Length of the Ranch-of-Origin Weaning Period Does Not Affect Post-Receiving Growth or Carcass Merit of Ranch-Direct, Early-Weaned Beef Calves

J. W. Bolte, K. C. Olson, J. R. Jaeger, T. B. Schmidt, D. U. Thomson, B. J. White, R. L. Larson, G. A. Milliken, N. A. Sproul, L. A. Pacheco, and M. D. Thomas

Introduction

Bovine respiratory disease (BRD) is the most economically devastating feedlot disease. Risk factors associated with incidence of BRD include (1) stress associated with maternal separation, (2) stress associated with introduction to an unfamiliar environment, (3) low intake associated with introduction of novel feedstuffs into the animal's diet, (4) exposure to novel pathogens upon transport to a feeding facility and commingling with unfamiliar cattle, and (5) inappropriately administered respiratory disease vaccination programs. Management practices that are collectively referred to as preconditioning are thought to minimize damage to the carcass from the BRD complex.

Preconditioning management can reduce the aforementioned risk factors for respiratory disease by (1) using a relatively long ranch-of-origin weaning period following maternal separation, (2) exposing calves to concentrate-type feedstuffs, and (3) producing heightened resistance to respiratory disease-causing organisms through a preweaning vaccination program. The effectiveness of such programs for preserving animal performance is highly touted by certain segments of the beef industry but poorly documented in peer-reviewed scientific literature.

Ranch-of-origin weaning periods of up to 60 days are suggested for preconditioning beef calves prior to sale; however, optimal length of the ranch-of-origin weaning period has not been determined experimentally. The objective of this study was to test the validity of beef industry assumptions about the appropriate length of ranch-of-origin weaning periods for calves aged 100 to 160 days and weaned during the summer.

Experimental Procedures

A total of 400 polled, spring-born calves (average body weight (BW) at weaning = 359 ± 69 lb; average birth date = 03/21/2006 ± 19.5 days) were used for this experiment. One set of calves (n = 200) originated from the Kansas State University Cow-Calf Unit. The second set (n = 200) originated from the Agricultural Research Center at Hays (ARCH). Bulls were castrated at least 14 days prior to the study. At each location, calves were blocked by sex and age and assigned randomly to treatments that corresponded to the length of time between separation from their dam and shipping: 60, 45, 30, 15, or 0 days (n = 40/treatment per location). Calf age on the date of maternal separation was 100, 115, 130, 145, and 160 days for calves weaned 60, 45, 30, 15, and 0 days relative to shipping, respectively. The study was initiated on June 15 (75 days before shipping), and the common shipping date for all treatments was August 24 (day 0).

All calves were given an initial modified-live vaccination for IBR, BVD, PI3, BRSV, (Bovi-Shield Gold FP, Pfizer Animal Health, Exton, PA) and clostridial disease (Vision 7 with SPUR, Intervet Inc., Millsboro, DE) 2 weeks prior to separation from their dam. They were also individually identified with a color-coded ear tag corresponding to treatment at that time.

On the day of maternal separation, all calves were revaccinated for IBR, BVD, PI3, BRSV, and clostridial diseases; they were also treated for internal and external parasites with Dectomax (Pfizer Animal Health) and weighed. Calves were immediately transported a short distance (< 15 miles) to a central home-ranch weaning facility.

Calves were maintained in earth-floor pens (4 pens/treatment) at their respective home-ranch weaning facilities for a period of days corresponding to their treatment assignment. Calves were fed a common weaning ration during that period that was based on chopped hay, soybean meal, and sorghum grain. It was formulated to achieve an average daily gain (ADG) of 2.0 at a dry-matter intake of 2.5% of BW.

Calves were monitored for symptoms of respiratory disease at 7:00 a.m. and 2:00 p.m. daily during the weaning phase of the experiment. Calves with clinical signs of BRD, as judged by animal caretakers, were removed from home pens and evaluated. Each calf with clinical signs of BRD was weighed, had a rectal temperature measured, and was given a clinical illness score (Table 1). Calves that presented with a clinical illness score greater than 1 and a rectal temperature > 104.0°F were treated according to the schedule described in Table 2. Cattle were evaluated 72 hours posttreatment and re-treated on the basis of observed clinical signs.

