Improving meat tenderness with vitamin D3 and electrical stimulation

By

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Submitted in partial fulfilment of the requirements for the degree

MSc (Agric) (Meat Science)

In the

Department of Animal and Wildlife Sciences

University of Pretoria

Pretoria

June 2007

Abstract

Meat tenderness is regarded as the single most important characteristic of meat quality. Fifty Bonsmara feedlot steers were fed a commercial feedlot ration (10,5 MJ ME/Kg DM, 12% CP), supplemented with 0,15mg Zilmax/kg live weight in the feed and with different levels of vitamin D_3 (1 to 5 X 10^6 IU Vit D_3 /day) for five days prior to slaughter. The steers were randomly allocated to the vitamin D_3 treatments and a control group that received no vitamin D_3 supplementation. The steers were fed from ca. 248 ± 3 kg live weight, while Zilmax was fed for the last 35 days to a target weight of ca 400kg. All steers were slaughtered at a commercial abattoir after a Zilmax withdrawal period of 7 days. Samples from *m. longissimuss lumborum* were collected 24h post-mortem for sheer force testing on an Instron apparatus equipped with a Warner Bratzler shear blade. Cooking loss was determined by measuring the amount of fluid loss after cooking. Feedlot performance, carcass characteristics and drip loss of meat samples did not differ significantly between the different vitamin D_3 treatments. The inclusion of 5 X 10^6 IU of vitamin. D_3 resulted in significantly lower shear force (SF) values compared to the steers in the control group. The results suggest that dietary supplementation of 5 X 10^6 IU of vitamin. D_3 may significantly improve the tenderness of meet from steers fed 0,15 mg Zilmax ®/kg live weight for the last 35 days in the feedlot.

The aim of the second study was to explore the effectiveness of the use of electrical stimulation on tenderness of mutton. In this experiment 22 wethers of class AB weighing between 45 and 50kg were used. The carcasses were assigned to two treatment groups, of which group one was electrically stimulated (ES) and the other group was not electrically stimulated (NES). The results revealed that electrical stimulation did not significantly affect of the fatty acid content of meat and crude fat content. Treatment however, significantly ($P< 0,038$) influenced the moisture content of the samples. There was a variation in SF values between the two treatment groups; SF of samples from the ES group were lower compared to that of the NES group. This suggests that ES can be successfully applied to reduce the variation in tenderness within the class- AB mutton.

Declaration: I declare that this thesis for the degree MSc (Agric) (Meat Science) at the University of Pretoria has not been submitted by me for a degree at any other University.

Signature:.....

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SUMMARY

Tenderness remains a significant characteristic in most meat products and is considered the primary attribute of eating quality in red meats. In the first study the effects of Zilpaterol hydrochloride (Zilmax®) in combination with high doses of dietary vitamin D_3 supplementation on the tenderness of meat from β-agonist treated steers was examined. The inclusion of 5 X 10^6 IU of vit. D_3 resulted in significantly lower shear force values compared to the control group, suggesting that supplementation with 5 X 10^6 IU of vit. D_3 may significantly improve the tenderness of meat.

In the second study, the effect of electrical stimulation did not have a significant effect on fatty acid composition and crude fat content of mutton. Treatment however, significantly affected ($P>0.038$) the moisture content of the samples. There was a variation in shear force values (SF) between two treatment groups: the variation in SF of samples from the ES group was less compared to those of the NES group. The results suggest that ES can be applied to reduce the variation in tenderness within the class- AB mutton.

Keywords: Tenderness, Electrical stimulation, beef, mutton, Vitamin D_3, β-agonists

Acknowledgements:

I would like to thank the following people without whom the successful completion of this study would not have been possible.

Prof E.C. Webb from the Department of Animal and Wildlife Sciences at the University of Pretoria, for the honour of having him as a promoter, for his continuous faith in my potential, his guidance, help and support which led to the successful completion of this study.

Prof N.H. Casey for his advice and monitoring of the research process.

Dr M. van der Linde, at the Department of Statistics for analysing and translating the data.

I would also like to thank Dr Langa Simela for her assistance in the preparation and analysis of the samples.

The National Research Foundation (NRF) for awarding me a bursary to complete the Msc (Agric) degree.

Mr Michael Peta, Mrs Peta and Mrs Mercy Molema, my grandparents who have shown great interest in my studies.

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