

# SENSORY CHARACTERISTICS OF SUCKLING LAMBS. INFLUENCE OF BREED AND SLAUGHTER WEIGHT

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## Introduction

Suckling lamb is a typical product of the Mediterranean areas associated to the production of ewe's milk for cheese-making. Many lamb products are also associated with Protected Geographical Indications, these quality brands include some specific breeds but also foreign breeds, introduced due to its higher milk production, have an increasing relevance. When the influence of breed on physico-chemical and sensory quality is considered, the effect is unclear, making difficult differentiation between foreign and local breeds. Indeed, although the range of carcass weights in light lambs is short (9 to 12 kg of live weight for suckling lambs of *Lechazo de Castilla y León* PGI), there are high differences in the tissues composition and meat quality between them (Díaz *et al.*, 2003) but for the sensory characteristics the effect is unclear. In some studies, they appear to affect some organoleptic scores (Jeremiah *et al.*, 1998, Martínez-Cerezo *et al.*, 2005), but in others they have no effect (Solomon *et al.*, 1980). These differences may be explained in some cases by differences in slaughter weights when breed effect was compared and because, at the same slaughter weight, breeds have different levels of maturity. Taking this into account the aim of this work was to determine if there are differences between Spanish and foreign breeds at different slaughter weights and to decide the optimum slaughter weight for the studied breeds.

## Materials and Methods

Nineteen suckling lambs (animals that were raised exclusively on maternal milk from birth to slaughter at one month age), from three breeds: 30 Churra lambs, 30 Castellana lambs and 30 Assaf lambs were slaughtered according to standard commercial procedures in Magnus abattoir (Arcenillas, Zamora, Spain). Within breed, three slaughter live weights were considered: 9.5 kg, 10.5 and 11.5 kg. At 72 h post-mortem, carcasses were cut into two halves and the *Longissimus dorsi* from left half of carcasses was taken to laboratory

Sensory analysis was developed by a fifteen member trained panel using the quantitative descriptive analysis (Murray and Delahunty, 2001) on 2 cm-thick slices of *Longissimus lumborum* wrapped in aluminium foil and cooked on a pre-heated double hot plat grill at 200°C until the internal temperature reached 70°C. Then, they were cut into portions, each one uniform and free from obvious connective tissue and fat streaks. The sub-samples were immediately wrapped in aluminium foil, coded and kept at 60°C. Meat was served following a randomised design for order and carry over effects. Within the descriptors generated by the panel, the following were defined as being the most discriminating and related to the consumer perception: brown, pink, aroma intensity, taste intensity, liver odour, hardness, juiciness, fat sensation, springiness and fibrous sensation. Reference scales (Severiano *et al.*, 2005) to assess the intensity of texture parameters were used. The anchored reference standards, terminology definitions and evaluation techniques were agreed upon by the assessors during training. For quantification of the intensity of each attribute, 9-point scales were employed, in which "1" referred to the minimum intensity and "9" the maximum for each parameter.

Statistical analysis was performed using the Statgraphic Plus program for Windows (Manugistics Inc. 1995). Outliers were detected by means of Box and Wisker plot, the significance of effects and their respective interactions were obtained using General Linear Model procedures. The LSD Fisher-test was employed to test for statistically significant differences between samples, differences were considered significant at the  $P < 0.05$  level.

## Results and Discussion

The first step in sensory evaluation of suckling lamb meat was to define the parameters most significant in order to describe the samples. Initially, more than twenty parameters were generated by the panel but after several reductions, taking into consideration the frequency and intensity assigned to each parameter for the panel, the following parameters and definitions were selected. The colour parameters chosen were brown: characteristic brown colour on the cooked meat surface and pink: characteristic pink-red colour in the cooked meat centre. Among the texture parameters the panellist selected hardness: the effort to bite the sample, juiciness: initial juiciness perceived during the firsts 2-3 chews, fat sensation: fat perception in the mouth springiness: recover of the initial form after suppression of initial deformation force, fibrous sensation: sensation due to the low extensibility of meat fibre. Indeed some flavour and odour parameters were used as aroma intensity: sensations perceived by the olfactory organ, taste intensity: sensations perceived during tasting and liver odour: odour associated with the liver.

Regarding the effect of breed and slaughter weight on sensory characteristics of suckling lambs, results show (Table 1) that both factors affected the organoleptic properties studied. The outer colour was affected by the slaughter weight showing the lower values the medium weight animals (10.5 kg) for the three breeds and there were no statistical differences for inner colour.

All the texture parameters were affected by breed. The Assaf breed was considered harder and with higher springiness, lower fat sensation and slightly lower juiciness, while Churra breed had higher juiciness and Castellana produced lower fibrous sensation. The slaughter weight had influence on almost all the texture parameters. In Spanish breeds, animals of 10,5 kg of live weight had lower hardness and fibrous sensation, but for Assaf breed this slaughter weight presented the higher values for these two parameters. Juiciness tended to increase with slaughter weight for the three breeds but the fat sensation was higher at 10,5 kg live weight. Finally, springiness was the only texture parameter not affected by slaughter weight.

