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RESEARCH OVER CARCASSES QUALITY OBTAINED BY THE USE OF ROMANIAN BREEDS IN CROSSING WITH MEAT RAMS

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Abstract

The research aim was to assess the possibility of increasing the quality of carcasses provided by young sheep undergoing fattening. In this sense, the biological material used was represented by industrial half-breeds from several forms of crossbreeding between Romanian sheep breeds and meat rams' breeds. The maternal form that was the basis on suppling biological material subject to fattening was represented by F1 crossbred females resulting from the crossing of Blue faced Leicester (BL) rams with local Merino of Palas (MP) and Țigaie (TI) females. In obtaining fattened lambs, Suffolk (S) rams were used as a terminal breed. In order to meet the objectives, set by the experimental protocol, research batches were organized that benefited from the same experimental treatment. Control sacrifices were performed to determine the carcass quality at the end of fattening. The assessments made indicate that in the case of two control groups, made up of individuals belonging to the local Merino and Țigaie breeds, no situations were reported in which the exterior of the carcasses met the requirements for classification in the S.E.U. The assessment of the degree of development of the muscles on the upper line indicates clear differences between groups. In the case of determining the area of the muscle eye in carcasses obtained by slaughtering lambs from batches S x (BL x MP) shows that the average value is approximately 3 cm^2 higher than the control batch, and in batch S x (BL x TI) the difference expressed in absolute values is + 3.43 cm^2.

Key words*: carcass conformation, lamb, meat sheep, muscle mass, Romanian sheep.*

INTRODUCTION

An important index in assessing the standard of people living, along with energy consumption, is the contribution of meat, milk, eggs, butter, etc., all reported per capita. However, worldwide, for each country, more than 50% of the total amount of animal origin protein from food is provided by the daily consumption of meat. However, this percentage undergoes changes from one geographical area to another because it is strongly influenced by the social and economic factors specific to each people (Pascal, 2015).

At this time in the literature most scientific information refers to the genetic variation in the quality of sheep meat resulting from purebreds or from different batches of industrial half-breeds. The role and scientific destination of these data, although of some importance, are useful only in establishing the principles of genetic variation. On the other hand, this data is not very clear when we look at the concrete definition of breeding objectives or when we aim to identify some genetic markers that could be used in determining the quality of meat.

In general, while an increasing number of studies have investigated differences in breeds in terms of meat quality, the differences in breeds included in various scientific sources are not always consistent, concrete or convincing.

Regarding the genetic variation for some quantitative characteristics of meat production, there are some publications that present evidence of differences between breeds in terms of meat colour (Carson et al., 1999; 2001; Dawson et al., 2002; Martinez-Cerezo et al., 2005) and fat colour. Moreover, Legrand et al. (2002) suggested that differences may occur between breeds in terms of fat quality, especially fat colour. These studies show that there are differences and that lambs obtained from the use of Texel rams had a more acceptable colour score for subcutaneous fat compared to lambs produced from Charolaise rams. Crouse et al. (1981) also reported the

effects of breed on fat colour, and in Suffolk lambs' subcutaneous fat is denser and yellower than Rambouillets lambs.

MATERIALS AND METHODS

The biological material used in research was represented by several batches of young sheep half-breed obtained from systematic crosses of adult sheep belonging to Romanian breeds (Merino of Palas and Țigaie) with rams belonging to meat (Blue faced Leicester and Suffolk). The maternal form used in the crossbreeding to obtain crossbreeds intended for the research of the established objectives was a first-generation crossbreed sheep (F_1) obtained from the crossing of Blue faced Leicester rams with the local sheep Merino of Palas and Țigaie. In order to obtain the desired crossbreeds, these crossbred mothers were crossed with Suffolk terminal rams.

In order to assess the real skills specific to meat production, several batches were set up which benefited from the same experimental treatment. Subsequently, the performances of the batches of mixed lambs were compared with those recorded in the control batches consisting exclusively of young people belonging to local breeds, subjected to fattening under the same conditions of feeding and maintenance.

The applied fattening technology was of intensive type and had a total duration of 90 days, being extended on three technological phases (accommodation, growth and fattening and finishing). During the fattening, a ration was administered with an optimal structure so that the fattened youth would externalize their productive performances.

