STUDY OF THE SLAUGHTERED WEIGHT EFFECT IN THE QUALITY OF THE LAMBS MEAT OF THE MERINO AUSTRALIANO AND ILE DE FRANCE X MERINO BREED

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Background

The meat has high nutritional importance in the human beings' feeding being considered a food highly nutritious as much as source of amino acids, minerals, water, fat, fat soluble vitamins and cholesterol. The search for healthy and quality foods has been frequent and every time there is a larger concern of the population. As example, the amount of ingested cholesterol in which it is supposed that a increase in its ingestion is related to the increase of its level in the blood. The main qualitative characteristics of the meat for the healthy consumer are: the color and the superficial shine at the moment of the purchase, the flavor, the aroma, the succulency, the texture and the softness in the moment of the consumption (SAÑUDO, 1991; BRESSAN et al. 2001). Those attributes are associated with the transformation process from muscle to meat: the speed of the biochemical reactions *post mortem*; carcass temperature during the rigor development; extension of the glycolysis and final pH.

Objectives

The present work had as objective to evaluate the influence of four slaughter weights in male lambs not castrated of two different genetic groups, Merino Australiano (MERINO) and Ile de France x Merino (ILEMER) on the centesimal composition and on meat quality parameters.

Material and methods

Animals: it was used 48 male lambs not castrated, 24 from Merino Australiano (MERINO) breed and 24 mestizos of from Ile de France and Merino Australiano (ILEMER). The animals entered in the experiment when they reached 15 kg. In this weight, six animals of each genetic group were slaughtered and the 36 remaining were confined in individual cages, provided of drinking fountain and feed bunkers, randomized distributed and slaughtered when they reached 25, 35, and 45 kg of live weight. The diet fed to the lambs was composed of 20% ground Coast cross (*Cynodon dactylon*) hay and 80% in order to get gain of 300g/day. The animals in the 15 kg strip were not confined but they received the same diet of the others until they reached 15 kg. The feeding was supplied ad alibitum twice a day being foreseen a refusal of 30%.

Chemical analysis: samples of the *longissimus dorsi* (LD), *biceps femoris* (BF), *semimembranoso* (SM) and breastplate deep (PP) muscles were analyzed for humidity and fat (HORWITZ, 1990), protein (SILVA, 1981), ashes (IAL, 1997) and cholesterol (BOHAC et al., 1988 adapted by BRAGANGNOLO & RODRIGUEZ-AMAYA, 1995). In the LD and SM muscles were made pH readings at 0, 2, 4, 6, 8 ,10, 12 and 24 hours *post mortem*, and analyzed for color by the CIE L*a*b* system (brightness index, red tenor and yellow tenor) (BRESSAN, 1998), weight loss by cooking (PPC) (FELÍCIO, 1999) and shear force (FC) by texturemeter.

Statistical analysis: it was used a DIC (completely randomized design) in factorial 2 x 4 with two genetic groups and four slaughter weights. For the significant slaughter weights regression analysis was used, and for the genetic groups, it was used T test. The pH analysis was done in subdivided parts in the time (hour of the measures), and the analysis of variance was done by SAS (SAS, 1985).

Results and discussion

The lipids content varied with the slaughter weight, having a increased fat content as the weight increase, showing the tendency of the heaviest animals in depositing larger amount of fatty tissue in relation to the lightest animals. When evaluating the humidity content of the samples we verified that there was a decrease in this content as the slaughter weight increased. According to FORREST et al. (1979), lipids and humidity are inversely proportional, in other words, with the increase of the fat content there is a decrease in the humidity content. For the PP muscle there was significant interaction between breed and slaughter weight and at 25 kg of live weight there was significant difference in the humidity content of the two breeds. These results are in agreement with PRADO (1999) and BONAGURIO (2001) that when working with lambs in different slaughter weights they reported the decrease of the humidity with the increase of the fat content. The protein content varied with the slaughter weight tending to decrease with the increase of the weight from the 15 kg of live weight strip. As the youngest animals deposit more muscular tissue in relation to the other tissues there was an increase in the protein content from the 15 kg to 25 kg of live weight, following by fall in the other weight strips. We verified that the animals ILEMER had, on average, larger values of CP in relation to the MERINO animals. The ashes content were significant ($P<0.05$) only for the SM muscle for the factor slaughter weight, decreasing with the increase of the weight. The more accentuated fall occurred in the strip from 15 kg to 25 kg. The statistical analysis for the cholesterol content in the LD muscle showed that there was not significant difference for the slaughter weight, breed and the interaction among these factors. However, there was significant difference ($P<0.01$) for the cholesterol content in the PP muscle for the factor slaughter weight decreasing with the increase of the weights, however, the 35 kg animals had superior values to those of 25 kg.

