Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 191

2005

Effects of early weaning on feedlot performance of bulls and steers

E.K. Schlickau

T.T. Marston

J. Brethour

See next page for additional authors

Effects of early weaning on feedlot performance of bulls and steers

Authors

E.K. Schlickau, T.T. Marston, J. Brethour, Michael E. Dikeman, and John A. Unruh

EFFECTS OF EARLY WEANING ON FEEDLOT PERFORMANCE OF BULLS AND STEERS

E. K. Schlickau, J. A. Unruh, T. T. Marston, J. Brethour, and M. E. Dikeman

Summary

Crossbred Hereford × Angus calves (n = 103) were used to determine the effects of early weaning on feedlot performance of bulls and steers. Treatments were: 1) early-weaned (117 days of age) bulls, 2) early-weaned steers, 3) normal-weaned (220 days of age) bulls, and 4) normal-weaned steers. Early-weaned calves were placed on a grower ration at an average age of 134 days and on a finishing ration at 182 days of age. Normal-weaned calves were placed on a finishing ration at 242 days of age. Weight, feed intake, and ultrasound measurements were recorded during the feeding period. Three early-weaned cattle were removed due to chronic bloat, and four early-weaned cattle died in the feedlot. The feedlot period was terminated at either 358 or 387 days of age. Early-weaned cattle had greater average daily gains early in the feedlot period, but normal-weaned cattle had greater gains later in the feedlot period. Excluding the initial weight at 117 days of age, early-weaned cattle maintained heavier weights throughout the feeding period. Bulls had greater average daily gains until feedlot entry of normal-weaned calves, but steers had greater average daily gains later in the feedlot period, resulting in similar final weights. For early-maturing British-type cattle, early weaning resulted in heavier final weights, but it may not be the most viable management strategy because of disadvantages in animal health. Overall, there was no growth-performance advantage for leaving males intact, suggesting that the implant regimen used for these steers was sufficient to compensate for the expected loss in performance when bulls are castrated.

Introduction

Some consumers prefer "natural" non-implanted beef with minimal fat. Feeding bulls may provide an opportunity to meet this specification and improve performance compared with that of steers. Increased muscle gain can be obtained through the use of bulls for beef production. Although the use of bulls for meat production was extensively researched in the early 1980s, it has not been evaluated in combination with the practice of early weaning. Early weaning of steers has been shown to improve feed efficiency, accelerate marbling deposition, and decease age at slaughter. Our objective was to investigate the use of early weaning and bulls on feedlot performance.

Procedures

One hundred three male Hereford × Angus calves born from January 31 to April 6, 2003, were used for this experiment. Calves were blocked by birth date and sire, then randomly assigned to one of four groups: 1) early-weaned bulls, 2) early-weaned steers, 3) normal-weaned bulls, and 4) normal-weaned steers. All calves were injected with Fortress® 7 (Pfizer Animal Health) on May 27 (average age of 86 days); at this time, calves assigned to the steer groups were castrated and implanted with Component® E-C (VetLife).

At an average age of 117 days, calves assigned to early weaning were weaned, weighed, injected with Bovi-Shield® 4 (Pfizer Animal Health), randomly assigned to pens by sex class (two bull pens and two steer pens),

and fed a complete starter ration. At an average age of 134 days, weight was recorded, and calves were shipped to the Agriculture Research Center in Hays, Kansas. The early-weaned calves were fed a grower ration and adjusted to a finishing ration at an average age of 182 days.

The calves designated for normal weaning remained with the cows on native grass near Manhattan, Kansas, with no creep feed throughout the summer. At an average age of 201 days, calves were injected with Bovi-Shield® 4, One Shot® (Pfizer Animal Health), and Fortress® 7. Calves were weaned, weighed, randomly assigned to pens by sex class (two bull pens and two steer pens), and fed a complete starter ration at an average age of 218 days. At an average age of 242 days, calves were weighed, shipped to Hays, and adjusted to a finishing ration. All calves were then injected with Bovi-Shield® 4, and steers were implanted with Synovex® Choice (Fort Dodge). Steers were re-implanted with Synovex® Choice at an average age of 328 days. Feed intake was recorded daily for each pen.

Three cattle (two early-weaned steers and one early-weaned bull) were removed from the trial due to chronic bloating. Three early-weaned steers and one early-weaned bull died during the early feedlot phase. The cause of death was not determined. Data collected from these seven animals were not included in analysis.

