

# Effect of surgical castration at different stages of maturity with or without analgesia on growth performance and acute-phase response

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## Introduction

Although castration is a commonly practiced management procedure, it causes pain and stress that can temporarily reduce performance. Currently, there is no approved medication for analgesia in cattle. Meloxicam is a non-steroidal anti-inflammatory drug (NSAID) approved by the FDA for analgesic use in companion animal species. The objective of this study was to determine whether surgical castration at birth or weaning with or without concurrent analgesia by administration of meloxicam impacts growth performance or the acute-phase response (APR).

## Materials and Methods

Sixty bull calves from the University of Arkansas research herd were randomly assigned at birth to 1 of 4 treatments (surgical castration soon after birth [BTH], administration of meloxicam [1 mg/kg, PO] followed by surgical castration soon after birth [BMX], surgical castration at weaning [WNG], or surgical castration at weaning with administration of meloxicam [1 mg/kg, PO; WMX]). Data were collected from birth through a 56-day post-weaning stocker phase. Body weights were recorded on all calves at birth and at 4, 33, 66, 116, 162, 199, 214 (weaning), 228, 242, and 270 days of age. A subset of 7 calves from each treatment (ie, 28 calves total) were selected randomly and blood samples were collected via jugular venipuncture at birth and at 1, 3, 7, 214 (weaning), 214 + 6 hours, 215, 217, 221, and 228 days of age. Serum was analyzed for concentrations of interleukin-6 (IL6), interferon gamma, tumor necrosis factor, and haptoglobin (Hp) by use of an enzyme-linked immunosorbent assay. For statistical analyses, calves left intact at birth were considered a positive control (BUL) for observations that occurred before they were castrated at weaning; likewise, calves castrated at birth were considered a negative control (STR) during post-weaning observations. Results were analyzed using the PROC MIXED procedure of SAS. Values of  $P \leq 0.05$  were considered significant for all analyses.

## Results

Average daily gain (ADG) did not differ significantly ( $P=0.88$ ) among treatments throughout the pre-weaning period (days 0 to 214). However, the ADG from days 214 to 228 (ie, for 14 days after calves in the WNG and WMX groups were castrated) was significantly ( $P=0.002$ ) greater for calves in the STR (BTH and BMX groups) and WMX groups, compared with the ADG for calves in the WNG group. Furthermore, during the 56-day postweaning period, ADG was greatest for calves in the STR group, intermediate for calves in the WMX group, and least for calves in the WNG group. Overall, calves in the STR group had significantly ( $P=0.04$ ) greater ADG after weaning, compared with that of calves in the BUL group. The APR was not affected by early castration; however, an overall decrease (day effect;  $P < 0.001$ ) in IL6 concentration was observed between birth and day 7. At weaning, Hp concentration was significantly ( $P=0.005$ ) greater for calves in the BUL group, compared with that for calves in the STR group on days 214+6 h, 215, and 217 and was significantly ( $P=0.05$ ) greater for calves in the WNG group than that for calves in the WMX group on day 217.

## Significance

Early castration did not impact weaning weight. Delaying castration until weaning reduced postweaning ADG, but this reduction was mitigated by the use of meloxicam at the time of castration. Furthermore, castration at weaning, but not early castration, altered immune function. Oral meloxicam reduced serum Hp concentration when administered to calves castrated at weaning, but not in calves castrated early. Therefore, oral administration of meloxicam may be efficacious when castrating older bull calves at or beyond the typical weaning age.