

EFFECT OF SLAUGHTER WEIGHT ON SENSORY MEAT QUALITY IN KIDS

Monge, P.¹, Lemes, J.^{1,2}, Campo, M.M.¹, Guerra, V.³, Sañudo, C.¹

¹ Universidad de Zaragoza, Miguel Servet 177, 50013-Zaragoza, Spain

² Universidade Federal de Pelotas. Campus Universitário s/ n°, 96010-900. Pelotas - Brasil.

³ Asociación de Criadores de la cabra Bermeya, 33554. Arenas de Cabrales, Asturias, Spain

Abstract— Most of the local goat breeds are poorly studied and its quality is, most of the times, badly known. Bermeya is a native breed from the North of Spain (Asturias region) and it is reared as semi intensive and unweaned or in a traditional extensive production system in the mountains of this region. The aim of this study was to assess how sensory quality is affected by two slaughter weights associated to two production systems (light – milk fed vs. heavy- grass fed). Twenty two animals were used. Sensory analyses were performed both by a trained sensory panel and by 100 consumers. Samples were aged for 4 days at 4 °C in both analyses. The trained panel included 9 panellists, who assessed a total of 13 descriptors. The effect of slaughter weight was significant in several descriptors. Fat odour and fat flavour intensity were significantly influenced by slaughter live weight ($p < 0,05$), with higher scores in animals slaughtered at a lighter weight. Tenderness and juiciness had higher values in light kids. As a consequence, heavier animals were found 11% more fibrous than light ones. Consumers showed greater general acceptability and tenderness acceptability in light kids, coincidentally with the preference expressed by the trained panel. We can conclude that, at these production systems and slaughter weights, heavier animals had lower quality and acceptability and that both products are different enough in their sensory characteristics to be commercialized with different labels.

Keywords— goat, consumer test, panel test.

I. INTRODUCTION

Most local goat breeds are poorly studied and its quality is, most of the times, badly known compared with other species. Bermeya is a native endangered

breed from the North of Spain (Asturias region) and it could be reared in different production systems: unweaned as suckling kids less than two months old or in a traditional extensive system grazing from the mountains of this region, reaching nearly one year old.

Acceptability of meat is so influenced by local custom and preference that is impossible to apply a universal standard for its quality [1]. Besides perceptions of meat quality vary from country to country, between ethnic groups and over the time, with important cultural species-related influences.

The leaner meat of goats could be more attractive to consumers than other types of red meat. This is due to the slower development of subcutaneous fat in goats compared with sheep at similar ages and nutrition [2].

Many studies have reported the influence of nutritional characteristics on choice behavior, and also sensory properties are important in affecting meat acceptability [3]. Flavour, tenderness, aroma and juiciness influences goat meat acceptability in decreasing order, having very high organoleptic influence [1].

Thus, sensory studies are a very important tool to have the possibility of getting some recognized quality labels and to reevaluate the product. This is very important in red meat in general and in goats in particular, the species with less quality labels in Spain and in many other countries, considering domestic ruminants.

II. MATERIALS AND METHODS

The study used twenty-two kid carcasses of Bermeya breed, a local breed from Asturias, in the North of Spain. Animals of two different weights were

used. Twelve of them were reared mostly with milk (light animals) and the other ten kids were reared in a very traditional extensive production system, late weaned and finished with high mountain grass (heavy animals). All animals were slaughtered at a licensed abattoir following standard protocols.

Sensory analyses were performed both by a sensory panel and by consumers.

The sensory test involved nine trained panellists, who evaluated meat samples based on a quantitative descriptive analysis.

Samples (muscle *Longissimus dorsi*) were aged 4 days and later stored frozen until analysis. After thawing, in tap water, samples were wrapped individually in aluminium foil and cooked at 200°C on a preheated, double-grill hotplate, until the internal temperature reached 70°C. The cooked samples were cut into cubes and wrapped in aluminium foil, and assigned a single random three-digit code. Samples were kept warm at 50°C until they were served in random order according to sample, replicate and panellist.

The parameters used in the evaluations were chosen by the panellists during a training session. The panel evaluated the samples on a 10-point semi-structured and continuous scale in which intensity ranged from low (0) to high (10), and overall likeness from very bad (0) to very good (10).

Samples in consumer's study were cooked in same way as those of the sensory panel. The test involved 100 consumers that evaluated three different attributes for each sample: tenderness acceptability, flavour acceptability and overall acceptability.

III. RESULTS AND DISCUSSION

The effect of slaughter live weight associated to their respective production system on sensory evaluation with the trained panel is shown on Table 1.

There was a significant effect of slaughter weight in several descriptors: fat odour and fat flavour intensity, tenderness, juiciness, fibrosity and overall acceptability.

Table 1 Means (\pm standard deviation) for sensory quality, with a trained panel, of kids meat slaughter at different live weights.

