Influence of beef production system on calpain-1 autolysis and Troponin-T degradation


Objective
The objective of this study was to determine the impact beef production systems utilizing different levels of growth promotant technology on calpain-1 autolysis and troponin-T degradation, which are measures of tenderness.

Study Description
Calpain-1 is an enzyme that degrades muscle proteins after being activated through a process known as autolysis. The active form of calpain-1 will degrade muscle proteins such as Troponin-T. Troponin-T is a muscle protein that is a well-established indicator of tenderness in beef. Steers (n = 16, 4/treatment) were finished under four different production systems. 1) No antibiotics (NT), 2) non-hormone treated cattle (ANT; 300 mg monensin and 90 mg tylosin during finishing phase); 3) implant (IMP; NHTC plus a series of three implants) and 4) all previous technologies plus a beta-agonist (BA; same technologies as IMP and fed 200 mg ractopamine hydrochloride per steer per day). Steaks (1 inch) were cut from striploins, vacuum packaged, aged for 7 day, and frozen. Western Blots were conducted for calpain-1 autolysis, intact troponin-T, and a well characterized troponin-T degradation product. Treatments were evaluated in PROC MIXED of SAS 9.2 where tests for fixed effects were significant at P < 0.05.

Take home points
Production system may play a role in the activation or autolysis of calpain-1 from the inactive to the active form. The IMP treatment had more calpain-1 in the active form compared to the BA and ANT treatments. Degradation of troponin-T, a target for calpain-1, was not different among the technology treatments. These data indicate while calpain-1 may remain active at day 7 postmortem in IMP treatment it may not influence protein degradation.

Keywords: beef, technology, tenderness, western blot