

SENSORY MEAT QUALITY IN LIGHT AND MEDIUM WEIGHT LAMB CARCASSES. COMPARISON BETWEEN BRITISH AND SPANISH SENSORY PANELS.

Sañudo, C.¹, Nute, G.R.², Campo, M.M.¹, Maria, G.¹, Baker, A.², Sierra, I.¹, Enser, M.², and Wood, J. D.²

¹Dept. of Animal Production. Veterinary Faculty. 50.013 Zaragoza. Spain.

²Div. of Food Animal Science. University of Bristol. Langford, BS18 7DY. UK.

ABSTRACT

Palatability of lamb was assessed by trained sensory panels of two countries. Thirty-two lambs were studied. Twenty-four lambs were purchased in Spain: eight Spanish Merino (ME), and eight local breed (RA) fed concentrate *ad libitum* and slaughtered at 80-90 days, and eight British export carcasses (BE) from grazed Welsh lambs (5-6 months old). Eight medium weight carcasses were bought in Britain (BP) and were typical early lambs. Frozen left side joints of ME, RA and BE were tasted in Spain and right side carcasses including BP, were tasted in UK. Both panels prepared and cooked the lamb according to their local conditions. Both panels made the same conclusions that lamb odour and flavour intensity were higher in British carcasses, tenderness was higher in ME and British meat and juiciness ratings were higher in Spanish carcasses. Hedonic ratings of flavour and overall liking showed that British meat was preferred by the British panel and Spanish lamb preferred by the Spanish panel. These results show that acceptability can be influenced by culinary procedures and that different criteria of quality may apply in each country.

INTRODUCTION

Small ruminant meat, specially lamb and mutton, comprises a large proportion of protein foods of commercial importance in many areas of the world. The quality characteristics of sheepmeat are influenced by a large number of production factors that include processing and post-mortem ageing. Variations in these factors and their combinations will account for the differences between domestic and export markets. Thus, it is essential for the lamb industry to establish how the characteristics of its national lamb products are perceived by the consumer into the other countries, specially when cultural background and cooking methods are quite different. If attention is paid to these points, it might be possible to encourage the development of sheepmeat market, since lamb farmers could produce lamb to meet the requirements of their customers in specific markets.

Previous works have studied the influence of different geographical sources of grazing lambs (Jeremiah, 1988) or grazing and intensively reared lambs (Sañudo *et al.*, 1992) in meat sensorial quality tasted by an unique panel from the own country. Also, Griffiths *et al.*, (1992) evaluated lamb meat using sensory panels composed of assessors from various cultural backgrounds, including domestic one, but only meat produced under USA conditions was tasted. It is of interest that, to date, no one has attempted to study the palatability of lambs produced in different countries, using their typical production systems and followed by sensory assessments in each country using their local cooking methods. This is the aim of the present study.

MATERIAL AND METHODS

Animals: Thirty two commercial lamb carcasses were studied. Twenty four were bought in Spain and eight were bought in England. Lambs bought in Spain had light carcasses (10.0-11.5 kg cold weight): eight Spanish Merino breed (ME) entire males, which were produced under an extensive system and after weaning, stabled and fed *ad libitum* and slaughtered at 80-90 days old; eight entire males from Rasa Aragonesa breed (RA), which is a medium wool breed of rustic type sheep located on the North-East of Spain, these lambs were produced in intensive-housed system, weaned and kept on concentrate *ad libitum* and cereal straw and then slaughtered at 80-90 days old; and eight British export wethers (BE) from Wales, kept on extensive regimen (pasture), slaughtered at 5-6 months old in Britain and sent refrigerated to Spain. Animals bought in England (BP) were typical early lambs (Easter time, 16.5 to 18.5 kg carcass weight), which were suckling in a first step and given some concentrate to aid early growth and then finished on early season grass.

Sampling: After 3 days post-slaughter for ME and RA and post-purchase for BE at 3°C ageing time, loin joints were blast frozen in vacuum bags and stored at -20°C. Left side loins remained in Spain and right side loins were sent to England. Loins from BP carcasses were blast frozen, vacuum packed and stored on purchase day. Only right sides were tasted in England.

Spanish Panel: Samples were thawed 24 h before cooking and m. *Longissimus dorsi lumborum* (LD) was removed and completely trimmed of fat but the epimysium was left intact. A trained taste panel of 11 panellist assessed lamb odour intensity, tenderness, juiciness, flavour intensity, flavour quality and overall appraisal using unstructured line scales measuring 100 mm (100 points). The left end of the lines (=1) were labelled: non odour, extremely tough, extremely dry, no flavour, dislike extremely flavour and dislike extremely; the right ends (=100) were labelled: very strong lamb odour, extremely tender, extremely juicy, very strong flavour, like extremely flavour and like extremely. Entire LD was grilled until the internal temperature reached 70°C and then it was cut in 20 mm slices. The samples were served hot. Each trio (ME, RA, BE) was randomly evaluated on separate panels.

British panel: The entire loin joints were thawed 24 h before cooking and tasted with a 10 member trained panel. The same attributes used in Spain were evaluated using a 8 points category scale. Entire joints were cut into 20 mm slices and then cooked under a conventional grill to an internal temperature of 80°C. Only LD was assessed using the four lamb types (ME, RA, BE, BP) randomised within panel.

Data analysis: Data were analysed using the GLM procedures of the SAS package (SAS, 1985). The model used was: $y = xb + e$ where "y" is a Nx1 vector of records, "b" denotes the fixed effects (lamb type) with association matrix and "e" denotes the vector of residual effects. British and Spanish panel results were independently analysed.

