PAIN MANAGEMENT; WHAT'S IN IT FOR ME?

Production parameters are often too imprecise to reflect the pain experienced by animals following castration (Stafford and Mellor, 2005). Furthermore, weight gain following castration may be negatively influenced by a decrease in testosterone following removal of the testes (King et al, 1991). However, assessment of production parameters is critical if animal well-being research is to have relevance to livestock producers. In studies reviewed by Stafford and Mellor (2005), Burdizzo or surgical castration were found to have no effect on average daily gain (ADG) over a three month period following castration (Knight et al, 1999; King et al, 1991). However, the ADG of 7 week-old calves during the 5 weeks following castration using rubber rings, clamp or surgery was found to be lower than non-castrated calves but similar between the different castration methods (King et al, 1991). Rubber ring and surgical castration were reported to cause a decrease in ADG of 50% and 70% respectively in cattle aged 8 to 9 months (ZoBell et al, 1993). When 8, 9 and 14 month old cattle were castrated surgically or using latex bands, cattle castrated later had poorer growth rates than those castrated at weaning. Cattle castrated with latex bands also had lower growth rates than those castrated surgically during the following 4 – 8 weeks (Fisher et al, 2001; Knight et al, 1999).

In a study conducted by Oklahoma State University, 162 bull calves were used to determine the effects of latex banding of the scrotum or surgical castration on growth rate. Bulls that were banded at weaning gained less weight than bulls that were banded or surgically castrated at 2 to 3 months of age (Lents et al, 2001). In a second study, 368 bull calves were used in two separate experiments to examine the effect of method of castration on receiving health and performance. In the first experiment latex banding intact males shortly after arrival was found to decrease daily gain by 19% compared with purchasing steers, and by 14.9% compared with surgically castrating intact males shortly after arrival. In the second experiment purchased, castrated males gained 0.58 lbs more and consumed 1.26 lbs more feed per day than intact males surgically castrated shortly after arrival (Berry et al, 2001).

LOCAL ANESTHESIA

Several studies have evaluated the effect of local anesthetic administration prior to castration on feed intake, average daily weight gain and inflammatory mediators (Table 2). In most cases the results of these studies have not shown a significant difference in performance between treated and control calves (Fisher et al, 1996; Ting et al, 2003a; Ting et al, 2003b).

SODIUM SALICYLATE
Salicylate is more soluble than aspirin and may offer a convenient and cost-effective means of providing free-choice access to a NSAID in drinking water. Baldridge et al. (2010) found that calves receiving 2.5 to 5 mg sodium salicylate/mL of water beginning 72 hours prior to concurrent surgical castration and dehorning and continuing for 48 hours after surgery had a higher average daily weight gain for 13 days after castration-dehorning than untreated calves (Figure 1).

**Figure 1.**

![Graph showing ADG (kg) for different treatment groups.](image)

**ORAL MELOXICAM**

Castration in weaned calves is stressful and affects profitability by reducing ADG and increasing susceptibility to disease. This study evaluated the effect of meloxicam, a non-steroidal anti-inflammatory drug (NSAID), on performance and health of calves received as steers compared to bull calves surgically castrated on arrival at the feedlot. British × Continental bulls (n = 145) and steers (n = 113) (BW = 193 to 285 kg) were transported for 12 h in 3 truckloads (d 0), weighed, and randomly assigned to receive either lactose placebo (CONT; 1 mg/kg) or meloxicam (MEL; 1 mg/kg) suspended in water and administered per os, 24 h prior to castration. On d 1, bulls were surgically castrated (CAST) and steers were processed without castration (STR). Combinations of CONT/MEL and CAST/STR were allocated to 24 pens (6 pens per treatment) of 8-14 calves each. Pen was the experimental unit. Plasma meloxicam concentrations at the time of castration (d 1) were determined by HPLC-mass spectroscopy. Pen-level ADG, DMI, and G:F were estimated using BW obtained on d 0, d 14, and d 28 and weigh-back of feed. Individual animals were classified as sick based on a depression score of ≥ 2 on a 5-point scale and a rectal temperature of ≥ 39.78°C. On d 0, 1, and 14, calf chute temperament was evaluated using a 4-point scale. Data were
analyzed using generalized linear mixed models and survival curve analyses. Castration reduced pen ADG ($P < 0.001$) and G:F ($P < 0.001$) from d1 to d14, yet no effects were apparent by d 28. For all treatment groups, DMI increased with days on feed ($P < 0.0001$) but was less in CAST compared to STR calves ($P < 0.016$) throughout the study. From d 14 to 28, ADG increased in CAST but not STR calves, and G:F decreased in STR but not CAST calves. In CAST calves only, MEL treatment reduced the pen-level first pull rate ($P = 0.04$) and reduced bovine respiratory disease (BRD) morbidity rate ($P = 0.03$) (Figure 2). The frequency of chute escape behavior was greater on arrival and at castration in CAST vs STR calves ($P < 0.01$) but not different at d 14 ($P = 0.22$). Mean MEL concentrations at castration were no different between treated STR and CAST calves ($P = 0.70$). MEL administration prior to castration in post-weaning calves reduced the incidence of respiratory disease at the feedlot. These findings have implications for developing NSAID protocols for use in calves at castration with respect to addressing both animal health and welfare concerns.

**Figure 2.**

![Bar chart showing the percentage of pulled calves across different treatments.](image)

**SEDATIVE-ANALGESICS**

Faulkner et al. (1992) investigated the health and performance effects of intravenous butorphanol (0.07 mg/kg) and xylazine (0.02 mg/kg) co-administration to weanling bulls at the time of castration. Co-administration of xylazine and butorphanol resulted in reduced chute activity and clinical sedation characterized by muscle relaxation and occasional (< 15 to 20%) difficulty in exiting the chute. It is noteworthy that cortisol concentrations immediately post-castration were not evaluated in this study. However, treated calves were found to have significantly higher cortisol concentrations at 3 days post-castration compared with castrated controls. The authors conclude that butorphanol and xylazine did not reduce stress or improve performance.
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References available upon request