

Effects of transdermal flunixin meglumine on pain biomarkers at dehorning

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Introduction

Dehorning is a common procedure performed on over 90% of dairy farms. The increasing awareness of animal welfare and pain mitigation have made the use of nonsteroidal anti-inflammatory drugs (NSAIDs) common and desirable at the time of dehorning. Recently, a novel formulation of flunixin meglumine has been developed and approved in the European Union. This novel formulation is designed for topical application and transdermal absorption of the active ingredient. The objective of this study was to evaluate the analgesic effects of topical flunixin meglumine (Finadyne Transdermal; MDS Animal Health, UK) when given at the time of dehorning on pain biomarkers.

Materials and Methods

Twenty-four weaned male Holstein calves, 6 to 8 weeks of age, were enrolled into the study. The calves were randomly assigned to 1 of 3 treatment groups of: 1) topical flunixin and dehorn (DH-FLU); 2) topical flunixin and sham dehorn (SHAM-FLU); and 3) placebo and dehorn (DH-PLBO). Treated calves had topical flunixin meglumine applied at the label dose of 1.5 mg/lb (3.33 mg/kg) concurrently with dehorning. Dehorning was performed using an electrocautery dehorner applied to the horn for 10 seconds. Sham dehorning was completed using a cold dehorner applied to the horn for 10 seconds. Biomarker parameters collected and analyzed included: infrared thermography (IRT), mechanical nociception threshold (MNT), plasma cortisol, and Substance P.

Results

There were no differences in temperatures detected for the IRT measurements of the medial canthus of the eye, dehorning site, and adjacent skin for the DH groups. Mean control point MNT measurements at 49 hours were 3.14 kgF, 3.46 kgF, and 1.43 kgF for the DH-FLU, Sham-FLU, and DH-PLBO groups, respectively ($P < 0.001$). No other differences of MNT were detected between groups for the other test sites and time points. Plasma cortisol reached peak concentration at 20 minutes post-dehorning for the DH-FLU and DH-PLBO groups and 10 minutes for SHAM-FLU group. Peak plasma cortisol concentrations were 32.0 ng/ml, 12.7 ng/ml, and 28.8 ng/ml for the DH-FLU, SHAM-FLU, and DH-PLBO groups, respectively. Cortisol concentrations were lower for the DH-FLU group at 90 minutes post-dehorning compared to the SHAM-FLU and DH-FLU group ($P = 0.04$). Substance P concentrations at 4 hours post-dehorning were 27.81 pg/ml, 27.08 pg/ml, and 30.36 pg/ml for the DH-FLU, SHAM-FLU, and DH-PLBO groups, respectively ($P = 0.85$). No differences in Substance P concentrations between groups were detected for all time points.

Significance

Topical flunixin meglumine given at the time of dehorning did not provide substantial analgesia based on the pain biomarkers investigated.