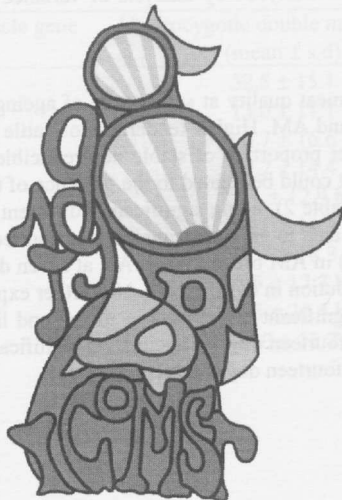


Posters B.132-B.160

PS 9

Poster session and workshop 9

Perception, evaluation and improvement of sensorial attributes



Tuesday, September 1st
17:15h-18:45h

Influence of Double Muscled Condition on Sensory Beef Meat Quality at Different Ageing Times

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Background

Genotype is probably the single most important factor affecting the profitability of the beef production industry. Sustainability animal production system based on autochthonous breeds is favoured by the E.U. Agricultural Policy. On this ground, Asturiana beef cattle is one of the most important breeds in Spain for producing high quality beef meat. The geographical and grazing characteristics of Asturias allowed an evolution of the Asturian precursor cattle into two breeds: Asturiana de los Valles and Asturiana de las Montañas. Asturiana de los Valles breed presents excellent beef production possibilities due to its carcass attributes quality, including a double muscled condition. Asturiana de las Montañas breed has developed an adaptation to hostile environment, taking an advantage in marginal lands where Asturiana de los Valles is not suitable. Double muscle condition, determined by a mutation in the myostatin gene (Grobet *et al.*, 1997), has been related to a fast ageing and high meat tenderness (Arthur, 1995). However, more studies are necessary to examine the relationship between the presence of recessive double-muscle gene and sensory beef meat quality.

Objectives

The main objective of our study was to evaluate the sensory meat quality of beef from several double muscled genetic conditions.

Methods

Data were collected on 25 yearlings. Nine of these animals were from Asturiana de la Montaña (AM) and sixteen were from Asturiana de los Valles breed (AV): eight animals were determined as homozygotes for the double muscle genotype (AV-H) and eight were determined as heterozygotes (AV-h). Animals were reared on an intensive system and slaughtered with 450 kg live weight. Genotyping was performed through amplification of the MST gene and visualisation of alleles in polyacrilamide gels.

After chilling carcasses for 24 hours, the *Longissimus dorsi* muscle of the left side was obtained, vacuum packaged and kept at 4°C until reaching seven days of ageing. 2 cm-thick steaks were cut (12th-13th rib), vacuum packaged, randomly chosen and frozen at -18°C, or stored at 4°C for seven more days until reaching fourteen days of ageing before frizzling them.

Steaks were thawed overnight and grilled to an internal temperature of 70°C. Longissimus muscle was analysed by an eleven-member trained analytical taste panel in a multisample comparative test: AM vs AV-H vs AV-h, employing a non-structured 100-mm line scale. Sensory variables were global and liver odour intensity, odour quality, global and liver flavour intensity, juiciness, fibrosity, tenderness and overall acceptability, where 0 stood for 'no odour or flavour', 'no liver odour or flavour', 'dislike extremely', 'no flavour', 'no liver flavour', 'extremely dry', 'low amount of fibres' and 'extremely tough', and 100 stood for 'very strong odour or flavour', 'like extremely', 'extremely juicy', 'high amount of fibres' and 'extremely tender'. Assessments were scored in mm as the distance from the left end of the scale.

At each ageing time, the effect of the genetic type was analysed by analysis of variance (SPSS, 1995). Means differences were assessed by Scheffe *t*-test.

Results and discussion

Means and standard deviations of palatability traits of meat quality at seven days of ageing are shown in Table 1. Tenderness ($p < 0.001$) from AV-H was significantly higher than those from AV-h and AM. Higher tenderness of cattle with double muscled condition has been associated with a lower amount of intramuscular collagen, a lower proportion of stable non-reducible cross-links and a fast ageing (Bailey *et al.*, 1982, Uytterhaegen *et al.*, 1994; Shackelford *et al.*, 1994), that could be related to the presence of the homocigotic double muscle gene. AV-H showed also the most tender meat at fourteen days of ageing (Table 2), being significantly different from AV-h but not from AM. The lowest value on tenderness at seven days of ageing in AM group, associated to an increasing value at fourteen days, is probably due to a late ageing time breed (Campo *et al.*, 1998). Odour quality was lower ($p < 0.05$) in AM breed than in AV at seven days and liver odour intensity was higher at fourteen days ($p < 0.001$), probably due to the different ageing evolution in these breeds. No further explanation can be found for the highest juiciness score ($p < 0.001$) of AV-H at fourteen days. There were no significant differences in global and liver odour intensity, flavour quality, global flavour intensity, fibrosity and overall acceptability at seven or fourteen days of ageing. No significant differences were found neither in liver flavour or juiciness at seven days of ageing and in odour quality at fourteen days of ageing.



