At the beginning and end of each phase were performed weightings of lambs, and based on the results it was determined the total increase, the average daily and increase consumption. In the appraisals carried out, in order to avoid calculation errors induced by intestinal content, the individuals were not fed with 12 hours prior to slaughter. The achieved results have been input into the data base, used to run statistical analysis through with the algorithm REML (REstricted Maximum Likelihood),

\*Corresponding author: pascalc@uaiasi.ro  
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which provide the achievements of the statistical parametric estimators within the normal range.

## RESULTS AND DISCUSSIONS

During the process of fattening the batches had a different evolution of body mass build-up. Thus, the half breeds S x (BL x Ti) had at the end of an average final weight of  $39.242 \pm 0.258$  kg, from which 43.65% was acquired during the period of lactation and 56.35% for fattening period. The presence of these differentiations, even in circumstances where an attempt was made to limit the influence of foreign factors, indicates that the practice of this type of service makes it easy to obtain a half breed youth sheep with very good quality and a very good rate of growth at fattening.

After the completion of fattening, a control slaughter were performed, and based on the centralized data determinations were made regarding: yield per sacrifice, determination, evaluation of conformation quality, assess the degree of fattening, establishing the structure of the tissue.

**The slaughter yield** is an extremely important indicator in problems concerning the

production of meat. It is influenced by a number of factors, of which nutrition is the most important along with the applied fattening technology. In order to limit their influence in the research, the nutrition was unified as the technology of fattening. With regard to this last aspect, several authors cite lower values of yield at slaughtering fattened sheep in youth based on feed volume [3, 4, 5, 6, 7,8, 11, 15, 16, 17, 19, 20, 21, 22,24, 25, 26, 27, 28].

At the end of the fattening, control slaughters have been carried out, in order to determine the main quantitative and qualitative properties of the carcasses and meat from the carcass as well as the efficiency of the slaughter. In this sense, in each experimental plot, at the end were slaughtered 12 individuals belonging equally to both sexes. In the research conducted on batches of half breed lambs and pure breed lambs, the calculated yield was as the slaughterhouse and the commercial. The data obtained from the lots surveyed are centralized in table 1.

Based on live weight before slaughter and that of the carcasses weighed at hot and cold after the specific values of the calculated yield after the slaughter were determined, or at warm even after being 24 hours refrigerated (cold).

Table 1 Carcass weight and yield at slaughtering

Specification	Statistics	Genotype			
		Merinos of Palas	S x (BL x Ti)	Tigaie	S x (BL x Ti)
Hot carcass weight (kg)	$\bar{X} \pm s_{\bar{x}}$	17.133 $\pm$ 0.674	20.833 $\pm$ 1.364	14.189 $\pm$ 0.331	20.523 $\pm$ 0.203
	V%	3.6	5.51	7.2	6.7
	minimum	16.5	19.0	13.0	19.5
	maximum	17.5	21.8	14.6	21.0
The cold carcass weight (kg)	$\bar{X} \pm s_{\bar{x}}$	16.563 $\pm$ 0.658	20.088 $\pm$ 1.122	13.789 $\pm$ 0.501	19.715 $\pm$ 0.355
	V%	6.8	9.7	8.8	6.7
	minimum	15.5	18.8	12.7	19.5
	maximum	16.8	20.5	13.9	21.0
Hot performance (%)	$\bar{X} \pm s_{\bar{x}}$	44.819 $\pm$ 0.386	51.652 $\pm$ 1.792	43.632 $\pm$ 1.417	52.200 $\pm$ 0.429
	V%	3.6	6.51	7.2	6.1
	minimum	43.7	52.2	41.9	49.8
	maximum	46.5	58.1	43.7	53.5
Cold efficiency (%)	$\bar{X} \pm s_{\bar{x}}$	43.328 $\pm$ 0.890	49.805 $\pm$ 1.350	42.400 $\pm$ 0.231	50.239 $\pm$ 0.231
	V%	3.9	4.7	6.5	6.3
	minimum	43.8	47.5	41.9	49.8
	maximum	44.5	50.0	42.7	50.7

The yield with the higher values at warm was recorded at the lambs slaughter from half breed lots S x (BL x Ti) and Suffolk (BL x MP) and have been of 52.20% respectively 51.65%. Determination of the same indicator for the control batches reveal net differences, and because the higher values were of 44.18% at Merinos of Palas and respectively 43.62% at Tigaie it can be concluded that local breeds have much lower average yields comparing to the half breeds, justifying the research point of view. The observed net differences were distinctly significant for  $p > 5$ .

