

A Pilot Study to Evaluate Plasma Substance P and Cortisol Concentrations Following Castration in Beef Calves

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Introduction

Pain inflicted by castration is a major animal welfare concern in beef production. Plasma cortisol is commonly assessed in animal welfare research; however a more robust measurement of pain is needed. The purpose of this study was to evaluate plasma substance P (SP) and cortisol response following castration.

Materials and Methods

Ten, \pm 250 kg Angus cross-bred bull calves were acclimated for five days after which they were blocked by scrotal circumference and randomly assigned to either a castrated or uncastrated control group. Blood samples were collected via jugular catheter at -24, -12 and 0 hours pre-castration and 3, 10, 20, 30, 45, 60, 90, 120, 150, 180 and 240 minutes post-castration. Plasma SP and cortisol was determined using competitive and chemiluminescent enzyme immunoassay respectively. Data were analyzed in SAS using PROC MIXED.

Results

Observed mean peak cortisol concentrations of 112.20 ± 4.81 nmol/L and 112.92 ± 32.26 nmol/L were recorded in castration and control groups respectively. No significant difference in cortisol between groups over time or time points was noted ($p = 0.79$). There was also no significant difference in the mean SP levels between groups over time ($p = 0.22$). However, significantly higher SP levels were recorded in castrated calves at 45 minutes and 2 hours post-castration ($p < 0.05$).

Significance

Our study contradicts previous reports suggesting that plasma cortisol correlates with nociceptive response post-castration. Elevated plasma SP could potentially be associated with pain post-castration but further research is required. These findings have important implications for assessing animal wellbeing in livestock production systems.