Calves from all treatments and both origins were individually weighed and shipped from their respective weaning facilities to an auction market located at Russell, KS, on August 24 (day 0). Calves from both locations were commingled with respect to gender, treatment, and body weight and maintained on the premises of the auction market for 14 hours. During that time, calves were moved through the normal processing facilities. The purpose of this step was to simulate pathogen exposure typically encountered by market-ready calves. Calves were shipped directly to the ARCH from the auction market.

Upon arrival at the ARCH feedlot, cattle were individually weighed and assigned randomly to a receiving pen on the basis of treatment and gender. Cattle continued to be fed the diet introduced after maternal separation for a period of 56 days after arrival at the ARCH. Feed intake was measured daily. Calves were monitored for symptoms of respiratory disease, and clinical illness was treated as in the home-ranch weaning phase. Body weights were measured at 28-day intervals during the receiving phase.

Following the receiving period, replacement heifers were removed, and cattle were placed on a common finishing ration (Table 3). Weights were taken every 60 days throughout the finishing period until slaughter. Cattle were fed to reach an average endpoint of approximately 0.4 in. of backfat at the 12th rib and placed into one of three slaughter groups. Once steers and heifers reached the targeted carcass endpoint, as determined by ultrasound, they were transported approximately 180 miles to a commercial abattoir. At the abattoir, lungs were examined for lesions. After carcasses chilled for

approximately 24 hours, they were ribbed and graded. Carcass measurements including 12th rib fat thickness; 12th rib loin eye area; kidney, pelvic, and heart fat; USDA yield grade; USDA quality grade; and marbling score were collected by a trained evaluator blinded to treatment.

Results and Discussion

Calf BW at feedlot receiving tended to decrease linearly (P=0.06) with successively earlier weaning dates (Figure 1); however, calf BW was similar (P>0.2) among treatments from day 30 after feedlot arrival to harvest. Feed intake (dry-matter basis) during the first 30 days following shipping increased linearly (P<0.01) as the length of the ranch-of-origin weaning period increased; however, dry-matter intake was similar (P>0.3) among treatments from day 30 following shipping to harvest.

Daily gain and gain efficiency (G:F) in our study were similar (P=0.4) among treatments during the first 30 days in the feedlot (Figures 2 and 3, respectively). Similarly, calf ADG and G:F were similar (P>0.2) among treatments from day 30 in the feedlot until harvest.

Incidence of undifferentiated fever was similar (P=0.18, data not shown) among treatments prior to shipping. In fact, only three calves were treated for respiratory disease, and none expired during the pre-shipment phase of this study. In addition, incidence of undifferentiated fever was similar (P=0.12) among treatments during the first 30 days in the feedlot (Figure 4).

Days on feed tended to increase linearly (P=0.06) with successively longer weaning periods (Figure 5). Dressing percentage; fat thickness; hot carcass weight; kidney, pelvic, and heart fat; marbling; loin eye area; and yield grade were similar (P>0.2) among treatments. Liver and lung scores also were similar (P>0.3) among treatments.

In general, finishing performance and carcass merit of early-weaned lightweight calves was not improved by ranch-of-origin weaning periods of between 15 and 60 days.

Implications

Under the conditions of our study, ranch-of-origin weaning periods between 15 and 60 days did not improve post-receiving growth performance, health performance, or carcass merit of early-weaned lightweight calves compared with shipping calves immediately after maternal separation.

Table 1. Scoring system used to classify the severity of clinical illness

Clinical illness score	Description	Clinical appearance
1	Normal	No abnormalities noted.
2	Slightly ill	Mild depression, gaunt, +/- cough
3	Moderate illness	Severe depression, labored breathing, ocular/nasal discharge, +/- cough
4	Severe illness	Moribund, near death, little response to human approach

Table 2. Treatment schedule used to treat calves diagnosed with bovine respiratory disease complex

Treat	Drug	Dose	Route of injection
1st Pull	enrofloxacin (Baytril)	5 mL/CWT	Subcutaneous
2nd Pull	florfenicol (Nuflor)	6 mL /CWT	Subcutaneous
3rd Pull	oxytetracycline (Biomycin 200)	5 mL /CWT	Subcutaneous

Table 3. Average ingredient and nutritional composition of finishing diet

Ingredient	Dry-matter basis (%)
Rolled milo	59.43
Sorghum silage	25.47
Soybean meal	11.04
Limestone	2.08
Ammonium sulfate	0.42

Nutrient composition	% of dry matter
CP	15.90
Ca	1.01
P	0.33
NE_m, Mcal/kg	1.75
NE_g, Mcal/kg	1.13

Diet also included salt, Rumensin 80, Tylan 40, and trace minerals.

