

## Consumer Appreciation of Carcass Quality of Organic vs Conventional Suckling Lamb Production

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### Abstract

*Carcass characteristics of suckling lambs (n= 40) of two breeds reared under conventional and organic conditions were analysed including objective and subjective parameters for fatness and conformation, meat and fat colour. Consumer acceptance was also studied using the home-use test. Results showed that the characteristics of the carcass of suckling lamb were similar for both types of production systems pointing out that organic production system did not affect fatness or muscle development. However, organic meat was darker (higher L\* and a\* values) probably related with the higher amount of exercise, although fat was not more yellow. In contrast consumers did not consider organic meat darker and there were not significant differences in appearance related with the similar conformation. These results reflect that consumer perceive organic meat as at least as good as conventional production not only regarding environmental quality but also regarding carcass quality.*

### Introduction

Organic meat production is supposed to use ecological resources, such as natural grass-lands and by-products with low alternative value. For organic meat production to expand in a sustainable way, consumers must perceive it as at least as good as conventional production regarding environmental quality and price (Kumm, 2002).

Grazing and exercise which are part of the organic farming management system may produce darker meat and yellow fat (Nielsen et al., 2005) and also affect muscle conformation and carcass fatness (Sañudo et al., 1998). Suckling lamb carcass quality has traditionally been mainly based on weight, fatness, meat and fat colour. The visual aspect of a carcass, described as previously mentioned, is one of the most important attributes. This is the first characteristic seen by the consumer, and it has a direct influence on the acceptance of the product. Information has been obtained on the effects of breed, sex or carcass weight (Miguélez et al., 2006) but to our knowledge, no scientific work has dealt with any suckling lamb organic carcass characteristics, despite the advantages of having well characterized quality label meats. Indeed, there

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are not studies that correlate objective determination of carcass quality and the consumer acceptance. Taking it into account, the aim of this work was to compare both types of production systems for suckling lambs in terms of carcass quality, including colour, to study the correlation of this parameters with the consumer appreciation and to determine consumer preferences between organic and conventional suckling lambs.

## Materials and methods

The material included 40 suckling lambs, ten animals per production system (organic or conventional) and breed, of two Spanish sheep breeds (Churra and Castellana) all of them from the same production area (Fariza, Zamora, Spain). Suckling lambs did not receive any kind of feed and were raised exclusively on maternal milk from birth to slaughter. The suckling lambs reared under organic conditions spent the day at pasture with their dams; however lambs reared under conventional conditions remained in a dry lot where their dams were fed with commercial concentrate. The animals were slaughtered according to current legislation, in abattoirs licensed, inspected and certified by the Castilla y León Organic Agriculture Conceal (CAECYL). Carcasses were chilled under commercial conditions at 4°C and 80% HR for 24 hours.

After chilling, the carcasses were weighed (CCW, cold carcass weight). Fatness were subjectively assessed (FS) using a scoring system that took into account the carcass as a whole (1-4 points) (EEC Regulation n° 461/93). Conformations were also subjectively evaluated (CS) using the scoring system suggested by Colomer-Rocher et al., (1988) (1-5 points) according to photographic patterns. To determine objective carcass conformation, the following measurements were taken on the whole and half carcass: carcass external length (K), carcass internal length (L), pelvic limb length (F), buttock length (G), buttock perimeter (BG), chest width (Th) and chest circumference (U). Meat and fat colour were measured on 72 h aged carcasses with a MiniScan XEPlus (Hunter Lab) with a 25 mm measuring head and diffuse/8° optical geometry. L\* a\* and b\* were recorded with a D65 illuminant at a 10°C standard observer in the CIELab space (CIE, 1976). Meat colour was measured on fat free surface of the m. *L. thoracis* (between 8<sup>th</sup> and 9<sup>th</sup> ribs) after 1 h blooming at 4°C and fat colour was determined on fat-cover of the left loin.

The affective analysis was carried out using a home-use test (Lawless & Haymann, 1998) involving 35 families (4 to 5 members) coming from the province of Zamora. Three-day aged half carcasses were delivered to each family with a questionnaire from where assessment characteristics of meat were collected. A 9-point hedonic scale, in which 1 corresponded to "I don't like it at all" and 9 corresponded to "I like it a lot" was used to measure the global relative preferences for the samples. The attributes assessed by consumers in fresh meat were general appearance, meat colour, colour and appearance of fat and inviting to eat.

Data of each variable were analysed by one-way analysis of variance (ANOVA). The statistical significance of factor considered (sample) was calculated at  $\alpha=0.05$  level using the *F*-test. In tables and figures, different letter (<sup>a,b</sup>) means statistically significant differences at  $\alpha=0.05$ .

