

Impact of plane of nutrition and analgesic treatment on wound healing and pain following cautery disbudding in preweaned dairy calves

C. N. Reedman,¹ BSc, PhD; T. F. Duffield,¹ DVM, DVSc; T. J. DeVries,² MSc, PhD; K. D. Lissemore,¹ DVM, DVSc; S. Adcock,³ MSc, PhD; C. Tucker,³ MSc, PhD; S. Parsons,² MSc, PhD; C. B. Winder,¹ DVM, DVSc

¹Department of Population Medicine, University of Guelph, Guelph, Ontario, CAN, N1G 2W1

²Department of Animal Biosciences, University of Guelph, Guelph, Ontario, CAN, N1G 2W1

³Center for Animal Welfare, Dept. of Animal Science, University of California, Davis, CA 95616

Introduction

Nutrition has been reported to be a crucial part of the wound healing process in humans as malnutrition has been well-documented to impede wound healing; however, this has not been evaluated in disbudding wounds in calves. Although it is becoming more common to feed an increased nutritional plane to young dairy calves, 33% of Canadian producers in a 2015 survey were still feeding calves low levels of milk (< 6 L/d). The objective of this study was to determine the impact of a biologically normal plane of nutrition compared to a limited plane on the primary outcome wound healing, and one dose of nonsteroidal anti-inflammatory drug (NSAID) compared to 2 on the secondary outcomes: lying behaviour, haptoglobin concentrations, and mechanical nociceptive threshold (MNT) in calves disbudded via cautery iron.

Materials and methods

Eighty female Holstein calves were enrolled at birth, individually housed and fed via a Calf Rail system (Förster Technik, Engen, Germany). A 2 x 2 factorial design was used to assess the effect of plane of nutrition and an additional NSAID. Calves were randomly assigned to a biologically normal plane of nutrition (BN; offered up to 15 L/d) or a limited plane (LP; offered up to 6 L/d) and to receive 1 or 2 doses of meloxicam. All calves received a lidocaine cornual nerve block and a subcutaneous (SC) injection of meloxicam 15 min prior to cautery disbudding at 18 to 25 d of age, while half the calves received an additional injection of meloxicam (0.5 mg/kg) 3 d after disbudding. Tissue type present, wound diameter and wound depth were evaluated 2 times per wk for 7 to 8 wk as measures of wound healing, lying behavior was recorded beginning 1 to 2 wk prior to disbudding until 7 to 8 wk after as a behavioral indicator of pain, haptoglobin concentrations were measured once per d for 7 d after disbudding, and MNT was evaluated 2 times per wk for 3 wk. Survival analyses were analyzed using Cox regression models (wound healing) and continuous data were analyzed using mixed effect linear regression models.

Results

Only 12% of horn buds were completely healed by 7 to 8 wk after disbudding and 54% had re-epithelized at this time. At any time, wounds from BN calves were more likely to have had re-epithelization occur compared to wounds from LP calves (hazard ratio [HR]: 1.93, 95% CI: 1.18 to 3.14). Wounds from calves that received only 1 dose of NSAID were more likely to have re-epithelization occur, compared to wounds from calves given 2 doses (HR: 1.87, 95% CI: 1.15 to 3.05). Wounds from BN calves had smaller diameters and depths over time beginning on wk 3 compared to LP calves. Wounds from calves that received an additional NSAID had larger diameters and depths over time beginning on wk 4 and 3 respectively, compared to calves that only received 1 dose of NSAID. Calves that received an extra NSAID had a tendency to be less sensitive 7, 10 and 17 d after disbudding compared to calves that only received 1 dose and spent less time lying in the week after disbudding. Calves on the BN milk program were more active compared to LP calves with lower lying times, fewer lying bouts/d, and longer average lying bouts.

Significance

Our results indicate that a BN milk feeding program for calves can result in faster healing times and more activity, and that providing an extra NSAID 3 d after disbudding appears to slow the healing process, but may result in less pain experienced by the calf in the 1 to 2 wk after the procedure. This study is also among the first to demonstrate that after the complete removal of the horn bud, wounds can take more than 8 wk to re-epithelize and fully heal.