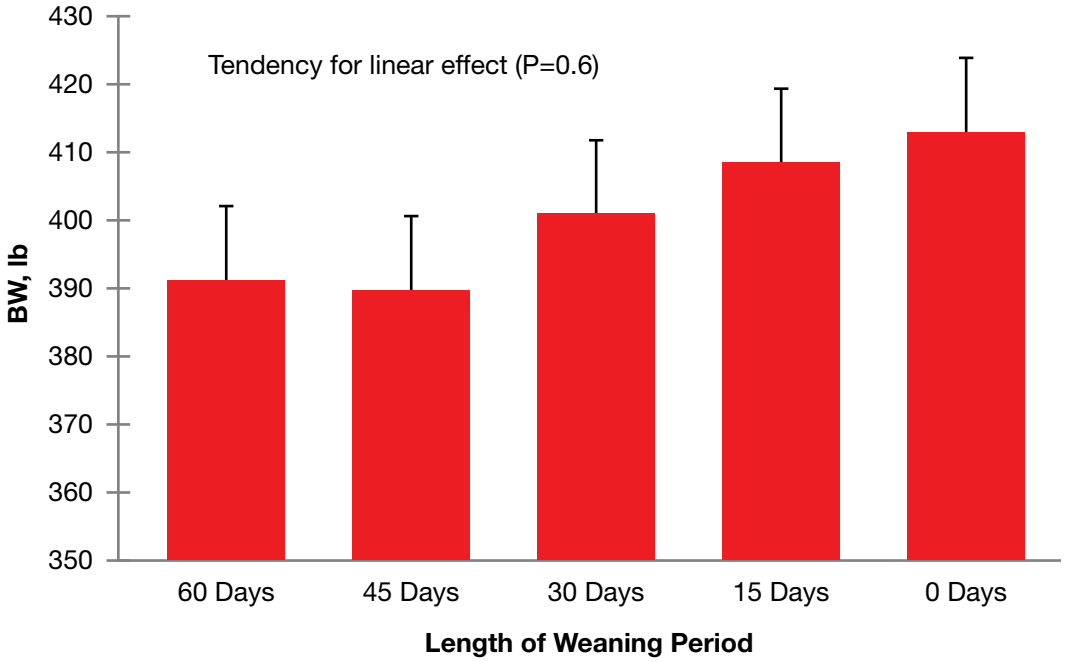

Figure 1. Effect of length of the ranch-of-origin weaning period on body weight (BW) of lightweight calves at feedlot arrival.

