Effect of Angus and Charolais Sires with Early vs Normal Weaned Calves on Feedlot Performance and Carcass Characteristics

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Story In Brief

Our objective was to evaluate the effects of Charolais vs Angus sires and the effects of early weaning using a forage-based growing system on subsequent feedlot performance and carcass characteristics. Utilization of Charolais sires was effective in improving live weight, carcass weight, average daily gain and feed efficiency of heifers vs heifers sired by Angus sires. Normal weaned calves had greater live weight throughout the feeding period and had greater average daily gain through d 56; however, daily gain was not different over the entire feeding period. Early weaning improved feed efficiency over the course of the feeding period, and decreased kidney, pelvic and heart fat deposition. However, no differences were observed in other carcass characteristics. Early weaning has previously been shown to improve marbling and carcass quality when early weaned calves are fed a high concentrate diet. However, early weaning using a forage-based growing system did not influence carcass quality.

Key Words: Beef Cattle, Carcass Merit, Early Weaning, Forages, Feedlot Performance

Introduction

Early weaning has been utilized as a strategy to allow cows to more efficiently increase body condition after parturition. Calves weaned at approximately 100 d (vs the 205 d standard) allow cows to increase body condition compared with contemporaries that were weaned in a normal manner (Arthington and Kalmbacher, 2003; Myers et al.,1999). Similarly, cow maintenance cost can be decreased by early weaning (Story et al., 2000) In addition, calves that are early weaned and placed on high concentrate diets generally have similar daily gains compared to their normal weaned counterparts while gaining more efficiently and depositing more intramuscular fat (Fluharty, et al., 2000; Schoonmaker et al., 2002). However, application of early weaning in production systems that utilize forage as the primary source of intake could eliminate advantages gained in body composition and feed efficiency due to their lower energy content. Our objective was to evaluate the effects Charolais vs Angus sires and the effects of early weaning using a forage-based growing system on subsequent feedlot performance and carcass characteristics in steers and heifers.

Materials and Methods

Fifty-six spring born steer and heifer calves from the Dale Bumpers Small Farms Research Center in Booneville, AR were sorted by sire breed (Angus or Charolais) and gender (Steer or Heifer). Calves were either early weaned (June 6th, 2001; 99 ± 3.0 d of age; 320 ± 46 lb BW) or normal weaned (October 4th, 2001; 217 ± 3.2 d of age; 601 ± 98 lb BW). All cattle grazed bermudagrass pastures and were supplemented with corn and soybean meal after weaning. Early weaned (EW) cattle were supplemented with 1.5 lb/d of corn and soybean meal supplement from June 6th until October 4th when the normal weaned (NW) cattle were weaned, and then all cattle grazed bermudagrass pasture with corn and soybean meal supplementation at 3 lb/d. From

January 8, 2002 until May 4, 2003 all cattle were maintained on Elbon rye pastures with no supplementation.

Cattle were transported to the Willard Sparks Beef Research Center May 5, 2003, and allowed to settle overnight. At processing all cattle were weighed, vaccinated for IBR-PI_3–BVD-BRSV (Titanium 5 Intervet, Millsboro, DE), treated for internal and external parasites (Ivomec® Plus Merial Animal Health, Duluth, GA), and implanted. Steers under 735 lb were implanted with Synovex-S (Vet Fort Dodge Animal Health, Fort Dodge, IA), steers over 735 lb were implanted with Revalor-S (Intervet Millsboro, DE), heifers under 735 lb were implanted with Component E-H (Vet Life Overland Park, KS) and heifers over 735 lb were implanted with Synovex Plus (Fort Dodge Animal Health, Fort Dodge, IA). Cattle were placed in four pens based upon weaning treatment and gender: 1) EW heifers, 2) EW steers, 3) NW heifers, and 4) NW steers. Cattle were fed for 106 (Heavy) or 142 (Light) d and were harvested at Tyson Foods Inc., Emporia, KS when estimated to have 0.50 in twelfth rib fat by visual appraisal.

