SENSORY AND INSTRUMENTRAL TEXTURE CHARACTERISTICS OF FOALS HORSEMEAT PRODUCED IN NAVARRA (SPAIN)

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Background

Horsemeat is becoming an interesting livestock commercial product due to the rearing conditions where natural resources are used, versus intensive livestock systems used for other meat sources. The sensory characteristics of this meat are not well known, that is why it is interesting to determine objective parameters in order to define this meat product. The texture of meat is one of the most important characteristics for consumers and it can be evaluated by both sensory and instrumental methods. In general, horsemeat has been found to be more tender that meat from other animal especies. This characteristic improves with animal age and the toughness of meat depends on the anatomical location and the physiology of the muscle (Debrot 1984, Robelin and Martin-Rosset 1986, Massi and Faccincani, 1987, Dough 1994, Durfey 1999).

Objectives

The aim of this work was to study the texture profile of foals horsemeat produced in Navarra (Spain) in two livestock production systems (intensive and extensive) by means of sensory and instrumental techniques.

Materials and methods

The present study was carried out in meat samples from the *L. dorsi* muscle of 56 foal horses from livestock production systems of Navarra (Spain): 25 animals were reared in intensive conditions and 31 in extensive two conditions. All animals were fed mother milk until 8 months of age. After that, foal horses in intensive livestock systems were fed concentrate and straw for 6 months and foal horses in extensive livestock production systems were finished with concentrate for 3 months after grazing for 6 months. After slaughter, meat was aged for 4 days on the carcass (2ºC) and then meat from the 9th and the 12th rib were cut and vacuum packaged for the instrumental and sensory analysis of texture, respectively. Samples were frozen and stored at –20ºC until analysis, when meat samples were thawed at 2ºC for 24h. The instrumental analysis was performed with a texturometer TA-XT2i (Stable Micro Systems) by uniaxial compression in raw meat (20%, 40%, 60%, 80% and 100% stress) (Lepetit and Culioli 1993) and by WB shear force in meat samples boiled to 70ºC during 40 min. (Bratzler 1949). The QDA (quantitative descriptive analysis) was used for the sensory analysis (Stone *et al.* 1974) with a seven member trained taste panel. A 125 mm hedonic scale was used to evaluate the texture sensory attributes. The SPSS 9.0 statistic program (1998) was used for data analysis. A one-way analysis of variance was applied to the data in order to assess the significance of the differences between treatments (feeding system). A discriminant analysis was also carried out.

Results and discussion

Meat from foal horses from intensive livestock production systems was better grouped versus extensive livestock production system by measures of texture instrumental parameters (Figure 1). These parameters showed significant differences in samples from extensive and intensive livetock production systems, except for 20% stress, shear force and max. stress (Table 1). Figure 2 shows the sensory profile of texture. Only flourness showed significant differences ($p<0.05$) between samples from intensive (40,86 (3,50)) and extensive (49,65 (3,30)) livestock systems. Finally, the discriminant analysis separated foal horsemeat samples from extensive and intensive livestock systems with a 96.7 % classification accuracy by means of the higher WB toughness and 100% stress of the latter (Figure 3).

Conclusions

The techniques used for the sensory analysis do not guarantee the differentiation between foal horsemeat samples from intensive and extensive livestock systems. It is necessary to use instrumental techniques in order to characterise the meat of foal horses from different livestock systems.

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SPSS version 9.0 (1998)

Figures 1-2. Texture profile of intrumental parameters: Stress 20% (S20 Kg/cm^2), Stress 40% (S40 Kg/cm^2), Stress 60% (S60 Kg/cm^2), Stress 80% (S80 Kg/cm^2), Stress 100% (S100 Kg/cm^2), Shear force (Kg/cm^2), Max. Stress (Kg/cm^2), Toughness (Kg/cm^2) and sensorial parameters: Initial Juiciness (IJ), Continued Juiciness (CJ), Hardness (H), Cohesiviness (C), Flourness (F), Facility to swallow (FS), Greasiness (G).

