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Meat quality of Suffolk and Bergamasca lambs slaughtered at 90 days of age

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ABSTRACT - Twenty lambs, 10 Suffolk (S) e 10 Bergamasca (B) born from single (SI) and twin type of birth (TW), were employed. Lambs fed the same diet. **Chemical-physical analysis were performed on raw *Longissimus lumborum* (LL).** B showed the lowest cooked loss on cooked LL, the highest value of a* and b* on raw meat. As regard fatty acid composition, LL of B showed the highest saturated fatty acids and the lowest value of polyunsaturated acids. Twin subjects showed raw meat with the lowest value of ether extract and with a healthy fatty acid composition.

Key words: Lamb, Suffolk, Bergamasca, Meat quality.

Introduction - Different animal related factors may affect lamb quality such as breed, age at slaughter and sex (Font i Furnols *et al.*, 2009). This variability can be regarded as an advantage for European lamb producers, because it offers opportunities to change or to diversify. Sheep meat from the Mediterranean region has apparently a paler and more delicate flavour, in contrast to that from the northern regions that has a fatter and more robust flavour. This point should be considered in the exchange of products between countries or when designing export or commercial strategies, although different tastes can be appreciated within the same country (Sañudo *et al.*, 2007). In the last years, healthy characteristics of meat affect consumer preferences. Ruminants have a relatively high ratio of saturated to unsaturated FA in their lipids, which is a risk factor for the development of vascular and coronary diseases. Various studies have shown that fatty acid (FA) composition of edible tissues of cattle and sheep is influenced by diet and genotype (Bartoñ *et al.*, 2007).

In the framework of a wider study carried out by the “Dipartimento di Scienze Zootecniche” and by the “Istituto Zooprofilattico Sperimentale” of Tuscany the aim of the present study was to compare meat quality of Suffolk and Bergamasca suckling lambs of 90 days of age raised on pastures.

Material and methods - Twenty lambs, 10 Suffolk (S) and 10 Bergamasca (B) born from single (SI) and twin (TW) births were employed. Lambs fed the same diet and they were raised with the same rearing system. The lambs were all males. When the lambs reached 30 days of age they were divided into two groups and positioned in two similar pastures. The lambs were free to graze and they fed mothers' milk and a pelleted feed with cereals flakes (15 % of crude protein); the pellets were given twice a day. Health status of the flocks was controlled regularly.

The following chemical-physical analysis (AOAC, 1990) were performed on raw *Longissimus lumborum* (LL): shear force (WB Warner Bratzler) on raw and cooked meat, drip loss, free water, colour, moisture, crude protein, ether extract, ash and fatty acid composition.

Data were analysed by analysis of variance, using the GLM procedure (SAS, 2003) following the model: $Y_{ijk} = \mu + R_i + P_j + (RP)_{ij} + \epsilon_{ijk}$ where R, P were breed and type of birth.

Results and conclusions - No significant effect of breed was observed for slaughter weight (38.4 S vs 36.7 B) whereas type of birth significantly influenced the slaughter weight (41.7 SI vs. 33.4 TW). Table 1 shows physical and chemical characteristics of LL. Cooking loss was higher in S lambs than in B lambs and also higher in SI compared to TW animals. These values were higher than those reported by Geesink *et al.* (2000) determined at 14 d *post mortem* on samples of *Long-*

Table 1. Physical and chemical analysis of *Longissimus lumborum* (LL).

	Breed		Type of birth		Breed*	RSD
	S	B	SI	TW	Type of birth	
Cooking loss (%)	38.7 a	32.5 b	38.6 a	32.5 b	*	5.71
WB cooked (kg/cm ²)	8.3 a	10.1 b	9.5	8.9	*	1.42
WB fresh (kg/cm ²)	6.3	5.2	5.2	6.3	n.s.	1.83
L*	42.9	42.1	42.7	42.3	n.s.	2.50
a*	18.9 a	20.1 b	19.6	19.4	*	1.98
b*	4.0 a	5.0 b	4.5	4.5	*	1.20
Chroma	19.3 a	20.9 b	20.1	20.0	*	1.07
Hue	0.2	0.2	0.2	0.2	n.s.	0.05
Free water (cm ²)	15.0	13.2	14.3	13.8	n.s.	3.94
Crude protein (%)	23.0 a	22.4 b	22.3 a	23.1 b	n.s.	0.52
Ether extract (%)	2.0	2.3	2.9 a	2.1 b	n.s.	0.56
Ash (%)	1.2	1.2	1.2 a	1.3 b	n.s.	0.05

