Effect of perioperative penicillin G procaine on bovine castration wound infection rate

K. M. Still Brooks, DVM, MPH, DACVPM, DABVP-Food Animal[1]; **J. Schleining**, DVM, MS, DACVS-LA[2]; **T. A. Brick**, DMV, MS[3]
[1]Department of Clinical Sciences, Colorado State University, Fort Collins, CO 80523
[2]Large Animal Clinical Sciences, Texas A&M University, College Station, TX 77843
[3]VDPAM, Iowa State University, Ames, IA 50011

Introduction

Perioperative administration of B-lactam antimicrobials, including penicillin G procaine, is commonly performed at the time of bovine surgical castration despite a paucity of published evidence regarding rate of bovine castration wound infections and efficacy of single-dose perioperative antimicrobial therapy for bovine castration. The best data on frequency of bovine castration complications was generated from a survey of US bovine veterinarians, which reported wound infection, swelling, gait stiffness, and hemorrhage as the most common complications. This same survey identified that a narrow majority of bovine veterinarians routinely utilized perioperative antibiotics, most commonly β-lactams class drugs, including penicillin G procaine. Increasing public demand for antimicrobial stewardship is elevating professional and consumer scrutiny around veterinary antimicrobial use in food animals. In the current climate that increasingly emphasizes judicious use of antimicrobial drugs, it is imperative to base decisions to incorporate antimicrobial prophylaxis into routine protocols on quality evidence. Currently, there is no published data to suggest that perioperative use of PPG reduces scrotal wound or generalized tetanus infection following routine surgical castration of calves. The objective of the study is to establish whether perioperative administration of penicillin G procaine at the time of surgical castration with the Henderson castrating tool decreases the risk of postcastration surgical wound infections.

Materials and Methods

A total of 94 commercial beef bull calves and 27 heifer cohorts were enrolled in a pilot trial designed to explore the effect of perioperative penicillin G procaine treatment on bovine castration wound healing. Enrolled calves were sourced from those participating in the Iowa Green Tag preconditioning program. Bull calves were randomly assigned to 1 of 3 treatment groups: untreated controls, penicillin G procaine at the label dose of 3,000 IU/lb (6,600 IU/kg [1 mL/cwt]), and penicillin G procaine at the typical extralabel dose of 9,000 IU/lb (19,800 IU/kg [3 mL/cwt]). For all groups, a routine closed surgical castration was performed with the Henderson castrating tool. Site (farm or veterinary hospital), herd composite hygiene score and individual behavior score, body weight, rectal temperature, and scrotal circumference were recorded at the time of castration. Outcomes of interest were assessed at a follow-up visit 2 to 5 weeks post-castration and included individual rectal temperature, scrotal remnant circumference, and castration site wound score. Effect of treatment and covariates were assessed through mixed repeated measures linear regression and ordinal logistic regression models.

Results

In this study, less than 50% of the calves presented at the follow-up with healed castration wounds; delayed healing (46%) and scrotal abscesses (30%) were the most common abnormal observations.

Rectal temperature at castration was not significantly associated with outcome in this study.

Preliminary multivariate analysis finds that penicillin G procaine perioperative treatment at either dose did not have a significant effect on wound score or scrotal tissue circumference, and that herd of origin was the most influential factor on surgical outcome.

Significance

We conclude that wound healing complications following routine bovine surgical castration is common in commercial calves, that rectal temperature at the time of castration is poorly associated with scrotal tissue infection, that single-dose perioperative administration of penicillin G procaine at either 3,000 IU/lb (6,600 IU/kg [1 mL/cwt]) or 9,000 IU/lb (19,800 IU/kg [3 mL/cwt]) does not significantly reduce castration wound infections, and that uncharacterized exposures related to herd of origin are the most influential risk factors.