Figure 1.

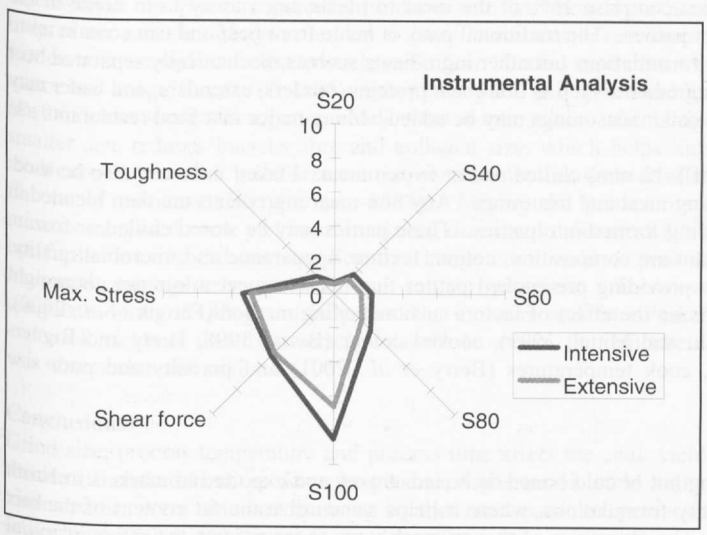

Figure 2.

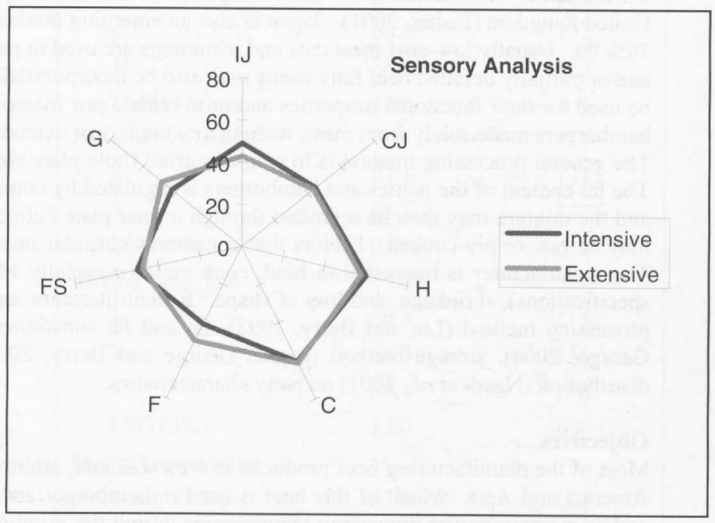

Table 1. Descriptive statistics: mean and standar error of instrumental texture for samples in Compression and Warner-Bratzler measurements in the muscle *Longissimus dorsi* aged 4 days of foal horsemeat

	COMPRESSION (Kg/cm^2)										WARNER-BRATZLER (Kg/cm^2)					
	Stress 20%		Stress 40%		Stress 60%		Stress 80%		Stress 100%		Shear force		Max. Stress		Toughness	
	Mean	Stand. error	Mean	Stand. error	Mean	Stand. error	Mean	Stand. error	Mean	Stand. error	Mean	Stand. error	Mean	Stand. error	Mean	Stand. error
Intensive	0,66	(0,03)	1,61	(0,06)	2,20	(0,08)	2,99	(0,11)	8,53	(0,15)	5,19	(0,17)	5,36	(0,21)	1,45	(0,04)
Extensive	0,57	(0,02)	1,17	(0,04)	1,58	(0,04)	2,26	(0,06)	6,62	(0,17)	4,92	(0,16)	4,87	(0,15)	0,96	(0,02)
Sig	ns		***		*		***		***		ns		ns		***	

ns=p>0,05; *=p<0,05; ***=p<0,001

Figure 3. Discriminant analysis of the instrumental and sensorial quality of foals horsemeat. Sample graphics of canonical discriminant function 1 according to livestock production systems criterium of clasification