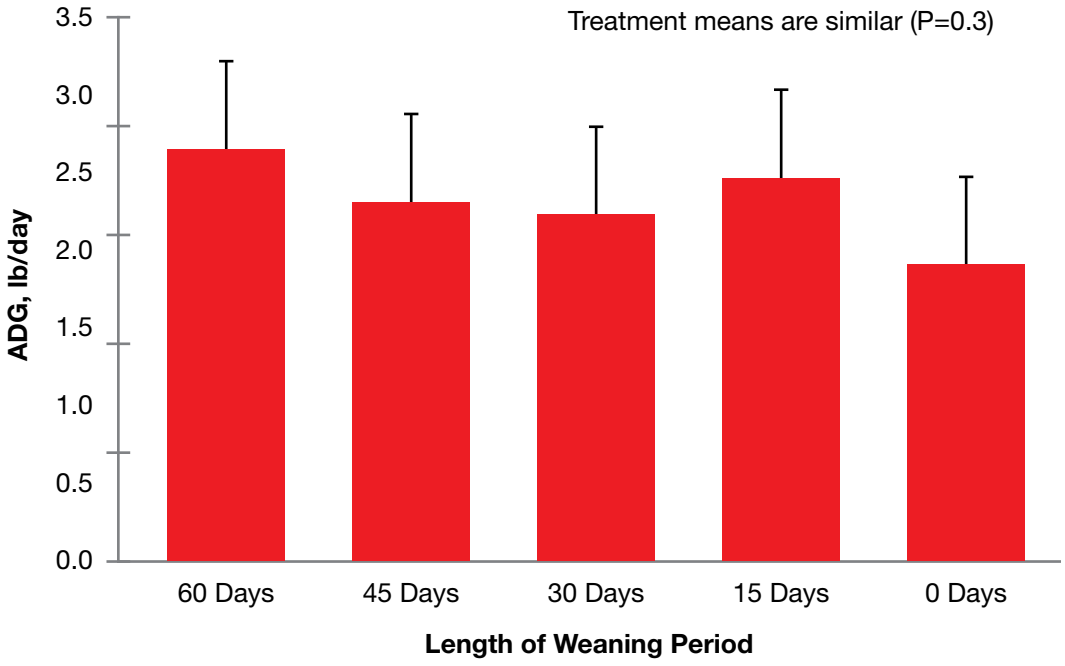

Figure 2. Effect of length of the ranch-of-origin weaning period on average daily gain (ADG) of lightweight calves during the first 30 days after feedlot arrival.

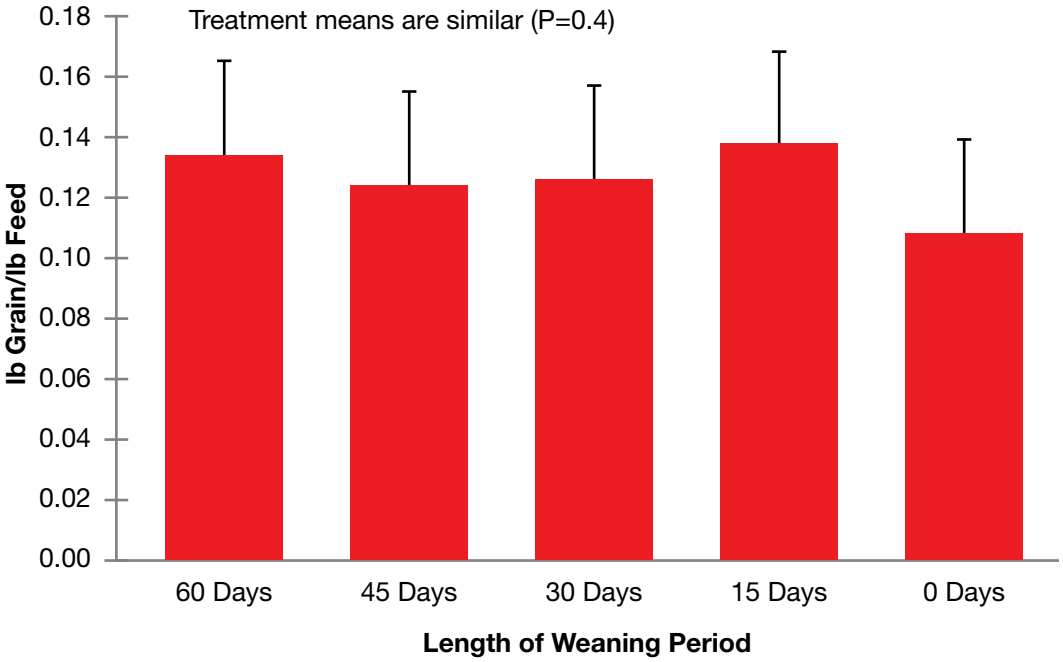

Figure 3. Effect of length of the ranch-of-origin weaning period on growth efficiency of lightweight calves during the first 30 days after feedlot arrival.