Diets were formulated to meet or exceed NRC (1996) nutrient requirements and included (DM basis) rolled corn (78.5%), supplement (6.5%), and FuzZpellet (15%). Monensin (33 mg/kg of the diet) and tylosin (11 mg/kg of the diet) were fed. Cattle were gradually adapted to the final diet (90% concentrate) by offering 55, 65, 75, and 85% concentrate diets for 7 d each. Steers were fed twice daily at 0700 and 1300. Feed refused was weighed at 28-d intervals and as needed (e.g., following inclement weather). Cattle were weighed individually before feeding once every 28 d throughout the trial and prior to shipping. Initial weight was analyzed as taken, whereas all interim weights were analyzed with a 4% pencil shrink. Final live weight was calculated by dividing hot carcass weight by a common dressing percentage (62.8%). Hot carcass weight was determined following harvest, and carcasses were evaluated after a 24-h chill for subcutaneous fat depth at the twelfth rib, longissimus muscle area, percentage kidney, pelvic and heart fat, yield grade, marbling score, and quality grade.

Cumulative feedlot performance and carcass data were analyzed as a 2 x 2 x 2 factorial using the MIXED procedure of SAS (1999) with sire breed, gender and weaning treatment as factors. Sire breed, gender, weaning treatment, and the interaction of sire breed and gender were included in the model as class variables after tests for other interactions were eliminated due to nonsignificance. Individual animal served as the experimental unit for performance and carcass data.

Results and Discussion

Early weaned (EW) cattle gained 0.7 lbs/d and normal weaned (NW) cattle gained 2.4 lbs/d from June 6, 2002 to October 4, 2002. From October 5, 2002 to January 8, 2003 all cattle were fed 3 lbs/d of a corn soybean meal diet. From January 9, 2003 to May 4, 2003 all cattle were maintained on Elbon Ryegrass with early weaned cattle gaining 2.8 lbs/d and normal weaned cattle gaining 2.3 lbs/d. Cattle were subsequently transported to the Willard Sparks Beef research Center and fed for 106 or 140 d.

Upon arrival at the feedlot steers were heavier ($P<.05$) than heifers while Charolais heifers were heavier ($P<.05$) than Angus heifers (Table 1). These effects for body weight were maintained throughout the finishing period and were also present for hot carcass weight at harvest. Steers

and Charolais-sired cattle had greater (P<.05) daily gains than Angus-sired heifers throughout the finishing period.

Table 1. Effect of sire breed and gender on feedlot performance

	Angus		Charolais			
Item	Heifers	Steers	Heifers	Steers	SEM	P–value
Number of cattle	8	16	18	14		
BW d 0, lb	631[c]	855[a]	731[b]	838[a]	26.6	.01
BW d 57, lb	836[c]	1084[a]	952[b]	1077[a]	30.9	.02
Adjusted final weight, lb	1105[c]	1339[a]	1243[b]	1352[a]	27.0	.01
ADG d 0 – 28, lb	3.72	4.53	4.32	4.65	0.31	.34
ADG d 0 – 56, lb	3.65	4.09	3.95	4.27	0.23	.76
ADG d 0 – End, lb	3.36[b]	4.16[a]	3.93[a]	4.03[a]	0.18	.02

[abc]Means in a row with different superscripts differ P<0.05

No differences were observed for carcass parameters other than hot carcass weight (Table 2). This result differs from reports by others (McBeth et al., 2002) that suggest leaner carcasses from cattle with Charolais sires. However, Angus-sired calves had higher (16.3%) numerical marbling scores and Charolais-sired calves were numerically leaner (14%) at the twelfth rib.