So, using the crosses rams from meat breeds with ewes of indigenous breeds, they have contributed in particular to the increase in body weight at the end of the fattening period, at the weight increase of the carcasses and at the slaughter yield of the half breed lambs.

**The quality evaluation and the conformation of carcasses** represent an important activity performed at the end of each production cycle. That issue was determined in relation to the methodology applied at the European level. To obtain information objectivity in the assessment the carcass conformation and final fattening were taken into account.

*Evaluation of the conformation of carcasses* was based on the assessment of the degree of development of the muscle masses according to the profile chronicled at the back, middle and front. The assessments which were carried out indicate that in the case of the two batches, consisting of control

individuals belonging to local breeds Merinos of Palas and Tigaie, there were not reported cases in which the outside of the carcasses to meet requirements for enrolment in higher classes S.E.U.

In the case of Merinos of Palas after the estimation of carcasses had been found that the largest share (60.66%) satisfied the requirements for grade R and only 19.67% for U. At the tri-racial hybrids formed by the participation of the reminded breed is found a significant increase in quality of the carcasses, after the evaluation at this batch 88.33% of cases had features specific to classes E and U and just 19.67% for class R.

At the Tigaie batch the carcass conformation was slightly different and therefore 50% of them have fulfilled the requirements of conformation to fit in the R class, and the rest for O and P classes.

At the assessment of the carcasses obtained from lambs slaughtered T x (BL x MP) approx 16.67% of cases presented specific features of classes E and the rest in equal proportion of 33.33% for U and respectively R.

In comparison with other data cited in the specialized literature for the same breeds or for other local populations (Vicovan, 2008 and Pascal C) the results obtained prove limited possibilities of the two breeds from Romania to produce in pure breed carcasses of high-quality and that through half breeding a considerable enrichment of conformation has place (table 2).

Table 2 Classification of carcasses in accordance with the UE standard

Category	Genotype			
	M. Palas	T x (BL x MP)	Tigaie	S x (BL x Ti)
After conformation (%)				
S	-	-	-	-
E	-	33.33	-	16.67
U	19.67	50.00	-	33.33
R	60.66	19.67	50.00	33.33
o	19.67	-	33.33	16.67
P	-	-	16.77	-
After the degree of fattening (%)				
1	-	-	-	-
2	16.67	-	16.67	-
3	33.33	-	66.66	-
4	50.00	50.00	16.67	83.33
5	-	50.00	-	16.67

*The evaluation of the degree of fattening* presents a different distribution of the carcasses on the five categories of quality, situation presented in a centralized manner in table 3.

The assessment of the carcasses depending on the degree of fattening indicates the existence of a similar situation, described at the appreciation of the carcasses based on the conformation analysis.

In the case of the carcasses by sacrificing individuals belonging to maternal breeds there have not been registered situations that permit classification in batch 5 (most favourable). Of the total cases, obtained from the batch Merinos of Palas, were placed in the greatest proportion in batch 4 (50%), 33.33% in batch 3 and 16.67% in batch 2. The Tigaie carcasses have fulfilled the higher proportions (66.66%) the requirements higher for batch 3 and only 16.67% for batch 4.

The carcasses from the batches formed by tri-racial hybrids presented features greatly improved, many being similar to those of the lambs belonging to specific breeds of meat. From both batches all the carcasses were placed after evaluation in batches 4 and 5. The difference between the batches was accounted for by the fact that while at the T x (BL x MP) 50% of the carcasses evaluated were classified in the highest class, meaning 5, from the batch S x (BL x TI) just 16.67% were placed.

These results demonstrate first that through the crossing scheme applied the carcass conformation is obviously improved,

being very similar to the aspects characteristic of breeds of meat. Secondly, these results justify the usefulness of research, but also the necessity of extending the practice of obtaining hybrids for meat, but in a systematic way.

All these will help increase the export of sheep meat in the carcass, mainly on the market represented by the European Union, and the profitability of sheep breeding in major traditional locations of these races.