At average ages of 269 and 328 days, calves were weighed, and ultrasound (Aloka, Wallingford, Connecticut, and Cattle Performance Enhancement Company cattle software; Oakley, KS) was used to determine marbling score and backfat over the first lumbar vertebrae. Ultrasound measures were then used to project feedlot termination. One randomly selected pen from each treatment was terminated when the steers were projected to have 0.4 inches of backfat. The remaining four pens were terminated when the bulls were projected to have 0.4 inches of backfat. Calves were consolidated and commingled with the other pens for shipment at average ages of either 358 or 387 days.

Results and Discussion

Early-weaned cattle initially had live weights similar to normal-weaned calves (117 days of age; Table 1). At 242 and 328 days of age (Table 1) and at the end of the feeding period (Table 2), early-weaned cattle were heavier than normal-weaned cattle. As a result, early-weaned cattle had greater weight per day of age than did normal-weaned cattle at all times except at 117 days of age.

Early-weaned calves had greater average daily gains from the time of early weaning to feedlot entry of the normal-weaned calves (Table 1). During the first 27 days that normal-weaned calves were in the feedlot (242 to 269 days of age), early-weaned cattle also had greater average daily gains. Early-weaned cattle had lesser average daily gains following this period until the termination of the trial (Table 2).

These results suggest that early-weaned cattle gain more rapidly during the early post-weaning period than do normal-weaned cattle, due to greater nutrient intake; early-weaned cattle continue to have an advantage in gain while normal-weaned cattle are adjusting to the feedlot. During the finishing phase, early-weaned cattle lose their advantage in gain but still have heavier final weights than normal-weaned cattle.

Bulls and steers had similar weights and weight-per-day-of-age at all times measured (Table 1). Compared with steers, bulls had greater average daily gains from early weaning to feedlot entry of normal-weaned cattle, but had lesser gains from 269 days of age until the end of the feeding period (Table 2).

It is well documented that bulls gain faster than steers due to the anabolic effects of testosterone, although this was not true during the feedlot period in our study. It may be that the implant regimen for steers yielded responses similar to the natural testosterone produced by bulls. Also, increased activity (fighting, etc.) may have caused bulls to expend more energy and have lesser gains later in the feedlot period.

Normal-weaned cattle had less dry matter intake but similar gain-to-feed ratios compared with early-weaned cattle during their first 27 days in the feedlot (Table 3). Compared with normal-weaned cattle, early-weaned cattle had similar feed intakes, but less efficient ($P<0.05$) gain-to-feed ratios during the finishing phase.

Bulls consumed less dry matter, but gained with similar efficiency to steers from feedlot entry of the early-weaned cattle to feedlot entry of the normal-weaned cattle (Table 3). After normal-weaned cattle entered the feedlot (242 days of age), bulls and steers had similar dry matter intakes and gain-to-feed ratios.

In our study, seven early-weaned cattle were removed due to chronic bloat or death. There were no deaths or instances of chronic bloat in the normal-weaned groups. The increased incidence of respiratory disease and death in our study may be partly due to stress at early weaning. The increased incidence of bloat may have been due to high feed intake or fluctuating consumption patterns induced by sub-acute acidosis.

Marbling score and backfat thickness, measured by ultrasound at 267 and 328 days of age, were greater for early-weaned cattle than for normal weaned cattle (Table 1). The greater intramuscular fat of early-weaned cattle can be partly attributed to the greater nutrient intake during the early feedlot period.

Bulls tended to have less ultrasound backfat at 269 days of age and had less ultrasound backfat at 328 days of age than steers did (Table 1). Bulls and steers had similar ultrasound marbling at both times, but this was not consistent with the carcass data (reported in an accompanying article). Bulls may have lost more marbling than steers did when cattle were mixed before slaughter, due to increased mounting and fighting activity.

In our study with early-maturing British-type cattle, early-weaned cattle and bulls gained faster early in the feeding period, whereas normal-weaned cattle and steers gained faster later in the feedlot period. Early-weaned cattle had heavier final weights than normal-weaned cattle had, but bulls and steers had similar final weights. Overall, there was no growth-performance advantage for bulls, suggesting that the implant regimen was sufficient to compensate for the expected loss in performance when bulls are castrated.

