



BEEF CATTLE RESEARCH UPDATE

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Effect of Corn- and Soybean Hull-Based Creep Feeds and Backgrounding Diets on Lifelong Performance and Carcass Characteristics of Beef Calves

Many research trials have shown that creep feeding nursing calves generally increases weaning weight, but frequently it is not economically. In addition, some research has indicated that increasing exposure to high grain (starch) diets to early weaned steers results in increased carcass quality at slaughter.^{1,2,3} Recent research evaluated the effect of creep feeding, creep feed energy source, and possible interactive effects with backgrounding diet energy source on lifelong performance and carcass characteristics in three studies for calves nursing cows grazing bermudagrass, ryegrass, or native pasture.⁴ In each study, creep feed intake was targeted at 1% of body weight (as-fed basis) beginning 90 days before weaning. The creep feeds were either corn- or soybean hull-based and were formulated to contain 15% crude protein on a dry matter (DM) basis. The basic designs of three studies were as follows:

- Spring calving with bermudagrass: One hundred twenty cows with spring-born calves (majority Angus ancestry) grazed predominately bermudagrass pastures located at the Southwest Research and Extension Center near Hope, AR. The calves were fed no creep, the corn-based creep, or the soybean hull-based creep. Following weaning in late September, the calves were backgrounded in drylot for 45 days on either a corn- or soybean hull-based ration. The calves were then transported to the Texas Tech University Research Farm (New Deal, TX) and finished on a steam-flaked corn-based diet.
- Fall calving with ryegrass: Sixty Brahman cross cows with fall-born calves (sired by Angus bulls) grazed predominately ryegrass pasture located at the Southeast Research and Extension Center at Monticello, AR. The calves were fed no creep, the corn-based creep, or the soybean hull-based creep. Following weaning in mid-May, the calves were backgrounded in drylot for 67 days on either a corn- or soybean hull-based ration. These calves were also finished at the Texas Tech University Research Farm on a steam-flaked corn-based diet.
- Fall calving with native range: Eighty cows in 2008 and an additional 80 cows in 2009 with fall-born calves (majority Red Angus ancestry) grazed native rangeland located at the Southern Plains Range Research Station, north of Fort Supply, OK. The calves were fed no creep or the corn-based creep. Following weaning in late March, the calves were placed in drylot for 2 weeks before being placed on graze-out wheat pasture until mid-May followed by native range grazing until late June. The calves were then shipped to Buffalo Feeders (Buffalo, OK) and finished on a steam-flaked corn-based diet.

The crude protein content of the bermudagrass pasture was 12.7% on day 0, 23.5% on day 28 following fertilization, and 14.5% on day 56 (DM basis). The protein content of the ryegrass pasture ranged from 20.5 to 22.6% (DM basis) over the creep period. The protein content of the native rangeland ranged from 5.7 to 6.0% (DM basis).

The effects of creep feeding on calf performance during the creep period are shown in Table 1. Creep feeding increased pre-weaning average daily gain (ADG) for bermudagrass ($P = 0.01$) and native range ($P < 0.01$) environments, but not in the ryegrass ($P = 0.18$) environment. Creep feeding significantly increased weaning weight by 62 lb ($P = 0.01$) in the bermudagrass study and tended to increase weaning weight by 29 lb ($P = 0.10$) in the native rangeland study. Creep feed energy source did not affect calf performance.

Table 1. Performance of calves nursing cows with and without creep feed.

