

**ABSTRACTS**  
**\* Author Presenting Paper**

**94 Influencing beef tenderness through manipulation of calcium metabolism with vitamin D.** J. Brad Morgan and Don R. Gill, *Oklahoma State University, Stillwater.*

During the past ten years it has been substantiated that elevated intramuscular calcium results in enhanced postmortem muscle tenderization. Elevation of intramuscular calcium has been accomplished by: (a) direct marination of a calcium-containing solution, (b) infusing calcium into carcasses via the circulatory system, and (c) injecting calcium into beef primal cuts. In an attempt to elevate calcium levels in beef animal/cuts through dietary means, an initial project utilized 182 steers, in which animals received either 0 or 7.5 million IU of Vitamin D<sub>3</sub> (VITD) for 7 d immediately prior to harvest. Compared to longissimus muscle samples from non-supplemented (CON) animals, VITD supplementation significantly elevated intramuscular calcium levels (21.3  $\mu\text{g/g}$  versus 14.2  $\mu\text{g/g}$ ), improved longissimus tenderness (4.21 kg versus 5.13 kg) and displayed higher calpain proteolytic activities. In a second investigation steers (n=119) were divided into four dietary treatment groups: CON; VITD (6 million IU/animal/d for 6 d); vitamin E (VITE, 1,000 IU/d for 56 d prior to harvest); combination (COM, treatments VITD and VITE). Mean shear force values were highest for CON longissimus samples regardless of postmortem aging time. Regression analysis indicated that steaks for VITD and COM required less time to achieve shear force values of  $\leq 3.86$  kg relative to CON and VITE treatments (7.4 d and 9.8 d versus 15.8 d and 11.8 d, respectively). Additional information indicated that VITE and COM steaks exhibited longer retail case life characteristics compared to CON and VITD steaks. In a third investigation it was determined that VITD supplementation (6 million IU/animal/d for 6 d) improved longissimus, gluteus medius and biceps femoris muscle tenderness as categorized by the percentage of cuts having shear force values  $\geq 3.86$  kg following postmortem aging. Results indicate approximately one-half (53.7%) compared to only one-fifth (19.8%) of the CON and VITD cuts, respectively, displayed tenderness values greater than this shear force tenderness threshold. To date, VITD supplementation appears to provide a unique approach to enhancing meat tenderness. Additional research is underway to further explain the exact mode of action of VITD supplementation on meat tenderness.

**Key Words:** Beef, Vitamin D, Tenderness