	Light-Milk	Heavy-Grass	sig.
Species odour	4,52 \pm 0,85	4,90 \pm 0,74	ns
Fat odour	3,35 \pm 0,83	2,91 \pm 1,0	*
Tenderness	5,94 \pm 1,0	4,66 \pm 0,85	***
Juiciness	4,98 \pm 0,56	4,46 \pm 0,44	**
Fibrousness	4,0 \pm 1,18	5,04 \pm 0,93	***
Greasiness	3,90 \pm 0,76	3,47 \pm 0,50	ns
Species flavour	4,81 \pm 0,79	4,78 \pm 0,58	ns
Metallic flavour	3,04 \pm 0,95	2,80 \pm 0,67	ns
Fat flavour	4,43 \pm 0,55	3,83 \pm 0,72	*
Milky flavour	1,61 \pm 0,59	1,30 \pm 0,57	ns
Acid flavour	2,56 \pm 0,73	2,56 \pm 0,66	ns
Spicy flavour	2,02 \pm 0,69	1,66 \pm 0,75	ns
Overall accept.	4,91 \pm 0,70	4,50 \pm 0,72	*

ns: not significant; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Fat odour and fat flavour intensities were significantly influenced by the slaughter live weight ($p < 0,05$), with higher scores in animals slaughtered at a lighter weight. This was probably more related with differences in fatty acid composition than with differences in fatness because there were not statistical differences in this characteristic. Results on tissue composition are also shown in this congress [4].

[5] found statistical differences on fat odour intensity but not on fat flavour intensity when compared lambs slaughtered at two weights (≤ 10.5 kg and ≥ 12.0 kg) being higher fat odour intensity in heavy animals.

Tenderness, juiciness and overall acceptability had higher values in light kids. The results agree with [6] who compared meat from Capretto (14-22 kg) and Chevon (30-35 kg) and found that the meat obtained from lower weight goats was more tender.

[7] found the same results in Churra lambs slaughtered at different weights (10-12 kg, 20-22 kg and 30-32 kg) where higher slaughter weights had less tender meat. Although these results could be expected, we did not find the same tendency with the results obtained on the instrumental measurements of texture [4] where there were lower values at C20% and C80% in heavy animals than in lighter ones.

In relation to the higher values on tenderness and juiciness in light kids, heavier animals were found 11% more fibrous than light ones. [8] reported that goat have more fibrous residues than sheep.

The overall acceptability from the panel test was significantly higher on light kids.

In the Table 2 we can see the effect of slaughter weight live on sensory evaluation with 100 consumers.

Table 2 Means (\pm standard deviation) for acceptability, with 100 consumers, of kid meat at different slaughter live weights

	Light-Milk	Heavy-Grass	sig.
Tenderness	6,74 \pm 1,66	5,95 \pm 1,96	**
Flavour	6,65 \pm 1,71	6,52 \pm 1,66	ns
Overall	6,65 \pm 1,75	6,15 \pm 1,79	*

ns: not significant; * $p \leq 0.05$; ** $p \leq 0.01$

Live weight associated to its respective production system had a significant effect on consumer's test. Light kids showed greater overall acceptability and tenderness acceptability, coincidentally with the preference by the trained panel and, probably the higher scores in some textural parameters. However consumers did not find statistical differences on flavour acceptability, which could be associated to the lack of significance in most of the flavour attributes showed by the panel.

V. CONCLUSIONS

We can conclude that, at these slaughter weights-production systems, higher slaughter weights and extensive conditions reduces the quality and the acceptability of kids meat. Both products are quite different in their sensory characteristics and acceptability. Because of that, they could be preferred by different segments of the market and they should be identified accordingly to their respective attributes.

ACKNOWLEDGMENT

Authors want to thank to ACRIBER (Breeders Association of Bermeya breed) and to Asturias Government for their financial support and to the Animal Production personnel in the Faculty of Veterinary, for their technical assistance.

REFERENCES

- [1] Naudé, R.T., Hofmeyr, H.S., (1981). In: gall,c. (ed), Goat production. Academic press, London, pp. 285-307.
- [2] Babiker , S.A., El Khider, I.A. and Shafie, S.A. (1990). Chemical composition and quality attributes of goat meat and lamb. *Meat Sci* 28: 273-277.
- [3] Horsfield, S. and Taylor, L.J. (1976). Exploring the relationship between sensory data and acceptability of meat. *J Sci Food Agr* 27:1044-1056.
- [4] Monge, P., Lemes, J., Campo, M.M., Guerra, V., Sañudo, C. (2011). Effect of slaughter weight on carcass composition and instrumental kid meat quality. 57th International Congress of meat Science and Technology. Genth, Belgium, 2011.
- [5] Muela, E., Sañudo, C., Campo, M.M., Medel, I. and Beltrán J.A. (2010) Effects of cooling temperatura and hot carcass weight on the quality of lamb. *Meat Sci* 84:101-107.
- [6] Dhanda, J.S., Taylor, D.G. and Murray, P.J. (2003). Growth, carcass and meat quality parameters of male goats: affects of genotype and liveweight at slaughter. *Small Rumin Res* 50:57-66.
- [7] Martínez-Cerezo, S., Sañudo, C., Medel, I., and Olleta, J.L. (2004). Breed, slaughter weight and ageing time effects on sensory characteristics of lamb. *Meat Sci* 69:571-578
- [8] Schönfeldt, H.C., Naude, R.T., Bok, W., van Heerden, S.M., Smit, R., Boshoff, E. (1993). Flavour and tenderness related quality characteristics of goat and sheep meat. *Meat Sci* 34:363-379.