**Table 1:** Means of sensory parameters for the three breeds (B) (Castellana, Churra and Assaf) and the three live slaughter weights (W).

	Castellana			Churra			Assaf			Significance	
	9,5 kg	10,5 kg	11,5 kg	9,5 kg	10,5 kg	11,5 kg	9,5 kg	10,5 kg	11,5 kg	B	W
Brown	4.48 <sup>b</sup>	3.19 <sup>a</sup>	4.97 <sup>b</sup>	4.51 <sup>b</sup>	3.69 <sup>a</sup>	4.53 <sup>b</sup>	4.77 <sup>b</sup>	3.65 <sup>a</sup>	4.51 <sup>b</sup>	n.s.	***
Pink	3.89 <sup>bc</sup>	3.60 <sup>ab</sup>	3.26 <sup>a</sup>	3.97 <sup>b,c</sup>	3.78 <sup>abc</sup>	3.97 <sup>bc</sup>	3.48 <sup>ab</sup>	4.20 <sup>c</sup>	3.62 <sup>a,b</sup>	n.s.	n.s.
Hard.	4.14 <sup>bcd</sup>	3.68 <sup>a</sup>	3.74 <sup>ab</sup>	4.44 <sup>de</sup>	3.48 <sup>a</sup>	3.81 <sup>abc</sup>	4.29 <sup>bcd</sup>	4.82 <sup>de</sup>	4.29 <sup>bcd</sup>	***	*
Juiciness	4.18 <sup>ab</sup>	4.24 <sup>ab</sup>	4.45 <sup>ab</sup>	4.30 <sup>ab</sup>	4.47 <sup>bc</sup>	4.86 <sup>c</sup>	4.30 <sup>ab</sup>	3.97 <sup>a</sup>	4.46 <sup>bc</sup>	*	**
Fibrous	4.91 <sup>cd</sup>	3.82 <sup>a</sup>	4.61 <sup>bc</sup>	5.07 <sup>cd</sup>	4.29 <sup>b</sup>	5.06 <sup>cd</sup>	4.73 <sup>c</sup>	5.28 <sup>d</sup>	4.67 <sup>c</sup>	***	***
Fat sens	3.80 <sup>bcd</sup>	4.19 <sup>d</sup>	3.61 <sup>bc</sup>	3.84 <sup>bcd</sup>	3.97 <sup>cd</sup>	3.88 <sup>cd</sup>	3.38 <sup>ab</sup>	3.76 <sup>bcd</sup>	3.34 <sup>ab</sup>	***	**
Springiness	4.37 <sup>b</sup>	3.75 <sup>a</sup>	4.21 <sup>ab</sup>	4.37 <sup>b</sup>	4.46 <sup>b</sup>	4.59 <sup>bc</sup>	4.12 <sup>ab</sup>	4.43 <sup>b</sup>	4.44 <sup>b</sup>	***	**
Taste int.	5.58 <sup>d</sup>	4.59 <sup>a</sup>	5.44 <sup>d</sup>	5.22 <sup>bcd</sup>	5.22 <sup>bcd</sup>	4.64 <sup>ab</sup>	5.27 <sup>bcd</sup>	4.76 <sup>abc</sup>	5.16 <sup>abcd</sup>	n.s.	**
Odour int	5.74 <sup>cd</sup>	4.56 <sup>a</sup>	5.82 <sup>d</sup>	5.23 <sup>bc</sup>	5.21 <sup>bc</sup>	5.31 <sup>bcd</sup>	5.33 <sup>bcd</sup>	4.93 <sup>ab</sup>	5.16 <sup>b</sup>	n.s.	***
Liver odour	3.81 <sup>bcd</sup>	3.81 <sup>bcd</sup>	3.17 <sup>abc</sup>	3.45 <sup>abcd</sup>	3.42 <sup>abcd</sup>	3.81 <sup>cd</sup>	3.24 <sup>abcd</sup>	2.98 <sup>ab</sup>	2.84 <sup>a</sup>	***	n.s.

<sup>a-b</sup> Different letter means differences statistically significant at  $\alpha=0.05$  within the row, n.s.= no significant effects; \*  $p<0.1$ , \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

Regarding olfactive and gustative parameters liver odour was influence only by breed, showing Assaf breed the lower value that is a positive characteristic of this breed. Finally, taste and odour intensity was affected by slaughter weight but not by breed showing, in general, the lower values for these two parameters in the suckling lambs with 10,5 kg live weight.

### Conclusions

Spanish consumers prefer light colour, taste and odour for meat lamb differing from other countries, where lambs are slaughtered at heavier weights. On the other hand, tenderness, juiciness and a moderate fat sensation that contributes to sustained juiciness are desirable characteristics for meat. Taking into account that the Churra and Castellana breeds presented better sensory characteristics than the Assaf breed, the optimum slaughter weight for suckling lambs of three breeds was 10,5 kg.

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