The pH in the LD and SM muscles had significant triple interaction (weight, genetic group and time). The installation of the *rigor mortis* happens when the pH of the muscle reaches values around 5,9 and coincides with the reduction of the energy rates. Evaluating the slaughter weight groups of 25, 35 and 45 kg, the muscular glycolysis ocurred in an expected way (same pH of 5.9 from 6 to 12 hours *post mortem*), while in the 15kg group the pH remained equal or superior to 6.2 until the 24 hours *post mortem*. In the LD muscle, the average values of final pH of the MERINO and ILEMER 15 kg animals were of 6.36 and 6.24 respectively, and for the SM muscle they were 6.27 and 5.97, respectively. This elevated pH reveals that in the moment of the slaughter the lambs showed low muscular and hepatic energetic reservations what possibly can be associated to the stress conditions in the *anti mortem*, as in the fasting, in the shearing and lower environmental temperatures.

The data obtained by the CIE L* a* b* system for the LD and SM muscles indicate that the brightness was influenced ($P<0.01$) by the slaughter weight. In the SM muscle the averages of L* were around 38 and 39 for 15kg and 25kg animals, and animals of 35 and 45kg showed L* inferior to those of the 25kg. This behavior of the brightness in sheep was described by Bressan et al. (2001) in Santa Inês and Bergamácia lambs. The reduction in the brightness as the slaughter weight increases is associated with the reduction in the percentage of water in the muscle

that is larger in younger animals. In the LD muscle the behavior of the L* averages was contrary to the behavior observed in the SM muscle. The low brightness in the animals of 15kg (inferior to 35) can be related to the high final pH (larger than 6.2) and according to FORREST et al. (1979), meats with high pH reveal darker meats. The a* average values increased with the increase in the slaughter weight in the SM and LD muscles and the b* color component (whose extreme of color vary from intense green to intense yellow) in the LD muscle showed significant variation ($P<0.05$) among the slaughter weights. Lambs of 15 and 25kg showed b* tendency for yellow and lambs of 35 and 45kg presented b* tending for the green. In the SM muscle, the interaction for the b* content between breed and slaughter weight was significant ($P<0.05$). In the weight strips of 25, 35 and 45kg, both genetic groups were statistically equal, just differing in the weight strip of 15kg in which the ILEMER animals (0.5281) presented superior values to the MERINO (-1.5231) ones.

The statistical analysis of PPC revealed significant difference ($P<0.01$) for the breed and slaughter weight factors in the LD muscle. For the SM muscle, it was significant just the factor slaughter weight. Smaller PPCs were observed in the groups of smaller slaughter weight lambs. In the SM muscle the ILEMER animals showed larger PPC (13.66%) than MERINO (10.71%) animals. The FC in the SM muscle in the MERINO animals increased as the slaughter weight increased. But, for the ILEMER animals, the FC for 15 and 25kg animals was reduced (it passed from 4.4kgf to 2.6kgf) and from 25kg the behavior of the ILEMER lambs was similar to those MERINO. The FC general averages were from 3.11 to 3.81kgf. The similarity of the results of FC among the slaughter weight groups in this work is due to the fact that the lambs used in this experiment were young animals with maximum age of 6 months old, and according to YOUNG & BRAGGHINS (1993) in spite of the solubility of the collagen to decline with the age, its concentration stays unaffected from 4 months to the 5 years old.

Conclusions

The fat and humidity content decreased with the increase of the weight, and the protein and ashes content had a tendency to decrease with the increase of the weight. The cholesterol was similar among the breeds but it had a tendency to decrease with the increase of the slaughter weight for the PP muscle. The installation of the *rigor mortis* happened between 6 at 12 hours *post mortem*. The color was influenced by the slaughter weight and PPC was influenced by the weight. The breed influenced the softness in sheep from 15 to 25 kg, however, considering the general averages for the two genetic groups, there was not difference in the softness.

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