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New Insight into the Effects of Small Heat Shock Proteins on Callipyge Lamb Tenderness

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Abstract

Callipyge lambs are a type of sheep that are genetically known to produce tough meat. High expression of calpastatin, which inhibits proteolytic activity of μ -calpain, has been identified as the main factor behind the toughness of callipyge lamb meat. Another group of proteins called small heat shock proteins (sHSP) has recently been suggested for its possible involvement in tenderness development of meat, where up-regulation of sHSP may be associated with toughness. However, the role of sHSP in meat tenderization of callipyge lambs has never been investigated; therefore, the objective of this study is to determine possible involvement of sHSP in myofibrillar protein degradation of callipyge lambs during post-mortem aging. A total of 17 lambs from four different genotypes were slaughtered. Muscle samples from *M. longissimus dorsi* were collected at 3, 6, and 9 days post-mortem for protein extraction. Western blots were performed to determine the extent of degradation of myofibrillar proteins, such as desmin and troponin-T, μ -calpain autolysis, and sHSP 20, 27, and 70. The qualitative results showed that meat samples from callipyge lambs had less myofibrillar protein degradation and μ -calpain autolysis than samples from normal lambs. Furthermore, more intact sHSP were found in the samples from callipyge lambs throughout whole-aging periods than the samples in normal lambs. These observations suggest that up-regulation of sHSP could be related to less extent of myofibrillar protein degradation of muscles from callipyge lambs. Future studies to determine the exact mechanisms by which sHSP protect muscle structure from proteolysis should be warranted.

Keywords

callipyge, callipyge lambs, small heat shock proteins, meat tenderness

References

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