*a, b are different within breed or type of birth for p<0.05; Breed*Type of birth = interaction between factors*

Table 2. Fatty acid composition of *Longissimus lumborum* (LL) (%).

	Breed		Type of birth		Breed*	RSD
	S	B	SI	TW	Type of birth	
Total Lipids	5.890	5.325	6.463 a	4.752 b	n.s.	1.07
C 14:0	4.05	3.70	4.80 a	2.95 b	*	0.86
C 16:0	21.8	19.8	22.3 a	19.3 b	*	1.13
C 16:1n7	1.82	1.73	2.01 a	1.55 b	*	0.09
C 17:0	1.22	1.17	1.19	1.15	n.s.	0.18
C 18:0	15.2 a	14.2 b	14.0 a	15.4 b	*	0.39
C 18:1n9 (cis+trans)	37.3	37.1	39.0 a	35.3 b	*	1.26
C 18:2n6 cis	9.65 a	11.8 b	8.04 a	13.4 b	*	0.93
C 18:3n3	1.35	1.33	1.29	1.40	n.s.	0.16
C 20:4n6	2.15 a	2.95 b	1.60 a	3.50 b	*	0.28
C 22:5n3 %	0.72	0.80	0.50 a	1.02 b	*	0.14
SFA	44.2 a	40.8 b	44.6 a	40.4 b	*	2.11
MUFA	38.5	38.6	40.4 a	36.7 b	*	1.49
PUFA n-4	2.30	2.19	2.58 a	1.90 b	*	0.08
PUFA n-6	12.3 a	15.4 b	10.0 a	17.7 b	*	1.11
PUFA n-3	2.65	2.99	2.33 a	3.30 b	n.s.	0.50

Also analyzed: C 12:0; C 14:1; C 17:0 anteiso; C 17:1; C 18:2n4; C 20:0; C 20:2n6; C 20:3n6; C 20:5n3; C 22:6n3.

*a, b are different within breed or type of birth for p<0.05; Breed*Type of birth = interaction between factors*

issimus (around 17%). The higher shear force of cooked meat in B breed could be related to the habit of Bergamasca that usually performs transhumance periods during its life. Such habit to move around remains even when the animals are confined. **Raw meat of B showed higher values of a*, b* and chroma than S.** As regard chemical analysis of LL (Table 1), S group showed higher percentage of crude protein than group B. TW subjects showed higher value of crude protein and lower value of ether extract than single type of birth subjects, probably because they were lighter than the former group.

Observing the fatty acid composition (Table 2) S animals showed higher percentage of C 18:0 and C 18:2n6. As regard the effect of type of birth, TW showed lower values of SFA and MUFA and higher of PUFA than SI, probably due to the lower slaughter weight and fat quantity of this group (Barton *et al.*, 2007; De Smet *et al.*, 2004). As far as the general average values are concerned, oleic acid was the most abundant fatty acid found in agreement with what has been reported in the literature (Lough *et al.*, 1992; Sarti *et al.*, 1993). Fatty acids are the most important lipid fraction of meat and their role is very particular because they have a part in the immune function, prevention of inflammation and as energy source (Webb *et al.*, 1994); on the other hand, cholesterol content and some saturated fatty acids from meat (particularly myristic and palmitic acids) were incriminated as the source of functional pathologies (Russo *et al.*, 1998).

In conclusions, the comparison between the two breeds producing lambs of 90 days of age evidenced that Bergamasca showed better meat quality parameters as regards healthy evaluation. On overall lamb production using free graze could represent a key element in terms of quality of meat and it could act as a guarantee for the maintaining of extensive rearing systems.

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