

# Comparison of firocoxib and meloxicam for pain mitigation in goats undergoing surgical castration

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## Introduction

Castration is a common husbandry practice in food animal management. Castration reduces aggression, prevents indiscriminate breeding, and improves carcass quality. For male goats intended to be kept as pets, castration is recommended close to sexual maturity (6-8 m) to allow for increased urethral diameter. A larger urethral diameter lowers the chances of ureteral obstruction occurring. There are currently no approved analgesic drugs for surgical castration in goats. Veterinarians must extrapolate analgesic data from other livestock species to try to mitigate pain in goats. Sheep and cattle are commonly used, but there is little research supporting best practices of pain mitigation in goats. This study sought to examine the effects of firocoxib and meloxicam after surgical castration in crossbred goats.

## Materials and methods

Eighteen male goats, ages 6 to 8 m, were enrolled on study. Twelve of these were castrated. Castrated animals were randomly assigned to either a treatment of firocoxib (FIRO, n = 6) or meloxicam (MEL, n = 6). Six male goats served as controls and were kept intact, (CNTL, n = 6) along with being given a placebo treatment of whey protein powder in a gelatin bolus. Treatments were administered at 0, 24 and 48 h. Firocoxib was administered at 1 mg/kg orally prior to induction (0 h), and then at 0.5 mg/kg orally at 24 and 48 h post castration. Meloxicam was administered at 2 mg/kg orally prior to induction (0 h), and then at 1 mg/kg orally at 24 and 48 h post castration. All outcomes were taken at -24, 4, 8, 24, 48 and 72 h. Measured outcomes included visual analog scale (VAS), infrared thermography (IRT), plasma cortisol, and kinetic gait analysis (KGA).

## Results

The VAS for FIRO goats ( $51.83 \pm 5.24$  mm) was significantly higher at 48 h when compared to MEL ( $35.50 \pm 5.24$  mm) and CNTL ( $0 \text{ mm} \pm 5.24$  mm) ( $P < 0.0001$ ). There were no significant differences in temperatures for IRT images of the medial canthus of the eye among groups. Mean cortisol values for FIRO ( $4.87 \pm 2.67$  ng/mL) and MEL ( $4.62 \pm 2.67$  ng/mL) were significantly higher when compared to CNTL at the 8 h timepoint ( $1.43 \pm 2.84$  ng/mL). Average rear stride length change from baseline (KGA) for FIRO ( $-18.24 \pm 5.66$  cm) was significantly shorter when compared to both MEL ( $3.76 \pm 5.66$  cm) and CNTL groups ( $0.16 \pm 5.66$  cm) ( $P = 0.0324$ ) when comparing treatment means. Mean values for gait velocity change from baseline values differed between FIRO ( $-54.17 \pm 18.21$  cm/sec), MEL ( $14.54 \pm 18.21$  cm/sec) and CNTL ( $-3.06 \pm 18.21$  cm/sec) ( $P = 0.045$ ).

Results from this study provide promising evidence that meloxicam may provide analgesia after surgical castration. Meloxicam had lower VAS scores, slightly lower mean cortisol values, a longer stride length change from baseline, and a faster gait change velocity from baseline when compared to firocoxib. Refinement of analgesia dosages and castrated control animals are factors that will be included in future research studies. Further evaluation of firocoxib and meloxicam administration following surgical castration is needed in this age of goats.

