

Behavioral evaluation of the analgesic effects of ketoprofen in lame dairy cows

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Introduction

Lameness in dairy cattle decreases productivity and diminishes animal welfare. Alleviating the pain associated with lameness would improve animal welfare and could improve productivity and enhance recovery. In dairy cows, lameness is associated with increased duration and frequency of lying bouts, abnormal locomotion, and increased weight shifting behavior. Weight shifting between the rear limbs can be used to objectively quantify pain levels and responses to pain-relieving drugs. The hypothesis of this study was that administration of the non-steroidal anti-inflammatory drug (NSAID) ketoprofen would decrease pain-associated behaviors in lame dairy cows.

Materials and Methods

Thirty-two lactating Holstein cows were enrolled based on the presence of abnormal locomotion. Cows were randomly and equally assigned to 2 treatment groups. One group was treated with ketoprofen (3 mg/kg body weight) twice at a 48-hour interval, while the other group was treated at the same interval with an equivalent volume of isotonic sterile saline solution (3 mL/45.5 kg body weight). Both treatments were administered intramuscularly, with the volume split evenly into 2 injections given on either side of the neck. On the day before the first treatment, each cow was recorded on video while walking and evaluated at the walk by an observer using a Visual Analog Score system. Each cow was also held for 3 sessions, each lasting 5 minutes, on a scale that records weight borne on each limb more than 10 times per second. Weight shifting behavior was calculated as the standard deviation of the weight borne on each rear leg for all sessions at each data collection point. Cows were assigned a lameness score using the video recordings by a masked observer using a 5-point scale, with a "1" score denoting no lameness and a "5" score indicating the most severe lameness. For the Visual Analog Score (VAS), observers marked a horizontal 100 mm line to indicate each cow's degree of lameness, with the left end of the line representing perfect

soundness and the right end of the line indicating severe lameness. The distance in mm from the left end of the line to the observer's mark was used as a measurement of the degree of lameness. Weighing, locomotion recording, and VAS observations were performed 2, 6, 12, 24, and 48 hours after the first treatment. The second treatment was administered immediately after the 48 hour data collection. Data were collected again 12 and 24 hours after the second treatment. Weight-shifting behavior, locomotion scores, and VAS scores were compared between drug-treated and placebo groups using a general linear mixed model with repeated measures. The model used included fixed effects of treatment, time and treatment by time interaction.

Results

Weight shifting behavior did not differ between the 2 groups before treatment or 2 hours after the first treatment. Cows treated with ketoprofen shifted weight between their rear legs significantly less than saline-treated controls at 6 hours and 12 hours after the first treatment ($P < 0.05$ for all significant differences). There were no significant differences in weight shifting behavior 24 and 48 hours after the first treatment. Treated cows again had decreased shifting behavior compared to controls 12 hours and 24 hours after the second treatment. Significant treatment effects on Visual Analog Scores and locomotion scores were not detected.

Significance

Lame dairy cows treated with ketoprofen exhibited decreased rear limb weight shifting behavior after treatment when compared to saline-treated cows. The duration of this effect appeared to be longer after the second treatment than after the first treatment. There was no effect of treatment on locomotion scores or the Visual Analog Scale. Weight shifting measurements appear to be more sensitive for detecting the alleviation of lameness pain using an NSAID than subjective methods of evaluating locomotion.