**The specific consumption of feed** is an indicator of activity in animal productions. This indicator has a special importance in the case of assessments relating to the management of production, considered a prime factor in evaluating the work done in the production of meat [1, 2, 10, 12, 13, 14, 23, 29, 30].

The research for the evaluation of specific consumption, expressed through UNC, shows different values between the analyzed batches (table 3 and table 4). Thus, in the analysis of the batches formed by using at crossing the local breed Merinos of Palas net differences were recorded in terms of the specific consumption necessary to achieve a spore growth of one kg. Compared to the consumption determined from pure breed lambs, the half breeds have achieved a higher specific consumption with 21.44%, due to the appearance of the precocity and favourable skills and better experimented for the production of meat.

Table 3 Evaluation of specific consumption at lots formed by using the breed Merinos of Palas

Specification	Merinos of Palas				T x (BL x MP)			
	Gross (kg)	UNC	PBDIN (g)	PDIE (g)	Gross (kg)	UNC	PBDIN (g)	PDIE (g)
Student/head/day	1.44	1.19	139.7	101.2	1.47	1.26	145.6	103.4
Cons./kg growth	6.81	5.83	660.6	478.8	5.52	4.58	535.5	388.2

Making the analysis also at the batches where for crossing was used the breed Tigaie confirms the lower values of specific consumption at batch formed of hybrid tri-racial S x (BL x Ti), results presented in table 16.

The difference between batches indicates that at the hybrids had a lower specific consumption by about 20% compared to the control batch consisting of youth sheep from the Tigaie breed.

Table 4 Evaluation of specific consumption in batches formed by using Tigaie breed

Specification	Tigaie				S x (BL x Ti)			
	Gross (kg)	UNC	PBDIN (g)	PDIE (g)	Gross (kg)	UNC	PBDIN (g)	PDIE (g)
Student/head/day	1.52	1.26	147.5	106.9	1.47	1.26	145.6	103.4
Cons/kg growth	6.91	5.91	573.3	415.6	5.75	4.77	462.7	404.4

The specific consumption with higher values specific to lots of local populations is due to a better level of precocity at the hybrid batches, but also better skills for their meat production.

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### CONCLUSIONS

1. At the onset of fattening the differences were favourable to both batches consisting of local breeds, and the explanation that can be given to this fact is that the mother ewes of Merinos of Palas and Tigaie had a superior milk secretion, which allowed the lambs to take full advantage of the specific growth rate of postpartum period.

2. At the end of fattening the batch formed by tri-racial hybrids S x (BL x Ti) had higher averages with 37.87% comparative to the data recorded in the control batch, recovering the difference made when the batches were formed.

4. The statistical process of the data shows that the difference between the batches at the end of the quarter periods had a different degree of significance of 1% and 5% for the thresholds.

5. The existence of these differentiations indicates a higher degree of precocity and an accelerated pace after weaning in regard to the body evolution at both batches of tri-racial hybrids.

6. Compared with the control batches where the yield determined at warm had values below 45%, in the case of the half breed batches S x (BL x Ti) and Texel (BL x MP) this indicator presents the average values of 52.20% and respectively 51.65%.

