Research Summaries 4

Meloxicam Administration Mitigates Behavioral and Performance Effects of Scoop Dehorning Without Local Anesthesia in Weaned Holstein Calves

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Introduction

This study was conducted to determine the pharmacokinetics of meloxicam and its effect on serum cortisol, heart rate, behavior, and weight gain in calves after scoop dehorning without local anesthesia.

Materials and Methods

Twelve Holstein steers (16 weeks of age; 308-451 lb [140-205 kg]) were randomly assigned to receive either meloxicam at 0.23 mg/lb (0.5 mg/kg; n=6) or a placebo IV immediately (<30 seconds) prior to scoop dehorning with a Barnes dehorner and thermocautery. Behavioral assessment was conducted from 48 hours before to 120 hours after dehorning using three-dimensional accelerometers. Heart rate was recorded continuously 48 hours before and after dehorning with telemetric heart rate monitors. Body weight was determined prior to dehorning and at six and 10 days post-dehorning. Blood samples for cortisol and meloxicam determination were collected prior to dehorning and at 5, 10, 15, 20, 30, and 60 minutes and 6, 22, 30, 45, and 52 hours thereafter. Samples were analyzed by LC-MS for meloxicam concentrations and chemiluminescent immunoassay for cortisol concentrations. Data were analyzed with a random effects-mixed model using a univariate split-plot approach. Pharmacokinetic data were analyzed using compartmental modeling.

Results

Plasma meloxicam concentrations were detectable for 50 hours post-administration and fit a two-compartment model with a rapid distribution phase (mean $T_{1/2\alpha}$ = 0.22 ± 0.087 hours) and a slower elimination phase (mean $T_{1/2\beta}$ = 21.86 ± 3.03 hours). Calves in the control group spent a lower proportion of time lying post-dehorning (42.7%) compared to pre-dehorning (46.1%). However, there were no significant differences in the lying time in the meloxicam-treated calves pre- or post-dehorning (43.1%, 43.0%, respectively). Calves receiving meloxicam prior to dehorning gained on average 2.31 ± 0.29 lb (1.05 ± 0.13 kg) body weight per day compared with 0.88 ± 0.55 lb (0.40 ± 0.25 kg) body weight per day in the placebo-treated calves over 10 days post-dehorning (P=0.0418). Although dehorning was associated with a significant increase in serum cortisol concentrations and heart rate, there was no significant difference between treatment groups.

Significance

To our knowledge, this is the first published report examining the effects of meloxicam without local anesthesia on the activity and performance of calves post-dehorning. These findings suggest that administration of meloxicam without local anesthesia immediately prior to dehorning may not mitigate signs of acute distress (cortisol and heart rate), but could have long term behavioral and performance benefits.