Table 2. Effect of sire breed and gender on carcass characteristics

	Angus		Charolais			
	Heifers	Steers	Heifers	Steers	SEM	P – Value
HCW, lb	693[d]	840[b]	780[c]	849[b]	17	.01
Dressing %	62.84	63.53	62.19	62.75	.58	.88
Ribeye area, in^2	13.07	12.52	13.43	13.07	.50	.81
12^{th} Rib fat, in	.58	.56	.48	.50	.04	.63
KPH	2.29	3.22	2.95	3.32	.28	.23

Marbling[b]	38.82	34.81	35.96	33.48	1.40	.50
Yield grade	2.87	3.48	2.77	3.15	.20	.49

[a]Practically devoid = 10; traces = 20; slight = 30; small = 40; modest = 50; moderate = 60; slightly abundant = 70
[bcd]Means in a row with different superscripts differ P<0.05

Normal weaned calves had heavier (P<0.05) BW than EW calves (Table 3) through d 56 of the feeding period and tended (P=0.10) to be heavier after final weight was adjusted to a common dressing percent (Table 3). From d 0 to 56 NW cattle gained at a greater (P<0.01) daily rate but the effect was equalized by the end of the feeding period (Table 3). Early weaning improved efficiency through the entirety of the feeding period and is similar to results of others (Myers et al., 1999; Schoonmaker et al., 2001; Schoonmaker et al., 2002)

Table 3. Feedlot performance of early or normally weaned calves

	Early Weaned	Normal Weaned	SEM	P – Value
Number of cattle	24	32		
BW d 0, lb	718	808	16.2	< .01
BW d 57, lb	931	1043	18.8	< .01
Adjusted final weight, lb	1242	1277	16.6	.10
ADG d 0 – 28, lb	4.47	4.13	.19	.17
ADG d 0 – 56, lb	3.78	4.20	.14	.02
ADG d 0 – end, lb	3.85	3.89	.11	.71
Feed:Gain d 0 – 28, lb/lb	4.89	5.51	.27	.07
Feed:Gain d 0 – 56, lb/lb	5.51	5.35	.19	.53
Feed:Gain d 0 – end, lb/lb	5.68	6.16	.18	.04

Hot carcass weight tended (P=0.10) to be greater for NW cattle and EW cattle deposited less (P<0.01) KPH but no other differences were observed for carcass characteristics. Early weaned calves have been reported to have lighter carcass weights but this is generally accompanied by greater twelfth rib fat depths and fewer days to their compositional endpoint (Myers et al., 1999; Schoonmaker et al., 2002; Story et al., 2000). This effect was likely not seen in the present trial

due to the low level of energy supplementation to the early weaned calves. Increases in deposition of intramuscular fat have been attributed to high energy diets fed to early weaned cattle which hastens deposition of intramuscular fat vs early weaned calves fed lower concentrate diets (Schoonmaker et al., 2003). Early weaned calves grazed bermudagrass and were fed a low level (1.5 lb/d) of a corn:soybean meal supplement from June 6, 2001 to October 4, 2000 that provided for a level of energy intake not greatly different from the NW calves. When combined with the long period of winter and spring grazing any potential differences in early intramuscular fat deposition were likely equalized.

Table 4. Carcass characteristics of early or normally weaned calves

	Early Weaned	Normal Weaned	SEM	P – Value
HCW, lb	780	802	10	.10
Dressing %	62.91	62.74	.36	.72
Ribeye area, in^2	12.85	13.10	.31	.70
12th Rib fat, in	.53	.53	.02	.88
KPH	2.51	3.36	.17	< .01
Marbling[a]	34.90	35.63	.86	.84
Yield grade	30.9	30.4	.12	.72

[a]Practically devoid = 10; traces = 20; slight = 30; small = 40; modest = 50; moderate = 60; slightly abundant = 70

Implications

Utilization of Charolais sires was effective in increasing feedlot performance but there was no significant leanness advantage for carcasses of Charolais sired cattle nor was there any significant carcass quality advantage for Angus-sired cattle in the present trial. Although early weaning would be effective in allowing cows the opportunity to increase their body condition, decrease their maintenance costs, and improve feed efficiency of their calves, carcass advantages associated with early weaning were not realized in the present experiment.

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