In the assessments made, in order to avoid errors calculation induced by gastrointestinal contents, the slaughtered individuals were not fed 12 hours before slaughter. The objective assessment of carcasses was made by determining the following elements: carcass mass, slaughter yield, determination of carcass physical structure, classification of carcasses by quality classes according to the methods applied in the European Union and establishing the cut portions of the carcass according to quality. The planimetry method was used to assess the development of muscle mass.

Data processing was performed using the REML (Restricted Maximum Likelihood) procedure, which guarantees that estimates are obtained in the normal range of parameters.

RESULTS AND DISCUSSIONS

The quality of the carcass is an important objective of the activities carried out in the production of sheep meat.

The carcass name is given to the compact part resulting from the slaughter of an animal after bleeding, skinning, evisceration, removal of the head, genitals, internal organs (heart, lungs, kidneys, etc.) and removal of the extremities of the forelegs and hindquarters from the metacarpal joint and the metatarsal joint.

In order to properly interpret the information used to assess the quality of the carcass, it is necessary to properly manage the data on hot and cold carcass weight, as it affects other important parameters such as fat content, carcass conformation and weight of different pieces (Díaz, 2001; Quoted, et al., 2014; Carter et al., 2008; Lambe et al., 2009).

In the case of carcass marketing, more attention should be paid to the fat content, as when it is in excess it also has a certain impact on the price of the carcass (Díaz et al., 2002). Some of the measures for this criterion are dorsal fat thickness, renal pelvic fat weight, and visual assessment of carcass fat content (Díaz et al., 2002; Carrasco et al., 2009).

Another variable that is important and used as a basic indicator in expressing the quality of the carcass is its conformation (Díaz, 2001). Conformity assessment is done on the whole carcass and involves a visual assessment and objective measurements such as chest width and depth, leg length, groin width or rib area, etc. (Díaz, 2001, quoted by Ramírez et al., 2014). To the above criteria can be added the types of pieces obtained from the carcass and the ratios between the different types of tissue; bone, muscle and fat (Díaz, 2001; Rodrigues et al., 2006).

Assessing the conformity of carcasses resulting from slaughter was a primary objective of the research conducted. According to the experimental protocol, the research included among the objectives and activities aimed at analysing factors associated with the exercise

of aspects related to the emergence of differences in carcass conformation from the slaughter of young sheep belonging to different genotypes. Conformity is appreciated and of particular importance in terms of meat trade, which often face uneven carcasses that differ greatly in shape and lack data relating to knowledge of breed data, etc. (Kirton et al., 1967).

Given the practical importance of conforming the carcass in the meat trade, a standard grid has been developed in the European Union, which is now a reference in all slaughterhouses. In order to evaluate the conformation of the carcass, the analysis of the essential parts in which there are high quality muscle masses is taken into account. This is justified by the fact that we are traditionally looking for a carcass with wide and well-filled thighs, with thick and short legs, wider than long and with a slightly developed neck in length: that is, a wide and short carcass. In addition, the butcher is looking for carcasses that will allow him to sell as much of the total carcass as possible in the form of sliced portions of the highest quality. Most often there is a tendency to associate the good conformation of the carcass with an increase in the proportion represented by the jigou and the muscle masses in the essential parts.

The conformity assessment of carcasses was based on visual assessments of carcasses resulting from control slaughter. In accordance with the working methodology applied, this assessment was based on the assessment of the degree of development of muscle mass established in relation to the profile recorded in the essential parts of the carcasses, namely the back, middle and front (Table 1). Also, given the fact that adipose tissue also plays an important role in determining the quality of carcasses, evaluations were also made according to the degree of fattening. In the latter case, the assessments were based on an analysis of the fat on the inside and outside of the carcasses (Table 1).

The assessments made indicate that in the case of the two control batches, consisting of individuals belonging to the local Merino and Țigaie breeds, no situations were reported in which the exterior of the carcasses met the requirements for classification in the S.E.U. Following the assessment of the carcasses obtained by the control sacrifices of the young belonging to the Merino of Palas breed, it was found that a proportion of over 60% met the minimum requirements for their classification in class R and only 19.67% for class U.