Item	Treatment ¹			Contrast P-value	
	NC	CC	SC	Creep vs. NC	CC vs. SC
Spring calving with bermudagrass study					
Creep intake, lb/day	---	2.65	2.87	---	0.26
Initial weight, lb	300	302	306	0.47	0.66
ADG, lb	1.08	1.67	1.72	0.01	0.46
Weaning weight, lb	406	463	472	0.01	0.51
Creep conversion, F:G ²	---	4.5	4.3		
Fall calving with ryegrass study					
Creep intake, lb/day	---	1.76	2.65	---	0.55
Initial weight, lb	329	344	326	0.71	0.44
ADG, lb	2.80	3.06	3.09	0.18	0.93
Weaning weight, lb	584	626	609	0.22	0.52
Creep conversion, F:G ²	---	6.7	10.0		
Fall calving with native rangeland study					
Creep intake, lb/day	---	3.75	---	---	---
Initial weight, lb	304	313		0.84	---
ADG, lb	1.61	1.90		< 0.01	---
Weaning weight, lb	483	512		0.10	---
Creep conversion, F:G ²	---	12.5			---

¹Creep treatment: NC = no creep, CC = corn creep, and SC = soybean hull creep.

²Quantity of creep feed consumed divided by additional weight gain of creep-fed calves above control calves.

Adapted from Gadberry et al., 2012.

During the backgrounding period (bermudagrass and ryegrass studies), performance differed little due to prior creep treatment. In addition, backgrounding diet energy source did not affect backgrounding ADG for the bermudagrass or ryegrass environment. Creep-fed calves on bermudagrass and native range entered the feedlot at a heavier weight than those not offered creep feed (583 vs. 516 lb, $P = 0.01$ and 648 vs. 609 lb, $P = 0.06$, respectively). Creep feeding, source of creep feed (corn versus soybean hulls), and backgrounding energy source (corn versus soybean hulls) did not affect feedlot performance or carcass quality.

These researchers concluded that creep feeding improved ADG of calves in environments of lower forage quality (bermudagrass and native range), with the additional weight carrying over into feedlot entry. However, they pointed out that cattle producers must consider the cost of additional gain associated with the creep feed conversions with corn-based creep rations having a 4.5:1 feed:gain on bermudagrass pasture and 12.5 feed:gain on native rangeland. Creep feeding, whether corn- or soybean hull-based, did not improve carcass quality.

Impact of Transportation Stress following Preconditioning on Performance of Feedlot Calves

Numerous studies have shown that preconditioning weaned calves for 30 to 45 days post-weaning is beneficial to stocker and feedlot operations (less morbidity and mortality, improved post-weaning performance, and higher carcass quality). Transportation is generally regarded as stressful to cattle, particularly for feeder calves.^{5,6,7} Cattle shrink more as they spend more time in transportation. In general, as the distance that cattle are transported increases, the risk of bovine respiratory disease morbidity increases and performance decreases. Recent Kansas State University research evaluated the performance of preconditioned calves during receiving and finishing after being transported either 4, 8, or 12 hours prior to feedlot placement.^{8,9}

In this study, 428 Angus x Hereford calves (463 lb initial weight) were weaned at approximately 183 days of age. At this time, the calves were given initial vaccinations against respiratory pathogens (Bovi-Shield Gold 5), clostridial pathogens (Ultrabac 7), and *H. somnus* (Somubac) and treated for internal and external parasites (Ivomec). Booster vaccinations were administered 14 days later. The calves were fed a ration formulated to promote 2.2 lb average daily gain (ADG) at a dry matter intake (DMI) of 2.5% of body weight during a 30-day preconditioning period. After preconditioning,

the calves were transported 4 hours to a commercial auction market and commingled for 12 hours. Following commingling, the calves were loaded aboard a motor carrier and subjected to transport durations of either 4, 8, or 12 hours from the auction market to the Western Kansas Agricultural Research Center Feedlot in Hays, KS. Upon arrival at the feedlot, Calves were fed a common receiving diet for 57 days formulated to promote 2.2 lb ADG at a DMI of 2.5% of body weight and then gradually transitioned to a finishing diet.