### REFERENCES

- [1] Abboud, S.Y., 1989: Genetic and phenotypic parameters for body weight growth of purebred and cross breed lambs. Dissertation Abstract International B, Science and Engineering. 50: p. 1-38.
- [2] Ahlen, K., 1990: Genetic analyses of fleece characteristics in Swedish pelt-sheep. Uppsala - Sweden.
- [3] Alb, B., 1984: Grundlagen der Schafestallplanung: Futtegerate. Arbeitsblatt Landwirtschaftliches Bauwesen Der Bayer. Landesanstalt Fur Tierzucht, Grub.
- [4] Alexoiu Victoria, Ștefănescu, D., Ciolcă, N., 1968: Changes regarding the physical structure of carcasses on lamb meat production, depending on age and breed. Lucr. Șt. I.C.Z. vol XXXVI, p. 295-306.
- [5] Angelescu, I., Drăgănescu, C., 1970: Researches regarding meat production variation at young sheep. Lucr. Șt. vol. XIII, I.A.N.B.
- [6] Avram, M., 1975: Results regarding the fattening of F<sub>1</sub> from crossing White Turcana sheep with rams from meat breeds. Lucr. Șt. S.C.P.C.O.C. Palas-Constanța, Vol. 2, 237-252.
- [7] Bekedam, M., 1986: Quick lamb fattening methods up to 29-34 kg of body weight, 37<sup>th</sup> An. Meeting of EAPP, Budapest, 1.
- [8] Bennef, G.L., 1990: Selection for growth and carcass composition in sheep. Anim. B. Abstr.
- [9] Boufaria, M. et al. 1990: Carcass composition of demand lambs from varying size of little slaughtered at constant live weight. Rabat - Morocco.
- [10] Botkin, P.M., Fild, R.A., 1969: Heritability of carcass traits in lambs. J. Anim. Sci. vol. 29, p. 273-280.
- [11] Dărăban, S., 2006: Technology of sheep breeding. Edit. Risoprint, Cluj-Napoca
- [12] Hanekamp, W.J.A., Boer De J., 1995: Comparison of 3 classes of Texel farms as sires of fat lambs from crossbreeding ewe. 46<sup>th</sup> Annual Meeting of the European Association of Animal Production, Prague, Czech Republic, 4-7 September 1995.
- [13] Harington, G. et al. 1990: Improving lambs' carcass composition to meat modern consumer demand. Anim. Breed. Abstr.

- [14] Haris, D.C., 1990: High contaminat free lambs. Proceeding of the Australian Society of Animal Production. Sidney - Australia.
- [15] Ionescu A., Ursescu A., Vicovan G., 1985: Study regarding the use of hybrids to enhance and improve sheep productions. I.C.P.C.O.C. Palas - Constanța.
- [16] Ionescu A., Radu R., Enciu Ana, Ida Aurelian, Pascal C., 2001: Concepts and amelioration programs of milk production at the local sheep. *Lucrări Științifice-Seria Zootehnie*, vol. 43/44, USAMV Iași.
- [17] Imangaliera, T.B., 1990: The intensive growth of fattened lambs. *Rev. Creșterea Animalelor*, nr. 3, p. 60-63.
- [18] Inger, L., 1986: The effect of restricted feeding and realimentation on growth and carcass composition in lambs. 37<sup>th</sup> An. Meeting of EAPP, Budapest, 2.
- [19] Mireșan, E., Pop, A., Popa, O., 1979: Contributions at skill knowing for meat production of the Merinos of Transilvania, Tigaie and Turcana breeds. *Lucr. Șt. I.A.C.N.*, vol. 2, 143-146.
- [20] Mireșan, E., Pop, A., Popa, O., 1989: Contributions at skill knowing for fattening lambs from different breed structure. *Buletin Informativ A.S.A.S.*, nr. 40.
- [21] Mochnacs, M., Taftă, V., Vintilă, I., 1978: Genetics and improvement of sheep. Edit. Ceres. București.
- [22] Murat Lemon, Ionescu, A., 1995: Results regarding skills for meat production of young rams obtained from crossing local sheep breeds. *Lucrări Științifice-Seria Zootehnie*. Vol38. U.A.M.V. Iași.
- [23] Murat Lemon, 1997: Comparative researches regarding skills for meat production of young sheep from the new meat type Palas and other industrial hybrids. Teză de Doctorat, USAMV, București.
- [24] Pascal C., 1998: Sheep breeding technology. Edit. Corson, Iași
- [25] Pascal C., 1999: Technical methods of assessments prior the selection work of sheep and goats. Edit. Corson, Iași
- [26] Pascal C., 2004: Sheep meat production. Edit. Ion Ionescu de la Brad, Iași
- [27] Pascal C., 2007: Sheep and goat breeding, Edit. PIM Iași
- [28]. Pivodă Carmen Ana, Pascal C., Radu R., 2001: New technologies of sheep exploitation for meat production. *Lucrări Științifice-Seria Zootehnie*, vol. USAMV Iași
- [29] Taftă V., 1996: Production and reproduction of goats. Edit. Ceres. București
- [30] Vicovan G.P., Adriana Vicovan, Radu R., Șapera I., 2010: Genetic history of an Australian Merinos breed in Romania. *Lucr. Științ. USAMV Iași, Seria Zootehnie*, vol. 49.