

**Effects of dietary beta-agonist treatment, Vitamin D<sub>3</sub>  
supplementation and electrical stimulation of  
carcasses on meat quality of feedlot steers**

**By**

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## DECLARATION

I declare that this thesis for the PhD (Animal Science) degree at the University of Pretoria has not been submitted by me for a degree at any other university.

Signed.....

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## ABSTRACT

In this study, 20 young steers received no beta-adrenergic agonist (C), 100 animals all received zilpaterol hydrochloride, with 1 group only receiving zilpaterol (Z) while the other 4 groups received zilpaterol and vitamin D<sub>3</sub> at the following levels and durations before slaughter: 7 million IU Vit D<sub>3</sub>/animal/day for 3 days (3D7M); 7 million IU Vit D<sub>3</sub>/animal/day for 6 days (6D7M); 7 million IU Vit D<sub>3</sub>/animal/day for six days with 7 days no supplementation (6D7M7N) and 1 million IU Vit D<sub>3</sub>/animal/day for 9 days (9D1M). Left carcass sides were electrically stimulated (ES) and the right side not electrically stimulated (NES). Samples were aged for 3 or 14 days *post mortem*. Parameters included Warner Bratzler shear force (WBSF), myofibril filament length (MFL), sarcomere length and calpastatin and calpain enzyme activities. For drip loss and instrumental colour measurements, samples were analysed fresh (1 day *post mortem*) or vacuum-aged for 14 days *post mortem*.

Both ES-treatment and prolonged aging reduced WBSF ( $P < 0.001$ ). Treatments 6D7M, 6D7M7N and Z remained significantly tougher than C ( $P < 0.001$ ), while 3D7M and 9D1M improved WBSF under NES conditions. ES was shown to be more effective at alleviating beta-adrenergic agonist induced toughness than high vitamin D<sub>3</sub> supplementation. Aging increased drip loss, lightness, redness and yellowness while ES increased drip loss. In general, Z showed increased drip loss, lighter meat, and reduced redness. Vitamin D<sub>3</sub> supplementation could not consistently overcome the adverse effects of zilpaterol hydrochloride in feedlot steers.

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