As would be expected, the calves transported for 4 hours shrank less (2.91%, $P < 0.01$) than calves transported for 8 (4.81%) or 12 hours (5.15%). During the receiving period, ADG was greater ($P < 0.01$) for the calves transported 8 (2.82 lb) or 12 hours (2.77 lb) compared with calves transported 4 hours (2.60 lb). In addition, gain efficiency (gain:feed ratio) improved in calves transported 8 (0.171) or 12 hours (0.168, $P = 0.05$) compared with calves transported 4 hours (0.157). These researchers noted that the greater ADG and efficiency observed in calves transported 8 or 12 hours before receiving could be explained by the replenishment of gut fill lost during transport. No differences in morbidity between treatments were observed. In addition, no treatment differences in finishing performance or carcass characteristics were observed in the study.

These authors concluded that performance of preconditioned beef calves during feedlot receiving and finishing or on the rail was not affected by post-sale transport of up to 12 hours following a 30-day preconditioning program. In addition, they suggested that the calves likely benefitted from separating the stressors of weaning and transport with a 30-day ranch-of-origin preconditioning period.

¹ Sawyer, J. E. 2008. Nutritional management and beef carcass quality: Will high(er) priced corn diminish beef quality? Feeding Quality Forum, November 13, Amarillo, TX.

² Schoonmaker, J. P., M. J. Cecava, F. L. Fluharty, H. N. Zerby, and S. C. Loerch. 2004. Effect of source and amount of energy and rate of growth in the growing phase on performance and carcass characteristics of early- and normal-weaned steers. *J. Anim. Sci.* 82: 273-282.

³ Myers, S. E., D. B. Faulkner, F. A. Ireland, L. L. Berger, and D. F. Parrett. 1999. Production systems comparing early weaned to normal weaning with or without creep feeding for beef steers. *J. Anim. Sci.* 77: 300-310.

⁴ Gadberry, M. S., P. A. Beck, S. A. Gunter, B. L. Barham, W. A. Whitworth, and J. K. Apple. 2012. Effect of corn- and soybean hull-based creep feed and backgrounding diets on lifelong performance and carcass traits of calves from pasture and rangeland conditions. *Prof. Anim. Sci.* 28:507-518.

⁵ González, L. A., K. S. Schwartzkopf-Genswein, M. Bryan, R. Silasi, and F. Brown. 2012. Factors affecting body weight loss during commercial long haul transport of cattle in north america. *J. Anim. Sci.* 90:3630-3639.

⁶ Cernicchiaro, N., B. J. White, D. G. Renter, A. H. Babcock, L. Kelly and R. Slattery. 2012a. Associations between the distance traveled from sale barns to commercial feedlots in the United States and overall performance, risk of respiratory disease, and cumulative mortality in feeder cattle during 1997 to 2009. *J. Anim. Sci.* 90:1929-1939.

⁷ Cernicchiaro, N., B. J. White, D. G. Renter, A. H. Babcock, L. Kelly and R. Slattery. 2012b. Effects of body weight loss during transit from sale barns to commercial feedlots on health and performance in feeder cattle cohorts arriving to feedlots from 2000 to 2008. *J. Anim. Sci.* 90:1940-1947.

⁸ Bailey, E. A., J. R. Jaeger, J. W. Waggoner, G. W. Preedy, L. A. Pacheco, and K. Olson. 2013. Transport of up to 12 hours following preconditioning has no impact on health and performance of beef calves during receiving. Kansas State Univ. Agricultural Research Center - Hays Roundup Report of Progress 1086:1-4. Available: <http://www.ksre.ksu.edu/bookstore/pubs/SRP1086.pdf>.

⁹ Bailey, E. A., J. R. Jaeger, J. W. Waggoner, G. W. Preedy, L. A. Pacheco, and K. Olson. 2013. Transport of up to 12 hours following preconditioning has no impact on finishing performance or carcass characteristics of beef calves. Kansas State Univ. Agricultural Research Center - Hays Roundup Report of Progress 1086:5-7. Available: <http://www.ksre.ksu.edu/bookstore/pubs/SRP1086.pdf>.

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