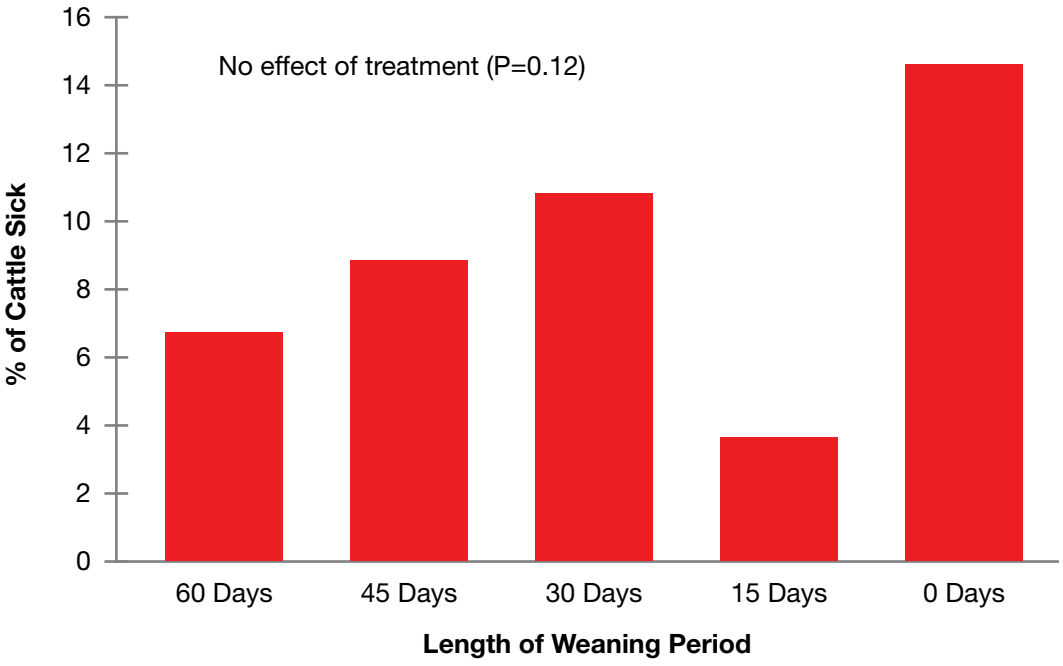

Figure 4. Effect of length of the ranch-of-origin weaning period on incidence of undifferentiated fever in lightweight calves during the first 30 days after feedlot arrival.

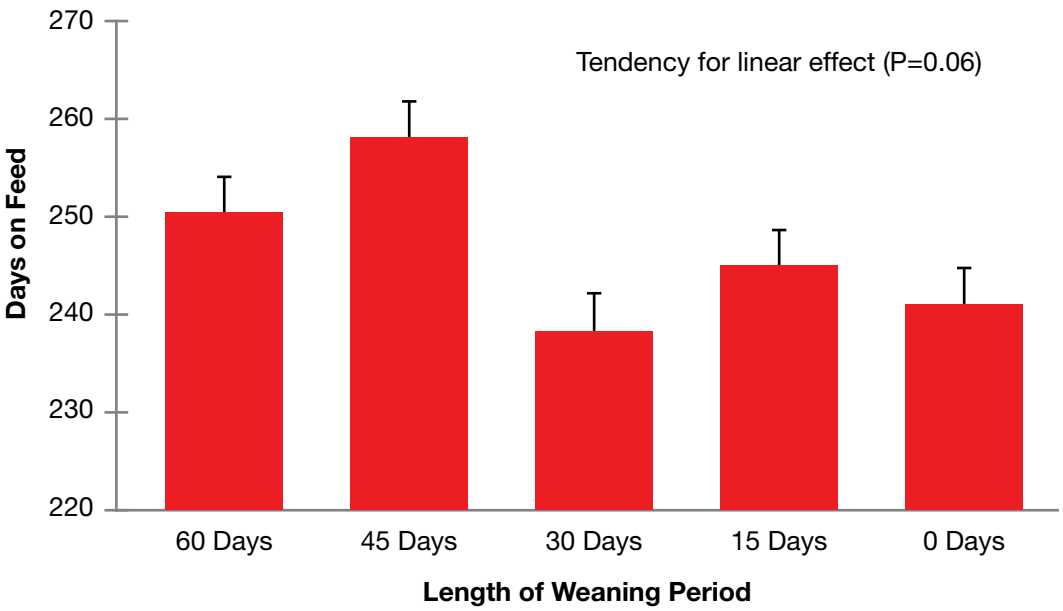

Figure 5. Effect of length of the ranch-of-origin weaning period on days fed from feedlot receiving to harvest.