## Results and Discussion

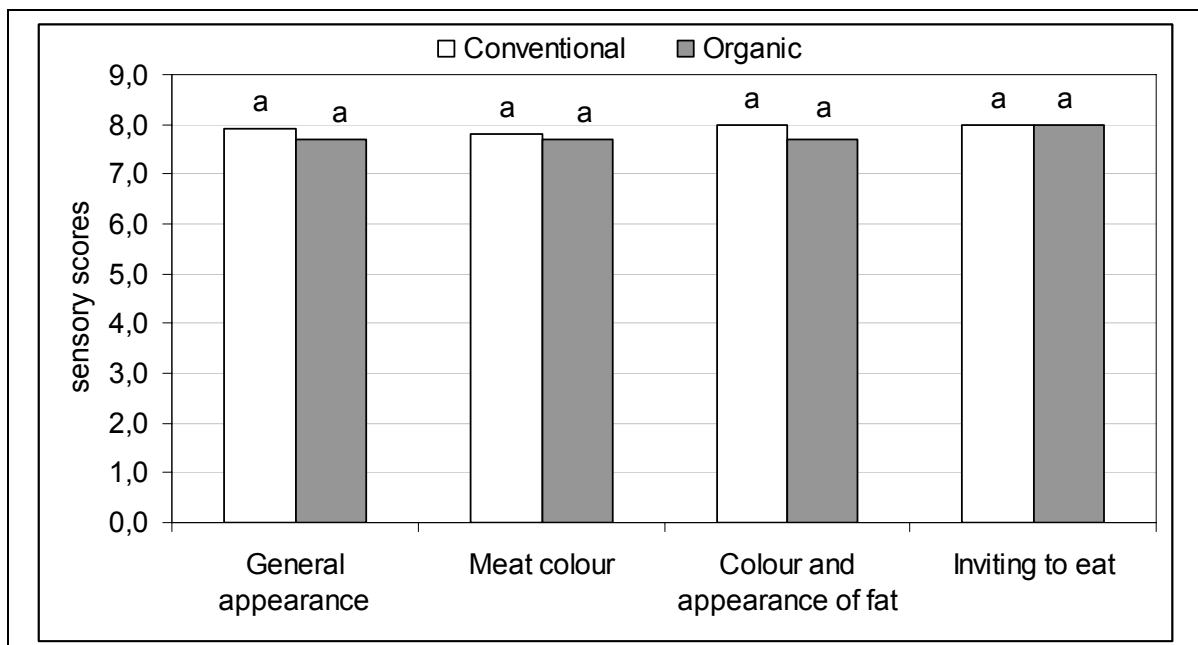
Table 1 contains the objective conformation values that fall within the range of those reported for several Spanish breeds (Miguélez et al., 2007). Production system, in

general, did not significantly affect these parameters except for chest width (Th) that were significantly higher for organic suckling lambs, however chest circumference (U) did not show significant differences. Regarding subjective conformation parameters, fatness scores (FS) and conformation scores (CS) were higher than those reported for suckling lambs (Díaz et al., 2003) and were not affected by production system. These results revealed that organic production system, characterized by higher amount of exercise, produced similar muscle conformation and did not implies less fat as milk diet is associated with greater animal fatness.

**Tab. 1: Means for subjective and objective carcass measurements, fat and meat instrumental colour of conventional and organic suckling lambs**

Carcass parameter	Conventional	Organic	Colour	Conventional	Organic
CCW	6.0 <sup>a</sup> (0.7)	6.1 <sup>a</sup> (0.5)	L* (fat)	75.6 <sup>a</sup> (5.9)	73.8 <sup>a</sup> (6.2)
K	49.1 <sup>a</sup> (2.0)	48.3 <sup>a</sup> (1.6)	a* (fat)	2.2 <sup>a</sup> (1.2)	1.9 <sup>a</sup> (0.9)
L	43.1 <sup>a</sup> (1.8)	40.9 <sup>a</sup> (6.8)	b* (fat)	11.0 <sup>a</sup> (2.6)	10.1 <sup>a</sup> (2.5)
Th	19.0 <sup>a</sup> (1.2)	19.9 <sup>b</sup> (1.0)	L* (meat)	53.3 <sup>b</sup> (5.0)	51.1 <sup>a</sup> (3.1)
U	46.7 <sup>a</sup> (2.9)	46.2 <sup>a</sup> (1.6)	a* (meat)	11.2 <sup>a</sup> (2.6)	12.8 <sup>b</sup> (2.3)
BG	38.9 <sup>a</sup> (2.1)	39.0 <sup>a</sup> (2.0)	b* (meat)	16.8 <sup>a</sup> (1.2)	16.5 <sup>a</sup> (2.0)
G	12.0 <sup>a</sup> (0.9)	11.9 <sup>a</sup> (0.8)			
F	29.0 <sup>a</sup> (1.4)	28.2 <sup>a</sup> (6.1)			
FS	2.3 <sup>a</sup> (0.8)	2.3 <sup>a</sup> (0.7)			
CS	1.95 <sup>a</sup> (0.68)	2.0 <sup>a</sup> (0.64)			

<sup>a,b</sup> Different letter means statistically significant differences at  $\alpha=0.05$ .



**Figure 1: Sensory scores for the parameters evaluated by consumers in raw meat.** <sup>a,b</sup> Different letter means statistically significant differences at  $\alpha=0.05$ .

In contrast, significant differences were observed for instrumental colour parameters of meat. Organic meat showed significantly lower values for L\* (Luminosity) and

higher values for  $a^*$  (redness), pointing out that this meat was darker than meat produced in conventional systems. As above mentioned, the exercise is part of the organic farming management system and it may produce darker meat and yellow fat but in this case no significant differences were observed for fat colour parameters.

Regarding consumer appreciation of raw meat, Figure 1 shows the results of the affective test carried out. Organic meat had lower values for some of the parameters but the differences were not statistically significant for any of them, agreeing with the lack of differences observed for the carcass fatness and conformation. Spanish consumers prefer very pale meat that is related with milk feeding and although organic meat was darker, consumers considered it as good as conventional because both were very pale.

## Conclusions

The characteristics of the carcass of suckling lamb determined in this work were similar for both types of production systems pointing out that organic production system did not affect fatness or muscle development. However, organic meat was darker probably related with the higher amount of exercise, although fat was not more yellow. In contrast consumers did not consider organic meat darker and there were not significant differences in appearance related with the similar. These results reflects that consumer perceive organic meat as at least as good as conventional production not only regarding environmental quality but also regarding carcass quality.

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