

Effect of Castration Upon Arrival on Health and Performance of High Risk Calves During a 44 day Receiving Period

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Introduction

The interaction between stress, the immune system, disease and performance of domestic animals has been reviewed (Breazile, 1998; Colditz, 2002). For beef cattle, the major stressor occurs when cattle are weaned, transported to a new environment, commingled and exposed to different pathogens, especially respiratory pathogens. In recent years, preconditioning programs have been developed, and although the specific components of each preconditioning program vary, they generally include weaning, castration, dehorning, deworming and vaccination against common respiratory pathogens (Peterson *et al*, 1989). According to Capucille *et al* (2002), beef cattle are castrated to prevent aggressive male behavior, control unwanted matings and to avoid consumer prejudices against beef from intact males. Based on a 1997 US National Animal Health Monitoring System report, surgical castration is the preferred method used by US cow-calf producers before weaning; however, post weaning techniques were not surveyed. This survey also reported that 25.5% of the cow/calf operations do not castrate their bull calves before selling them. Intact males represent a challenge for veterinarians and producers involved in backgrounding, stocker and finishing operations. Potential stress associated with post-weaning castration may include depressed immunity, expressed through the suppression of lymphocyte blastogenesis (Muratta, 1997) and interferon gamma production (Fisher *et al*, 1997). The objective of this study was to evaluate, in a controlled field study, health and performance of weaned calves arriving as bulls or steers during a 44-day receiving period.

Materials and Methods

Cattle and experimental design. A total of 315 calves (111 bulls and 204 steers) were purchased from different cattle auctions during the month of November 2005 and delivered in two loads to the Oklahoma State University Willard Sparks Beef Research Center, Stillwater, OK. On arrival, calves were allowed to rest for one hour. After the initial waiting period, cattle health

was assessed and each calf was individually weighed and identified with a unique numbered tag. Calves were then placed into holding pens and offered *ad libitum* access to prairie hay and water. Twenty four hours after arrival, all cattle were weighed, dewormed (Ivomec Plus 1.0 mL/110 lb [45. kg]; Merial Animal Health, Duluth, GA), vaccinated with a modified live viral (MLV) vaccine (Bovishield Gold 5, Pfizer Animal Health, New York, NY) and clostridial spp bacterin/toxoid (Ultrachoice 7, Pfizer Animal Health, New York, NY) and bulls were surgically castrated. All animals in Load 1 (bulls=93, steers=60) received metaphylactic treatment (Draxxin, 1.1 mg/100 lb [45 kg]), Pfizer Animal Health, New York, NY) four days after castration. All products were administered following Beef Quality Assurance guidelines. Cattle were blocked by arrival body weight (BW) and allotted to pens so that each pen contained a similar ratio of bulls to steers. A diet was formulated to meet or exceed nutrient requirements (NRC, 2000) and was delivered twice daily. Cattle were observed each morning by trained personnel for signs of bovine respiratory disease (BRD). Signs monitored included lethargy, inappetence, cough, weakness, and ocular and nasal discharge. Animals pulled for any of the mentioned signs with a rectal temperature above 104°F (40°C) were considered morbid and treated with an antimicrobial according to experimental protocol. Calves were then returned to their home pen. If the animal was pulled and the rectal temperature was below 104°F (40°C) they were returned to their home pens without antimicrobial treatment. Cattle were weighed on days 0, 15, 30 and 44.

Statistical analysis. Data for body weight (BW) and average daily gain (ADG), processing costs and treatment cost were analyzed as a randomized complete block design using the Proc Mixed procedure of SAS Release 8.02 (SAS Institute Inc, Cary, NC). Morbidity, mortality, animals treated once, animals requiring more than one treatment and case fatality rate (CFR) were analyzed using the Chi square procedure of SAS. Statistical difference was considered significant when $P < 0.05$.

Results

Performance. Cattle that arrived as bulls were heavier (548 lb; 249 kg) than cattle that arrived as steers (524 lb; 238 kg; $p = 0.008$). However, steers reached the same body weight as bulls by day 15 of the experiment (589 lb [266.8 kg] vs. 576 lb [261.94 kg], $p=0.21$; 645 lb [293.4 kg] vs. 640 lb [291.0 kg], $p=0.57$; and 767 lb [307.1 kg] vs. 683 lb [310.0 kg], $p=0.49$ on days 15, 30, and 44, respectively). There was no difference in BW at the end of the trial between bulls and steers. Daily gain was 27.5% greater (3.4 vs 2.5 lb [1.54 vs. 1.12 kg]/d; $p=0.003$) for steers compared with bulls during the first 15 days of the trial. For the second period of the experiment (days 16 to 30) steers gained 15.3% more (4.5 vs 3.9 lb [2.03 vs. 1.76 kg]/d; $p=0.002$) than bulls, and for the last period (days 31 to 44) there was no difference in ADG between treatments (2.7 vs 2.4 lb [1.24 vs. 1.10 kg]/d; $P=0.17$). However, for the overall 44-day receiving trial, steers gained 20% faster than bulls (3.56 vs 2.97 lb [1.62 vs. 1.35 kg]; $p<0.0001$). This difference represented an overall weight gain of 131 lb (59.4 kg) vs. 157 lb (71.3 kg) for cattle that arrived as bulls vs. steers, respectively, which resulted in steers overcoming the difference in initial body weight. These results are similar to results reported by Renfro *et al* (2004), in which intact males upon arrival had lower ADG compared with animals arriving as steers.

Health. Total morbidity, defined as animals requiring at least one treatment for BRD, was 31% higher (42.3 vs. 11.3%; $p<0.0001$) for bulls compared with steers. Total mortality was also affected by sex; bulls had a 23.4% mortality rate compared with 3.9% ($P=0.0005$) for steers. This number is similar to data reported by Renfro *et al* (2004), which showed higher mortality for bulls than steers. In the present experiment, the percentage of bulls requiring only one treatment for BRD was lower (55.3 vs. 91.3%; $P<0.0001$) than steers, whereas the number of animals requiring two or more treatments for BRD was greater (44.7 vs. 8.7%; $P<0.0001$) for bulls. This was reflected in increased medicine costs for bulls compared to steers (\$12.30 vs. \$2.65 per head; $P<0.0001$).

Significance

Recognizing high risk cattle based on their health and management history is important. Implementing strategic procedures to decrease costs and increase performance helps sustainability of beef cattle production. Bulls castrated on arrival generally have poorer performance and more health problems than cattle that arrive as steers. More research is needed to define different management procedures that might have a positive impact on the health and performance of this type of animal.