

EFFECT OF SEX CONDITION AND TIME ON FEED ON THE SENSORY QUALITY OF CROSSBREED HAIR LAMB MEAT

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Abstract – Consumers can evaluate quality of meat based on a number of variables including flavor, juiciness, texture and appearance. The aim of this study was to evaluate sensory quality of the meat from castrated or intact lambs, slaughtered at different time on feed. Forty eight Dorper x Santa Inês males were allotted in pens according to initial BW (block) and fed a high concentrate diet. After 14 days of adaptation 24 animals were castrated. The animals were slaughtered after 36 or 78 days of feeding (half of each sex) and the *m. Longissimus dorsi* sampled for analysis of the sensory quality. No interaction between sexual condition and time on feed was observed, but there was difference ($P<0.05$) in juiciness. Time on feed had an effect on tenderness, with the longer time on feed ($P<0.01$) resulting in more tender meat and fatter carcasses.

Key Word –Sensory panel, juiciness, flavor.

1- INTRODUCTION

The Brazilian market for sheep meat has expanded in recent years (FAO, 2013), but there is still a large gap to be filled in product quality. The requirement of the consumer for a healthier product is growing, and to meet this new demand new technologies have been developed.

In Brazil the most part of sheep production is based on crossbreeding of a local hair breed called Santa Inês - that shows a great tolerance to hot environments, low nutritional requirements and high prolificacy - with Dorper that result in a product with good carcass conformation and meat production. Additionally, the use of non-castrated males finished under feedlot with high concentrate

diets is another increasing practice, looking to improve lean meat production and net return.

On the other hand, depending on the age and sex condition of animals the meat composition can vary affecting body composition and sensory quality, which is a very important aspect of red meat because it is related to consumer market. There is a lack of information about the sensory quality of Santa Inês x Dorper crossbreed according to sex condition and time on feed. This trial was carried out to evaluate the effects of sex condition and time on feed on the sensory quality of meat from lambs fed high concentrate diets on the finishing phase.

2- MATERIALS AND METHODS

Forty eight crossbred Dorper x Santa Inês non-castrated (NC) males averaging 32.4 ± 5.0 kg of live weight (LW) and 3.5 months old were housed according to LW (block) in 24 pens with two animals per pen, and fed diets containing 75% whole grain corn, 20% protein-mineral pellet and 5% of coast cross hay. After 14 days of adaptation period half animals of each sex were randomly selected (within each block) and castrated (CA) using the Burdizzo emasculation technique. After that, animals were feedlot fed for 36 or 78 days before slaughtering.

After chilling for 24h carcasses were ribbed between 12th and 13th ribs and a sample of the *Longissimus dorsi* muscles (LM), 2.5 cm thick, was taken vacuum packaged and frozen at -18°C for further sensory analysis. The LM samples were thawed in a refrigerator at 4°C for 24 hours and then placed in 10% brine for 15 minutes. The steaks were roasted until they reached an internal temperature of 35°C , flipped over, roasted until they reached 70°C ,

and then removed from the oven. The roasted meat samples were cut parallel to the muscle fibers to form 1.5cm cubes. The samples were then placed in an oven (60°C) until the completion of tests, which were performed within 30 minutes of preparation.

The descriptive sensory analyses were performed in individual booths with red lighting. A sensory panel was carried out using a team of nine trained tasters to evaluate six attributes of aroma, flavor, and texture. The samples were evaluated using nine cm unstructured scales, anchored at each end with the terms defined.

The tasters, who were all regular meat consumers, were selected and trained according to the American Meat Science Association guidelines (AMSA, 1995). All procedures involving tasters reported in this study were performed according to the standards of the Department of Health (Ministério da Saúde) and authorized by the Ethics Committee of the School of Animal Science and Food Engineering, University of São Paulo (Comitê de Ética da Faculdade de Zootecnia e Engenharia de Alimentos da Universidade de São Paulo).

Statistical analysis were conducted using the GLM procedure of SAS (SAS Institute Inc., Cary, NC) accounting for block, sex condition, time on feed and sex condition vs time on feed interaction as fixed effects.

3- RESULTS AND DISCUSSION

Results for sensory analysis, that showed no interactions between sex condition and time on feed, are presented on Table 1. The effect of sex condition indicates that CA animals presented meat with more juiciness ($P=0.0003$) and the effect of time on feed in tenderness ($P<0.0001$) was better in animal slaughter with 78 days on feed.

Sheep aroma, rancid aroma, tenderness, sheep flavor and rancid flavor were not affected by sexual condition.

The effect of juiciness and tenderness can be explained by a higher ($P=0.0357$) subcutaneous fat thickness index in animals slaughtered after 78 days (4.0 mm) compared with animals slaughtered after 36 days (2.85 mm).

Table 1 - Attributes evaluated in the sensory analysis of meat from crossbred ½ Dorper × St. Inês sheep with different sexual conditions, intact (NC) or castrated (CA), and slaughtered after 36 or 78 days on feed

Attributes ¹	Sex condition		Days on feed	
	CA	NC	36	78
Sheep Aroma	4.69 ^a	4.54 ^a	4.66 ^A	4.57 ^A
Rancid Aroma	1.26 ^a	1.26 ^a	1.22 ^A	1.30 ^A
Tenderness	3.14 ^a	3.28 ^a	3.84 ^B	2.58 ^A
Sheep Flavor	4.37 ^a	4.49 ^a	4.60 ^A	4.26 ^A
Rancid Flavor	1.61 ^a	1.75 ^a	1.66 ^A	1.71 ^A
Juiciness	4.63 ^a	3.87 ^b	4.20 ^A	4.29 ^A

^{a,b,A,B} Columns with different letters within sex condition (lowercase) or days on feed (uppercase) differ ($P<0.05$).

¹Lower values meaning more weak sheep or rancid aroma and flavor and more tender or dry meat texture.

The meat from the castrated animals was juicier than the meat from the intact animals. This difference may have been due to the effects of testosterone, which promotes the growth of skeletal muscle and leads to lower fat deposition in intact animals compared with castrated animals.

Subcutaneous fat is very important for meat tenderness because it protects the carcass from cold shortening, which can occur during storage at cold temperatures. Furthermore, increased levels of subcutaneous fat slow the temperature and pH decline that occur in muscles following death, inhibiting glycolysis and producing a pH (5.4) level typical of more tender meat (OSÓRIO *et al.*, 2009; BRAY *et al.*, 1989; DEVINE *et al.*, 1993).

According to Geay *et al.* (2001) and Calkins and Hodgen (2007), the major chemical reactions related to volatile aromatics that occur during cooking are thermal lipid degradation and Maillard reactions, which occur between amino acids and reductive sugars.

The flavor and aroma of roasted foods are associated with heterocyclic compounds, including pyrazines, thiazoles and oxazoles,

which increase in abundance as meat is heated and can significantly affect taste and aroma. Therefore, we can conclude that the steaks were grilled in a uniform manner, without major differences in flavor or aroma between samples

Madruga *et al.* (2005), who evaluated the quality of meat from St. Inês lambs fed with different diets, found that meat with an intense sheep aroma odor and the highest scores for tenderness and juiciness were those with the highest fat content, consistent with the findings of Sañudo *et al.* (2000). According to Lawrie (2005), meat tenderness is inversely related to the density of muscle fibers and connective tissue and directly related to fat deposits.

4- CONCLUSION

In the conditions of this trial and with this kind of hair lamb the meat from castrated animals had more juiciness and more time on feed resulted on slightly more tender meat. The others characteristics were not influenced by castration of animals or time on feed.

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