Table 1. Conformity classification of carcasses

Specification	Genotype			
	Merino of Palas	S x (BL x MP)	Țigaie	S x (BL x Ti)
by 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	-
by 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

Notes: S = Suffolk; BL = Blue faced Leicester; MP = Merino of Palas; TI = Țigaie

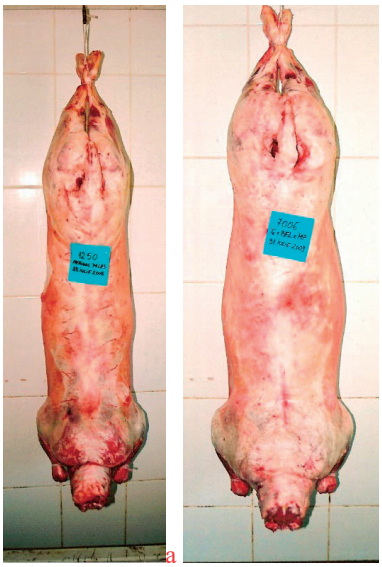

Figure 1. Carcass conformity in Merino of Palas (a) and in half-breeds obtained by the use of this breed (b)

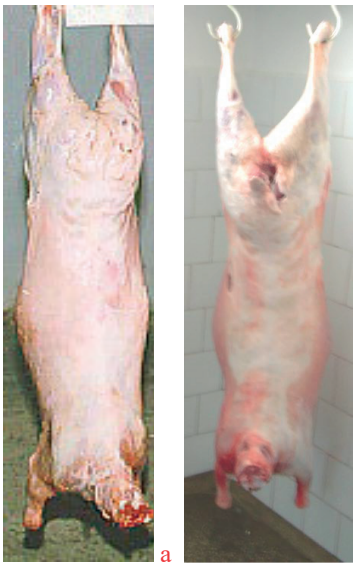

Figure 2. Carcass conformity in Ţigaie (a) and in half-breeds obtained by the use of this breed (b)

There is a significant increase in the quality of carcasses in industrial crossbreeding resulting from the crossing of Suffolk rams with F1 half-breed sheep resulting from the mating of Blue faced Leicester rams with Merino of Palas ewes. Applying the same evaluation system shows that in this experimental batch approximately 88.33% of the carcasses clearly and visibly had the minimum requirements specific to classes E and U and only 19.67% for class R.

Other studies found that differences in genotype were evident and significant for conformation using the EUROP scoring system, and that merino lambs had a higher proportion ($P<0.001$) of lower scores, especially compared to Poll carcasses. Dorset × (Border Leicester × Merino) and Texel × BLM (Border Leicester × Merino) (Hopkins et. al., 1997).

The carcasses evaluation by fattening shows a different distribution of carcasses by the five quality categories (Table 1). Regarding the distribution of fat on the external surface of the carcasses, it was found that while in the local breeds the adipose tissue was thicker in the posterior area was almost absent in the anterior area. On the other hand, the carcasses obtained by slaughtering mixed individuals showed a uniformity of the fat layer and a total coverage of the carcass with this tissue.

The assessment of carcasses by fattening indicates a situation similar to that presented in the assessment of carcasses on the basis of conformity analysis. In the case of assessing the carcasses resulting from the slaughter of individuals belonging to maternal breeds, there were no situations that would allow them to be included in batch 5 (the most favourable). Of the total carcasses obtained from the Merino of Palas purebred batch, approximately 50% of them were found to meet the requirements for classification in batch 4 and 33.33% for the requirements for classification in batch 3. In the batch Ţigaie which in this experiment as a witness, it is found that at a proportion of 66.66% the minimum conditions of batch 3 were met and only 16.67% for the quality batch marked with 4.

In the batches consisting of three-breed crossbreeds, the carcasses had a different quality and had much improved features, many being similar to those specific to lambs belonging to meat breeds. In both batches of all mestizos, following the application evaluation, it was found that the minimum requirements for inclusion in the higher batches were met. The difference between the batches was represented by the fact that while in the batch S

x (BL x MP) at about 50% of the evaluated carcasses the minimum requirements to be classified in the best class were found (class 5). At the end of performing the same assessment on cross-bred carcasses S x (BL x TI) for the same classification class, only 16.67% met the minimum requirements.

These results show, first of all, that the cross-pattern applied clearly improves the conformation of the carcass, which is very close to the characteristics of the meat breeds. Secondly, these results justify the usefulness of conducting research, but also the need to expand the practice of obtaining crossbreeds for meat, but in a systematic way. All this will contribute to the increase in the export of sheep meat to carcasses, especially on the market represented by the European Union, but also to the profitability of sheep farming in the main traditional breeding grounds for these breeds.

