



Tenderness Fact sheet

Beef tenderness is a complex trait influenced by inherent muscle properties, as well as the conditions that occur within the muscle after slaughter and processing (Scheffler, 2006). Tenderness is a highly favourable characteristic of meat quality and refers to the “toughness” of meat. Beef tenderness is a function of connective tissue, marbling or intramuscular fat, and postmortem protein degradation (Rubio Lozano, et al., 2016).

The primary factor governing protein degradation in the muscle after slaughter is the calpain-calpastatin system (Koochmaraie, Geesink, Kuchay, & Chishti, 2006). Calpains and calpastatin are both important to tenderness and meat quality. Calpain is an enzyme that weakens muscle fibres during the post-mortem aging process. While calpastatin is an enzyme that regulates the activity of calpain. The Tenderness test is a three-marker test for calpains and calpastatin. The results of these three genetic markers are translated to a 1 to 10 scale for tenderness. A score of 1 is the least tender genotype, and a score of 10 is the most tender genotype.

References

Koochmaraie, M., Geesink, G., Kuchay, S., & Chishti, A. (2006). u-Calpain is essential for postmortem proteolysis of muscle proteins. *Journal Animal science* , 2834-2840.

Rubio Lozano, M., Alfaro-Zavala, S., Sifuentes-Rincón, A., Parra-Bracamonte, G., Braña Varela, D., Medina, R., . . . Figueroa Saavedra, F. (2016). Beef Tenderness Sources of Variation. *Journal of Food Quality*, 150-156.

Scheffler, T. (2006). Exploring Factors that Contribute to Beef Tenderness. *University of Florida - The Department of Animal Sciences*.

More information

The “IGENITY Tenderness” document is available on the Iowa State University website: <https://www.nbcec.org/validation/igenity/tenderness.html> .