

Effect of Sex at Arrival on Health and Performance of High Risk Calves During a 44-Day Receiving Period

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Story in Brief

The objective of this study was to evaluate the effect of sex at arrival of high risk calves on health and performance during a 44-d receiving period. A total of 111 bulls and 204 steers were purchased from different auctions and received at the Willard Sparks Beef Cattle Research Center for the experiment. Animals were processed after a 24-h period and calves that arrived as bulls were surgically castrated. Health was assessed by trained personnel every morning and animals that met the pull criteria were taken to the processing facility and rectal temperature was recorded. Animals that met the treatment criteria were treated and returned to their home pens. During the length of the trial, animals that arrived as bulls had a higher morbidity and mortality rate than those that arrived as steers (42.3 vs 11.3% and 23.4 vs 3.9%, respectively) and an increased medicine cost per animal (\$12.30 vs \$2.65/animal). Although the animals that arrived as bulls were heavier (249 vs 238 kg; $P=0.008$), at the end of the trial no difference was detected in body weight (BW; 307 vs 310 kg). However, average daily gain (ADG) during the length of the trial was greater for steers compared with animals that arrived as bulls (1.65 vs 1.35; $P<0.0001$). Bulls castrated on arrival have decreased performance and greater health risk compared with cattle that arrive as steers.

Key words: Bulls, Steers, Health, Performance

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), the implications of castration of beef cattle are to prevent aggressive male behavior, control unwanted matings, and remove consumer prejudices against beef from intact males. Based on the 1997 U.S National Animal Health Monitoring System, 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 their calf crop. Intact males represent a challenge for veterinarians and producers involved in backgrounding, stocker, and finishing operations. The objective of this study was to evaluate, in a controlled field study, health and performance of weaned calves arriving as bulls or steers to the Willard Sparks Beef Research Center for a 44-d receiving period.

Materials and Methods

Cattle and Experimental Design. A total of 315 calves (bulls = 111 and steers = 204) were purchased from different cattle auctions during the month of November 2005 and delivered in two groups to the Oklahoma State University Willard Sparks Beef Research Center, Stillwater, Oklahoma. On arrival, calves were allowed to rest for 1 hour after the initial waiting period cattle health was assessed and each calf was individually weighed and identified with a unique numbered ear tag. Calves were then placed into holding pens and offered ad libitum access to prairie hay and water. Twenty-four hours after arrival, cattle were weighed, dewormed (Ivomec Plus 1.0 mL/45.4 kg; Merial Animal Health, Duluth, GA), vaccinated with a Modified Live Viral (MLV) vaccine (Bovishield Gold 5, Pfizer Animal Health, New York, NY, USA) and *Clostridial* spp bacterin/toxoid (Ultrachoice 7, Pfizer Animal Health, New York, NY, USA), and the bulls were surgically castrated. All animals in the first group (bulls = 93, steers = 60) received a metaphylactic treatment (Draxxin, 1.1 mg/45 kg, Pfizer Animal Health, New York, NY, USA) 4 days after castration. All products were administered following Beef Quality Assurance guidelines. Cattle were blocked by arrival 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, lack of appetite, cough, weakness, and ocular and nasal discharge. Animals pulled for any of the mentioned signs with a rectal temperature above 40°C were considered morbid and treated with an antimicrobial according to experimental protocol. Calves were then returned to their home pen. If an animal was pulled and the rectal temperature was below 40°C it was returned to its home pen without antimicrobial treatment. Cattle were weighed on d 0, 15, 30 and 44.

Statistical Analysis. Data for BW and ADG, processing costs, and treatment costs were analyzed as a complete randomized design using the Proc Mixed procedure of SAS Release 8.02 (SAS Institute Inc., Cary, NC). Morbidity, mortality, animals treated once, and animals requiring more than one treatment, were analyzed using Chi-square Proc Freq of SAS. Statistical difference was considered significant when $P \leq .10$.

Results

Performance. Performance results are summarized in Table 1. Cattle that arrived as bulls were heavier (249 vs 238 kg, $P=0.008$) than cattle that arrived as steers. However, steers reached the same BW as bulls by d 15 of the experiment. No difference in BW at the end of the trial was a result of increased ADG for steers compared with bulls. Daily gain was 27.5% greater for steers compared with bulls during the first 15 days of the trial. For the second period of the experiment (d 16 to 30) steers gained 15.3% more than bulls, and for the last period (d 31 to 44) there was no difference in ADG between treatments. However, for the overall 44-d receiving trial, steers gained 20% faster than bulls. This difference represented an overall weight gain of 59.4 vs 71.3 kg for cattle that arrived as bulls vs steers, respectively, which resulted in steers overcoming the difference in initial BW. These results are comparable to results reported by Renfro et al., (2004), in which intact males upon arrival had lower ADG compared with animals arriving as steers.

Table 1. Performance of bulls and steers during a 44-d receiving period
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Weight (kg)	Bulls	Steers	Std. error	P-value
d 0	249.0	238.0	4.34	.008
d 15	266.8	261.9	3.97	.21
d 30	293.4	291.0	4.07	.57
d 44	307.1	310.0	4.15	.49
ADG (kg)				
d 0-15	1.12	1.54	.14	.003
d 16-30	1.76	2.03	.08	.002
d 31-44	1.10	1.24	.10	.17
d 0-44	1.35	1.62	.06	<.0001

Health. Health results are summarized in Table 2. In this study, sex at arrival influenced the health status of the animals on trial. Total morbidity, considered as animals requiring at least one treatment for BRD, was increased by 31% for bulls compared with steers. Total mortality was also affected by sex; bulls had a 23.4% mortality rate compared with 3.9% for steers. This number is similar to data reported by Renfro et al., (2004), which showed an increased mortality associated with sex on arrival at the feedlot. Another variable measured was the number of treatments required by each experimental group. For this calculation the total number of animals treated and not the whole population was used. The percentage of bulls requiring only one treatment for BRD was lower compared with steers, whereas the number of animals requiring two or more treatments for BRD was greater for bulls. This was reflected in an increased medicine cost for bulls compared to steers.

Table 2. Health of bulls and steers during a 44 d receiving period

	Bulls	Steers	P-value
Morbidity, %	42.3	11.3	<.0001
Mortality, %	23.4	3.9	.0005
Only one treatment, %	55.3	91.3	<.0001
Two or more treatments ^a , %	44.7	8.7	<.0001
Medicine cost (\$)	12.30±1.63	2.65±1.63	<.0001

^aThe total number of animals treated (not all cattle on trial) was used for this calculation.

Implications

It is important for producers to identify and address associated risk factors involved with receiving calves. Recognizing high-risk cattle based on health and management history is important for profitability. Implementing strategic procedures to decrease costs and increase performance will help ensure sustainability of beef cattle production. Bulls castrated on arrival have been associated with decreased performance and increased health risk compared with cattle that arrive as steers. Because many cow/calf producers do not castrate their calves before sale, more research is needed to address different management procedures that might have a positive impact on the health and performance of calves arriving as bulls. This is especially important because of the documented (Renfro et al., 2004) negative impact that cattle arriving as bulls has on feedlot performance and carcass characteristics, resulting in decreased hot carcass weight, yield grade, and quality grade.

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