Assessing the degree of muscle mass development is a feature that enjoys special attention to the expression of carcass quality because it is considered an objective indicator in assessing muscle mass in the carcass (Southam et al., 1971; Pascal et al., 2014). Regarding the methods for determining the surface area of the muscle eye, Hillers J.K., quoted by Murat et al., 1995 shows that there are no statistically significant differences between the planimetry method, the Polish method and the determinations performed using the graduated grid.

The determination of the surface of the muscular eye is made at the level of the space between the dorsal or lumbar vertebrae, but lately there is an increase of preoccupations that take into account other new areas for determination, so that the registered values are as representative and eloquent as possible. The surface area of the muscular eye was determined in the present studies at the level between the ribs 5-6 but also at the level of the pulp, and the data obtained for all the experimental batches are presented in Table 2.

Table 2. Average muscle surface area values

Genotype	No.	Muscle surface (cm^2)					
		Longissimus dorsi			Jigou muscles		
		$\overline{X} \pm s_{\overline{x}}$	Difference		$\overline{X} \pm s_{\overline{x}}$	Difference	
			absolute (±)	difference significance		absolute (±)	difference significance
MP	5	13.99 ± 0.08	-	-	104.14 ± 0.24	-	
S x (BLxMP)	5	16.96 ± 0.10	+ 2.97	*	157.72 ± 0.48	+ 53.58	**
TI	5	13.44 ± 0.59	-		99.13 ± 0.57	-	
S x (BLxTI)	5	16.87± 0.66	+ 3.43	*	156.17 ± 0.84	+ 57.04	**

Note: S = Suffolk; BL = Blue faced Leicester; MP = Merino of Palas; TI = Țigaie

Assessing the degree of muscles development on the upper line indicates clear differences between batches.

In the case of determining the area of the muscle eye in carcasses obtained by slaughtering lambs from batches S x (BL x MP) it was found that the average value is about 3 cm^2 higher than the control batch consisting of young belonging to the local breed Merino of Palas, and the batch metis S x (BL x Ti) the difference expressed in absolute values is + 3.43 cm^2 compared to the average value determined on the carcasses resulting from the control sacrifices of the fattened youth. All differences between batches were significant for the statistical thresholds taken into account.

Compared to other data in specialized publications, these values are close. Thus, in the profile literature, values of 16.65 cm^2, of 14.64 cm^2 for the Merino of Palas, of 12.85 cm^2 for Țigaie and of only 9.75 cm^2 for Țurcană are cited for the Carne-Palas Line (Vicovan et al., 2013; Pascal, 2011; Pascal et al., 2014).

Regarding the sections practiced in the jig muscles, the differences between the experimental and control batches are even more obvious. Thus, expressed by absolute values, the difference between the average values obtained in the hybrid batch S x (BL x MP) was higher by +53.58 cm^2 compared to the average value recorded in the control batch. In the analysis performed in batch S x (BL x

TI) the surface of the leg was superior by +57.04 cm^2.

The existence of these clear differences and the high degree of their significance indicate very good skills for meat production in batches of three-racial crossbreeds, simultaneously with an increase in carcass conformation.

CONCLUSIONS

The industrial crossbreeds resulting from crossing Suffolk rams with F1 crossbred ewes resulting from the mating of Blue faced Leicester rams with Merino of Palas ewes show a significant increase in carcass quality because after the evaluation it was found that in this experimental batch approximately 88.33% of the carcasses clearly and visibly had the minimum requirements specific to classes E and U and only 19.67% for class R.

Assessment of the carcasses conformity resulting from the batch of young sheep resulting from the pairing of Suffolk rams with F1 crossbred sheep (Blue faced Leicester x Ţigaie) found that approximately 50% of carcasses met quality requirements for E and U favourable effect due to the practice of those crossings.

When evaluating the carcass by the presence and distribution of fat layer on the inside and outside of the carcasses, it is observed that while in batch S x (BL x MP) at about 50% of the carcasses evaluated the minimum requirements for the best class (class 5), for carcasses obtained from the batch crossbreed S x (BL x TI) for the same classification class met only the minimum requirements of 16.67%.

In the case of determining the area of the muscle eye in carcasses obtained by slaughtering lambs from batches S x (BL x MP) it is found that the average value is approximately 3 cm^2 higher than the control batch (MP), and in batch S x (BL x Ti) the difference expressed in absolute values is + 3.43 cm^2 compared to the determined average value and the control batch was only from the Ţigaie breed youth.

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