Table 1. Effects of Weaning Time and Sex Class on Growth Characteristics of Early-maturing British-type Cattle

	Weaning Time		Sex Class		
Item	Early[a]	Normal[b]	Steers	Bulls	SEM
No. of cattle	45	51	47	49	
Weight, lb					
117 days	356	368	365	359	7.1
242 days	712[e]	663[f]	681	694	11.5
269 days[c]	786	729	749	766	11.7
328 days	1035[e]	970[f]	1002	1003	15
Weight per day of age, lb					
117 days	3.11	3.22	3.22	3.11	0.07
242 days	2.98[e]	2.76[f]	2.84	2.89	0.04
269 days	2.91[e]	2.71[f]	2.78	2.84	0.04
328 days	2.95[e]	2.71[f]	2.8	2.84	0.04
Daily gain, lb/day					
117-242 days	2.67[e]	2.36[f]	2.43[h]	2.62[g]	0.13
242-269 days	3.64[e]	1.92[f]	2.82	2.73	0.71
Marbling score[d]					
269 days	4.4[e]	4.0[f]	4.3	4.2	0.09
328 days	4.9[e]	4.5[f]	4.7	4.6	0.11
Backfat thickness[d], inches					
269 days	0.21[e]	0.12[f]	0.17	0.15	0.008
328 days	0.33[e]	0.25[f]	0.33[g]	0.26[h]	0.012

[a]Early-weaned calves were weaned at 117 days of age and entered the feedlot at 134 days of age.
[b]Normal-weaned calves were weaned at 220 days of age, entered the feedlot at 242 days of age.
[c]Weaning time x sex class interaction ($P<0.05$) in which normal-weaned steers (709 lb) were lighter ($P<0.05$) than normal-weaned bulls (749 lb), early-weaned bulls (782 lb), and early-weaned steers (790 lb).
[d]Obtained by ultrasound; 4.0=Sl00, 5.0=Sm00.
[ef]Within a row and weaning time, means having different superscript letters differ ($P<0.05$).
[gh]Within a row and sex class, means having different superscript letters differ ($P<0.05$).

Table 2. Effects of Weaning Time, Sex Class, and Feedlot Group on Final Feedlot Performance of Early-maturing British-type Cattle

	Weaning Time		Sex Class		Feedlot Group[a]		
Item	Early[b]	Normal[c]	Steers	Bulls	358 days	387 days	SEM
No. of cattle	45	50	45	49	49	47	
Weight, lb	1117[e]	1077[f]	1109	1086	1065[i]	1130[j]	15.7
Weight per day of age, lb	3.00[e]	2.87[f]	2.95	2.91	2.95	2.91	0.04
Daily gain[d], lb/day	3.22[f]	3.51[e]	3.53[g]	3.20[h]	3.4	3.33	0.13

[a]Cattle were fed to average ages of either 358 or 387 days of age.
[b]Early-weaned calves were weaned at 117 days of age and entered the feedlot at 134 days of age.
[c]Normal-weaned calves were weaned at 220 days of age and entered the feedlot at 242 days of age.
[d]Average daily gain from 269 days of age to end of feedlot period.
[ef]Within a row and weaning time, means having different superscript letters differ (P<0.05).
[gh]Within a row and sex class, means having different superscript letters differ (P<0.05).
[ij]Within a row and feedlot group, means having different superscript letters differ (P<0.05).

Table 3. Effects of Weaning Time and Sex Class on Pen Average Daily Gain, Dry Matter Intake, and Gain-to-Feed Ratio of Early-maturing British-type Cattle

	Weaning Time		Sex Class		
Item	Early[a]	Normal[b]	Steers	Bulls	SEM
134 to 242 days of age[c]					
No. of pens	-	-	2	2	
Dry matter intake, lb/day	-	-	16.5[f]	16.3[g]	0.333
Gain:feed	-	-	0.145	0.185	0.026
242 to 269 days of age					
No. of pens	4	4			
Dry matter intake, lb/day	20.0[d]	16.6[e]	18.1	18.5	0.736
Gain:feed	0.123	0.104	0.119	0.108	0.012
270 days of age to harvest					
No. of pens	4	4			
Dry matter intake, lb/day	22.00	21.60	22.1	21.5	0.260
Gain:feed	0.140[d]	0.165[e]	0.158	0.147	0.005

[a]Early-weaned calves were weaned at 117 days of age, and entered the feedlot at 134 days of age.
[b]Normal-weaned calves were weaned at 220 days of age, and entered the feedlot at 242 days of age.
[c]Early-weaned pens only.
[de]Within a row and weaning time, means having different superscript letters differ (P<0.05).
[fg]Within a row and sex class, means having different superscript letters differ (P<0.05).