

band castrated with MEL (BAN+MEL). Upon feedlot arrival (d-10), animals were blocked by initial BW (224 ± 4.5 kg) and assigned randomly to treatment pens ($n = 6$). Oral MEL was administered at 1 mg/kg BW concurrent with castration on d 0. Blood samples were collected from a subset of animals ($n = 5$ animals/pen) on d 0, 0.25, 1, 4, 7, and 14 to determine haptoglobin (Hp) concentration, as a proxy for inflammation. On d -10, accelerometers were placed on the same subset of cattle to determine baseline and postcastration changes in behavior indicative of pain; activity variables (standing, steps, lying bouts, motion index) were continuously logged and averaged by d. There was a treatment \times day interaction ($P = 0.04$), with SUR animals having the greatest ($P < 0.01$) concentration of Hp on d 1 and 4. Meloxicam administered during surgical castration reduced ($P = 0.01$) Hp concentration relative to SUR on d 1. Method of castration had contrasting effects on specific behavior variables. Relative to baseline, standing duration for surgical castration increased 113 min ($P < 0.01$), while banding caused 6.7 more lying bouts ($P < 0.01$) immediately following castration on d 0. Steps were increased on d 0 for banded (2723), intermediate for CON (2216), and least (1801 steps) for surgical ($P < 0.01$). Results suggest that MEL mitigated the more pronounced inflammation observed for surgical castration; whereas, behavior was differentially altered for castration method indicative of a divergent pain response.

Key Words: analgesia, beef cattle, castration

0086 A systematic review-meta-analysis of castration and welfare indicators in beef cattle.

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To quantify the effects of castration in male beef cattle on welfare indicators based on cortisol concentration, average daily gain (ADG) and vocalization, a systematic review and meta-analysis were performed. We searched on five electronic databases (CAB Abstracts, ISI Web of Science, PubMed, Agricola, and Scopus) from January 1900 to May 2015 and included conference proceedings and electronically contacted experts, and also checked references of relevant review papers. Inclusion criteria were complete studies using beef cattle until 1 yr of age undergoing castration that analyzed cortisol level, ADG, or vocalization. Data were extracted using predefined protocols. The included documents were written in English, Spanish, Portuguese, or Italian. Random effect meta-analyses were conducted for each indicator separately with the mean of control and treated group. Possible influences of study characteristics and quality were assessed in meta-regression analyses. A total of 18 prospective publications reporting 23 studies and 156 trials were included in the MA involving 1617 animals. Significant between studies heterogeneity was observed

for MA results when analyzing cortisol and ADG. Regardless the control group and the castration technique, the comparison analyses showed no changes ($P \geq 0.05$) changes on cortisol levels when castration was performed without drug administration. We found no evidence ($P \geq 0.05$) for multimodal therapy in decrease cortisol concentration 30 min after surgical procedure. Anesthesia tended to decrease cortisol level ($MD = 0.411$ nmol/L; $P = 0.077$; 95% CI: -0.868, 0.045) 120 min after surgical castration compared with castrated group without drug administration. Random-effect meta-analysis suggested an increase in ADG in surgical ($MD = 0.231$ g/d; $P = 0.010$; 95% CI: 0.056, 0.405) and nonsurgical castration ($MD = 0.883$ g/d; $P < 0.001$; 95% CI: 0.313, 1.453) with no pain mitigation in comparison to uncastrated cattle. Publication bias was observed when cortisol was studied as an outcome, indicating that small size studies reporting nonsignificant effect were less likely to be published than similar studies with significant effect. In a meta-regression, only publication type contributed to the total variation (18.52%) when the outcome evaluated was ADG. The vocalization score presented data in a manner that was not suitable to MA. Our MA study demonstrates an inconclusive result to draw recommendations on preferred castration practices to minimize pain in beef cattle.

Key Words: animal welfare, cattle, cortisol, pain, vocalization, weight

0087 Blocking the steer's view of people during restraint in a squeeze chute results in calmer behavior.

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The aim of this study was to evaluate if facility design influences cattle behavior. Two types of systems were compared: open sides (OP) or solid wall (SW). To meet the objectives of this study, cattle were assessed at nine feedyards, according to the BQA Feedyard Assessment (FA) guidelines for cattle handling in commercial feedlots. Each bovine was observed once during and after vaccination processing. Four-hundred steers, from five feedyards were observed in the OP design, and 380 steers, from four feedyards were observed in SW. The variables recorded were vocalization, miscaught (MH), exit gait (run, trot, or walk) and exit behavior (jump, stumble, and fall). The statistics model for analyses included two factors: facility design (SW \times OP), and feedyard. The SW design reduced vocalization ($P = 0.0003$) and had no effect for MH ($P = 0.3158$). From observed animals, respectively for OP and SW, 41.5% and 26.3% vocalized and 1.6% and 2.5% MH. There was effect on exit gait ($P < 0.001$) and on exit behavior