Session code: S23.32
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Effect of different production systems on lamb meat quality

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Introduction

In the next years, consumers' demands will be nor only focused on intrinsic meat characteristics such as colour or freshness (Bello and Calvo, 2000) but also in extrinsic cues, such as animal welfare or environment (Grunert and Kristensen, 1992). Therefore, new approach to traditional productions systems would be the response to these new consumers' concept of quality. Consequently, it is of the major importance to study the effect of the production systems on meat quality.

Material and methods

The influence of four different production systems on lamb meat sensory characteristics was analysed. The treatments were: **INTENSIVE (INT)**, lambs were kept indoor with free access to concentrate while dams were only grazing from 8:00 to 15:00 h. **INDOOR (EST)**, lambs and ewes were kept indoor with free access to feed. **ALFALFA (ALF),** lambs and ewes grazed alfalfa without concentrate; **ALFALFA+SUPPLEMENT (ALF+S)**, animals grazed alfalfa and lambs had cereal supplement. Lambs from **INTENSIVE** and **INDOOR** were weaned at 45 days old. Six non-castrated male lambs from each treatment were slaughtered at 20-22 kg live weight and refrigerated at 4ºC. At 24 h post-mortem, loins from left half carcasses were excised, vacuum packed and aged for a total period of three days. Samples were tested by a trained 8 member panel using a structured scale of 10 points, from 1 (lowest) to 10 (highest), for the following attributes: lamb odour intensity, wool odour intensity, tenderness, juiciness, lamb flavour intensity, liver flavour intensity, fat flavour intensity, metallic flavour intensity and overall appraisal. A balanced incomplete block design was carried out and results were analysed by GLM Procedure (SAS, 1988).

Results

Significance of the production system, means and standard deviation for studied variables were shown in Table 1. No differences were found among treatments for any considered attribute. Nevertheless, a tendency in tenderness was observed, being higher for **ALFALFA** system.

The effect of diet on sensory meat characteristics is no clear in literature. Thus, although meat from lambs fed low energy diets was evaluated to be less tender than meat from lambs fed high energy diets (Rhodes, 1971, Summers *et al.,* 1978, Kemp *et al.,* 1981) some works showed that grazing lambs had more tender meat than those lambs fed with concentrate (Notter *et al.*, 1991) and others reported no clear differences in tenderness (Sañudo *et al.,* 1998). As demonstrated by Alfonso *et al.* (1999) tenderness nor depend only on diet but also there were interaction with other production traits, such as breed (Fisher *et al.,* 2000), age at slaughter or growth rate (Santos-Silva *et al.,* 2002), which could explain these disagreement.

For others variables, our results are also in accordance to Martínez-Cerezo *et al.* (2005). These authors, in a study involving breeds, slaughter weight and sex, reported that in lamb, differences in juiciness were slight and they tended to disappear as increasing carcass weight, whereas no differences were found in any of studied odour or flavour attributes.

Variability of the present results were 33.4% as average, which is usual in sensory analysis. Martínez-Cerezo *et al.* (2005) reported a on the whole comparable variability for sensory data, although they also found coefficients of variation greater, such as 68% for fat flavour and near 100% for abnormal flavour. Similarly, the variability of results was very high for liver flavour, metallic flavour or fat flavour, very low for tenderness and intermediate for the others considered attributes. This high variability could partially explain the absence of the effect on studied variables.

Conclusions

Results would imply that grazing alfalfa allows the production of light lambs without modifying sensory meat quality in comparison to those produced under indoor systems. These result are important because it imply the possibility to adapt lamb production system to new consumers' demands.

References

Alfonso, M., Sañudo, C., Pardos, J.J., Fisher, A. Sierra, I. 2000. Aceptabilidad de la carne de diferentes tipos ovinos europeos valorada por consumidores españoles. *PR,* 1, 18-24.

Bello, L., Calvo, D. 2000. The importance of extrinsic and intrinsic cues to expected and experienced quality: an empirical application for beef. *Food quality and Preference*, 11, 229-238.

Fisher, A. V., Enser, M., Richardson, R. I., Wood, J. D., Nute, G. R., Kurt, E., Sinclair, L. A. and Wilkinson, R. G. 2000. Fatty acid composition and eating quality of lamb types derived from four diverse breed x production systems. *Meat Science,* 55, 141-147.

Grunert, S.C., Kristensen, K. 1992. Den Danske Frobruger og Okologiske Fdevarer. *Report from the OKO foods project-series* H, nr 62. Department of Information Science, The Aarhus School of Business, Aarahus, Denmark.

Kemp, J.D., Mahyuddin, M, Ely, D.G., Fox, J.D., Moody, W.G. 1981. Effect of feeding system, slaughter weight and sex on organoleptic properties and fatty acid composition of lamb. *Journal of Animal Science*, 51, 321-330.

Martínez-Cerezo, S. 2005. Calidad instrumental y sensorial de la carne ovina. Influencia el peso al sacrificio y del tiempo de maduración. PD Thesis Facultad de Veterinaria de Zaragoza.

Notter, D.R., Kelly, R.F., Berry, B.W. 1991. Effects of ewe breed and management system on efficiency of lamb production. III. Meat characteristics. *Journal of Animal Science*, 69, 3523-3532.

Rhodes, D.N. 1971. Comparison of the quality of meat from labs reared under intensively indoors and conventionally on grass. *Journal of the Science and Food Agriculture*, 22, 667-668.

Santos-Silva, J., Mendes, I. A. and Bessa, R. J. B. 2002. The effect of genotype, feeding system and slaughter weight on the quality of light lambs - 1. Growth, carcass composition and meat quality. *Livestock Production Science*, 76, 17-25.

Summers, R.L., Kemp, J.D., Ely, D.G., Fox, J.D. 1978. Effects of weaning, feeding systems and sex of lamb on lamb carcasses characteristics and palatability. *Journal of Animal Science,* 4, 622-629.

Table 1. Significance of the production system on sensory characteristics. Means an standard deviation for studied variables.

	Intensive		**Indoor**		**Alfalfa**		**Alfalfa + supplement**		**F**	**Sig.**
	Mean	St.dev	Mean	St.dev	Mean	St.dev	Mean	St.dev		
Lamb odour intensity *(1 low-10 high)*	5,30	1,51	5,49	1,29	5,63	1,43	5,28	1,28	0,62	0,60
Wool odour intensity *(1 low-10 high)*	2,34	1,28	2,67	1,38	2,92	1,39	2,77	1,54	1,28	0,28
Tenderness *(1 low-10 high)*	7,17	0,95	7,16	1,21	7,68	0,91	7,30	1,19	2,18	0,09
Juiciness *(1 low-10 high)*	6,23	1,58	6,13	1,48	6,25	1,63	5,87	1,59	0,51	0,68
Lamb flavour intensity *(1 low-10 high)*	6,24	1,31	6,20	1,26	6,28	1,79	6,25	1,26	0,03	0,99
Liver flavour intensity *(1 low-10 high)*	3,48	1,78	3,79	1,65	4,01	1,80	4,04	1,61	0,96	0,41
Fat flavour intensity *(1 low-10 high)*	4,62	1,76	4,41	1,52	4,63	1,85	4,54	1,71	0,14	0,93
Metallic flavour intensity *(1 low-10 high)*	3,46	1,95	3,77	1,92	4,40	2,16	4,12	1,99	1,74	0,16
Overall appraisal *(1 low-10 high)*	5,45	1,16	5,11	1,53	5,08	1,45	5,00	1,24	0,93	0,43