4. Meat quality **‹P04-046›**

Tenderness of Italian Mediterranean buffalo meat compared to Piemontese beef

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Objectives: In Italy the problems associated with buffalo meat production are particularly complex, since buffalo farming is essentially based on milk production, which is practically the only source of income for the farmer. In fact, animals destined for slaughter constitute a real by-product of the farm because of their extremely low market price due to the lack of demand by consumers, who are generally unaware of meat characteristics. Therefore, the knowledge of the qualitative characteristics of buffalo meat becomes fundamental in order to have useful elements for promoting the product. Recent research on the quality of buffalo meat has shown its optimal nutritional properties. As the organoleptic characteristics, especially tenderness, are also important to the consumer, the aim of this study was to evaluate the instrumental tenderness of retail meat from young Italian Mediterranean buffalo and to compare it to that of the Piemontese breed, known for providing high quality beef.

Materials and Methods: A total of 12 *longissimus thoracis* muscles, from 6 Italian Mediterranean buffalo and 6 Piemontese young bulls, were purchased at retail from local butcher shops. The age at slaughter and the final live weight of the animals averaged 16 months and 550 kg, respectively. After an ageing time of 7 days at 4°C, sarcomere length (SL; μm) was measured by diffraction method using a helium-neon laser (λ=632.8 nm). The sarcomere length was calculated from the distance between the first order diffraction bands (Cross et al. 1981).Texture characteristics of meat were assessed by Texture Profile Analysis on raw meat and by Warner Bratzler shear force on raw (WBr; N) and cooked meat (WBc; N). For the cooking procedure, steaks with a thickness of 2 cm were wrapped in aluminium foil and cooked on a preheated double hot plate grill at 250°C until 70°C of internal temperature was reached. In TPA test, 1 cm^2 cross-section of raw meat cores were compressed twice at 20% and 80% of their original height using a modified square compression cell that avoids transversal elongation of the sample. The stress at 20% (H20%, N) and 80% (H80%, N) of the maximum compression, were used to assess the myofibrillar and connective tissue strength, respectively. In WBsf test, tenderness was measured as the maximum force (N) required to shear 1 cm^2 cross section core at a crosshead speed of 200 mm min^{1}. WBr is mainly reflecting the background or collagen toughness, whereas WBc meat may be considered a measure of myofibrillar toughness. Data were analysed by GLM procedure of SPSS.

Results and Discussion: The contractile state of sarcomeres after rigor mortis plays an important role in beef tenderness. Severe contraction of sarcomeres post-mortem has been shown to result in tougher meat, whereas stretching has been shown to result in more tender meat. Therefore, measuring sarcomere length is crucial before concluding tenderness results. Young male buffalo meat showed significantly lower sarcomere length (1.70 *vs* 1.90 μm). Smulders et al. (1990) observed that the ratio between sensorial tenderness and sarcomere length could be expressed by a sigmoidal curve with an inflection point at 1.8 μm, where higher values are associated with meat tenderness. The most widespread methods used as an indicator of meat texture are the texture profile analysis and the Warner-Bratzler shear test. Hardness or tenderness is a primary determinant of the meat quality and one of the most important attributes influencing consumer acceptance. In compression tests on raw meat, as deformation increases, the three structural components, myofibrillar proteins, intramuscular connective tissue, and perimysium, successively play a role in mechanical resistance. It was demonstrated that measuring strain at 20% and 80% of meat sample deformation it is possible to assess the myofibrillar proteins and intramuscular connective tissues toughness, respectively. Buffalo meat was confirmed as more thought than that of Piemontese. The significant higher H20% (15.49 *vs* 9.85 N) and H80% (54.65 *vs* 28.69 N) values observed in Buffalo meat suggest the greater contribution of both the myofibrillar and connective tissue to the meat toughness. No significant differences were observed for WBsf of raw and cooked meat. The WBc value in buffalo meat (37.95 N) indicates that it might be considered "tender" by consumers. In fact, Destefanis et al. (2008) stated that beef with Warner-Bratzler values of cooked meat lower than 42.87 N is perceived by most consumers as ''tender". This is a good result for buffalo meat. In fact, considering that, Italian Mediterranean buffalo is not a specialized meat breed, an earlier slaughter age and an extended ageing time could probably significantly improve buffalo meat tenderness.

References:

Cross et al. 1981. 10.1016/0309-1740(81)90016-4
Smulder et al. 1990. https://doi.org/10.1016/0309-1740(90)90048-B
Destefanis et al. 2008. https://doi.org/10.1016/j.meatsci.2007.05.031

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