RESULTS AND DISCUSSION

In this study, significant differences for all meat sensory characteristics were found between British and Spanish meat (Table 1). On average, according to the results obtained in similar work in Spain (Sañudo *et al.*, 1992) and UK (Dransfield *et al.*, 1979) the meat was quite tender and juicy and the flavour had a moderate intensity.

Odour and flavour intensity. Both panels rated odour and flavour intensities of British meat higher than Spanish meat. Between Spanish and British ratings for odour intensity there was a difference of 13.0 % ($P < 0.01$) in the British panel and only of 9.1%

($P < 0.01$) in the Spanish panel. The difference in flavour intensity was very similar to that for odour intensity when assessed by the British panel (13.5%) ($P < 0.01$), but it was higher than the odour (12.8%) ($P < 0.01$) in the Spanish panel. The higher odour and flavour intensities of British lamb showed that meat from older lambs had superior odour and flavour scores and that flavour was more pronounced than in younger animals. Production systems, and type of feeding (grass vs concentrate), had more influence on our results than energy level. Although it is true that higher planes of nutrition, as in Spanish systems, produce fatter carcasses and higher flavoured meat when animals are slaughtered with a similar grade of maturity, in our samples British lambs were older and consequently fatter. The differences between ME or RA (breed effect) and between both types of British carcasses (weight and breed, main effects) were not significant in the British or Spanish panels. That would indicate the less importance of breed or weight in odour and flavour intensity than the age or production system.

Tenderness. In our results, and in both panels, only RA breed was less tender than ME or British carcasses. Similar differences between RA and British meat had been previously found (Sañudo *et al.*, 1992). In the current study the difference between RA lamb and the other meats was of 11.7 % ($P < 0.01$) in the British panel and of 12.5 % ($P < 0.01$) in the Spanish panel. These results show that age, fatness, production system, weight or breed effects were not definitive (no statistical significance was found between ME and British carcasses or between BE and BP lambs). The higher tenderness of ME lambs could be explained by its young slaughter age and compensatory growth, and consequently a possible increase in the proportion of soluble collagen.

Juiciness scores were, in both panels, higher in Spanish than in British meat. These differences were statistically significant ($P < 0.01$) in the Spanish panel (17.8 %), but they were of 3 % in the British panel and only significant ($P < 0.05$) between ME and BP. These results agree with other work which shows that breed or weight effects are not important in lamb meat juiciness, or juiciness scores have been shown to be slightly higher in younger lambs, although not explanation was given for this findings (Webb, 1994). In our study British carcasses were fatter than Spanish carcasses, therefore differences in marbling do not seem to be an important factor that could explain differences in juiciness scores.

Hedonic assessment of flavour quality and overall appraisal. In the British panel the British lamb flavour acceptability was considered a 21.8% ($P < 0.01$) more acceptable than Spanish lamb flavour, and the overall appraisal of British lamb was, on average, 22.6% higher ($P < 0.01$). In the Spanish panel, the Spanish meat flavour and overall acceptability were ($P < 0.01$) 43.4 % and 45.4%, respectively, more acceptable than British lamb. This relationship between consumption habits or knowledge of the product and acceptability could partially be demonstrated by considering the unsolicited comments given by the British assessors in the present study. This showed that 19 adjectives were used 2 or more times within each lamb group. Within these 19 adjectives, only 3 (livery, greasy/fatty and venison) were needed to arrive to the 82.9% of the nominations in the British meat, but between 10 and 11 adjectives were needed to arrive to a similar degree on the Spanish meat.

In conclusion, the similarity between British and Spanish panel results in odour and flavour intensity, tenderness and juiciness confirms the efficiency of sensory analysis and its enhanced comparative value, but the differences (opposite) in flavour and overall acceptability showed that these parameters depend upon the preferences, culinary habits and psychology of the test panel components. On the other hand, it is possible to conclude that British or Spanish commercial lambs studied are two different products.

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Table 1. Eating quality of grilled lamb chops from Spain and Britain. Values are the means and standard errors where n=88 for Spanish panel and n=80 for British panel.

	Lamb type	Spanish Merino		Rasa Aragonesa		British export		Early-British	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE
Lamb odour intensity	British panel	2.83b	0.20	2.69b	0.16	4.03a	0.21	3.58a	0.21
	Spanish	57.95b	2.14	58.47b	1.34	67.34a	1.99	-	-
Tenderness	British panel	6.21a	0.14	5.30b	0.14	6.45a	0.15	6.05a	0.14
	Spanish	72.52a	2.06	58.46b	1.64	69.32a	2.06	-	-
Juiciness	British panel	5.18a	0.12	5.13ab	0.12	5.05ab	0.14	4.77b	0.13
	Spanish	64.05a	2.01	61.69a	1.39	45.11b	2.23	-	-
Lamb flavour	British panel	3.03b	0.17	3.17b	0.16	4.45a	0.19	3.91a	0.18
	Spanish	63.55b	1.94	58.20c	1.23	73.72a	1.82	-	-
Flavour quality	British panel	3.34b	0.17	3.35b	0.15	4.52a	0.20	4.03a	0.20
	Spanish	57.79a	1.72	59.42a	1.13	33.14b	1.85	-	-
Overall appraisal	British panel	3.49bc	0.16	3.43c	0.15	4.74a	0.20	4.09b	0.19
	Spanish	59.48a	1.92	57.82a	1.34	32.01b	2.01	-	-

Values in the same row with different letters are significantly different (within trait) ($P < 0.05$).
 British panel used 8 points category scales. Spanish panel used 100 mm. line scales.