Conclusions

The results obtained indicate that the homocigotic presence of double muscled gene affects sensory characteristics, especially tenderness. Both homocigotic and heterocigotic double muscled animals show a similar tenderisation process, that is faster than in rustic type animals.

Acknowledgements

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Table 1.- Mean and standard deviation of palatability traits in different genetic types of Asturiana breed branches at seven days of ageing.

	Asturiana de los Valles		Asturiana de las Montañas	P value
	Homocigotic double muscle gene (mean $\pm$ s.d)	Heterocigotic double muscle gene (mean $\pm$ s.d)		
Global odour intensity	50.0 $\pm$ 17.0	52.1 $\pm$ 16.8	47.5 $\pm$ 15.6	n.s.
Liver odour intensity	14.8 $\pm$ 16.8	14.4 $\pm$ 14.1	17.1 $\pm$ 16.0	n.s.
Odour quality	49.8 $\pm$ 47.5 a	48.7 $\pm$ 18.9 ab	41.8 $\pm$ 18.6 b	0.0314
Flavour quality	46.8 $\pm$ 17.6	48.9 $\pm$ 17.4	46.5 $\pm$ 14.2	n.s.
Liver flavour intensity	15.2 $\pm$ 17.4	15.4 $\pm$ 15.9	19.5 $\pm$ 18.7	n.s.
Global flavour int.	52.5 $\pm$ 16.1	57.7 $\pm$ 13.2	52.3 $\pm$ 13.4	n.s.
Fibrosity	42.7 $\pm$ 19.4	42.4 $\pm$ 29.9	44.3 $\pm$ 18.3	n.s.
Juiciness	44.5 $\pm$ 21.5	43.7 $\pm$ 21.5	41.5 $\pm$ 17.8	n.s.
Tenderness	56.1 $\pm$ 19.9 a	47.1 $\pm$ 21.3 b	45.7 $\pm$ 16.5 b	0.0042
Overall acceptability	44.6 $\pm$ 17.6	48.3 $\pm$ 15.1	45.3 $\pm$ 13.8	n.s.

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Table 2.- Mean and standard deviation of palatability traits in different genetic types of Asturiana breed branches at fourteen days of ageing.

	Asturiana de los Valles		Asturiana de las Montañas	P value
	Homocigotic double muscle gene (mean $\pm$ s.d)	Heterocigotic double muscle gene (mean $\pm$ s.d)		
Global odour intensity	49.1 $\pm$ 16.0	52.5 $\pm$ 15.1	52.0 $\pm$ 15.5	n.s.
Liver odour intensity	13.4 $\pm$ 12.1	13.0 $\pm$ 11.1	15.5 $\pm$ 13.1	n.s.
Odour quality	46.2 $\pm$ 15.8	46.7 $\pm$ 16.6	46.9 $\pm$ 16.6	n.s.
Flavour quality	49.6 $\pm$ 14.3	49.2 $\pm$ 14.4	45.9 $\pm$ 16.1	n.s.
Liver flavour intensity	10.6 $\pm$ 10.7 b	14.1 $\pm$ 12.9 b	21.3 $\pm$ 16.4 a	0.0001
Global flavour int.	51.1 $\pm$ 14.1	54.1 $\pm$ 14.2	53.8 $\pm$ 15.3	n.s.
Fibrosity	47.4 $\pm$ 19.8	43.9 $\pm$ 18.3	43.2 $\pm$ 17.7	n.s.
Juiciness	56.8 $\pm$ 15.4 a	44.5 $\pm$ 17.7 b	42.2 $\pm$ 17.3 b	0.0001
Tenderness	59.2 $\pm$ 19.3 a	49.5 $\pm$ 20.4 b	54.2 $\pm$ 19.4 ab	0.0114
Overall acceptability	49.3 $\pm$ 14.2	48.0 $\pm$ 13.7	45.2 $\pm$ 15.9	n.s.