The Professional Animal Scientist 31 (2015):30–39; http://dx.doi.org/10.15232/pas.2014-01349

Effects of weaning-period length on growth and health of preconditioned, spring-born beef calves originating from the Great Plains. II. Early weaning[1]

E. A. Bailey,*[2] J. R. Jaeger,† PAS, T. B. Schmidt,‡ J. W. Waggoner,† PAS, L. A. Pacheco,* D. U. Thomson,§ and K. C. Olson,* PAS

*Department of Animal Sciences and Industry, Kansas State University, Manhattan 66502;
†Western Kansas Agricultural Research Center, Kansas State University, Hays 67601;
‡Animal Science Department, University of Nebraska–Lincoln 68504; and
§Department of Clinical Sciences, Kansas State University, Manhattan 66502

ABSTRACT

Angus × Hereford calves (n = 409; initial BW = 163 ± 31 kg) were weaned early (~130 d of age) and assigned randomly to treatments that corresponded to a length of time (d) between separation from their dam and transport to a feedlot: 0 (i.e., nonweaned), 15, 30, 45, or 60 d. Weaning date varied by treatment; transport occurred on a common date and at a common age (160 ± 19 d) for all treatments. Calves were vaccinated against common diseases 14 d before maternal separation and again on the day of maternal separation. Calves were transported <20 km to a ranch-of-origin weaning facility following separation from dams and penned according to treatment. Calves were fed a complete diet (16.9% CP, 1.21 Mcal of NE_g/kg) ad libitum. On a common date, all calves were transported 4 h to a commercial auction market and held for 14 h. They were transported subsequently 1 h to a feedlot. Calf BW at transport was not different between weaned and nonweaned calves (P = 0.13) but decreased linearly (P = 0.01) as the length of the ranch-of-origin weaning period increased. Pretransport morbidity increased linearly (P = 0.05) as length of the weaning period increased. Calves not weaned before feedlot placement tended to have lesser (P = 0.08) ADG during receiving than weaned calves; moreover, ADG increased linearly (P = 0.02) as length of the ranch-of-origin weaning period increased. There were no treatment differences (P ≥ 0.24) in morbidity during receiving. In addition, finishing ADG, days on feed, slaughter BW, and carcass characteristics were not different (P ≥ 0.11) between weaned and nonweaned calves. Cow BCS change from 60 d before to 60 d after transport of calves increased linearly (P = 0.01) as weaning-period length increased. Cows with calves assigned to the 0-d pretransport weaning treatment had lesser (P = 0.03) pregnancy rates than cows with calves weaned before transport; moreover, pregnancy rate increased linearly (P = 0.03) with successively earlier weaning dates. Under the conditions of this experiment, ranch-of-origin weaning periods ≥15 d improved ADG of early-weaned calves during feedlot receiving but had minimal effects on health, finishing performance, or carcass characteristics.

Key words: beef calf, health, preconditioning, weaning

INTRODUCTION

Early weaning can be used by cow-calf producers to reduce stocking rates by 20 to 30% during drought (Rasby, 2007). Early-weaned calves may weigh less per day of age than calves weaned at conventional ages; therefore, calf

[1] Contribution no. 14-391-J from the Kansas Agricultural Experiment Station.
[2] Corresponding author: ebailey@wtamu.edu

value may be less, despite positive price slides in their favor (Story et al., 2000). Calves can be retained and grown before selling to avoid revenue shortfalls. Feeding concentrate-based diets to calves less than 125 d of age has been associated with excessive fat accumulation early in the feeding period and decreased carcass weights compared with calves that enter the feedlot after 200 d of age (Schoonmaker et al., 2002). Conversely, growth of early-weaned calves may be more efficient than that of calves weaned at conventional ages (Peterson et al., 1987).

Preconditioning adds calf-crop value through premiums generated at the auction market and through BW gains between weaning and sale (Thrift and Thrift, 2011); however, the effects of preconditioning on early-weaned calves have not been evaluated. Early-weaned calves preconditioned on the ranch of origin may have an immune system more responsive to challenge than preconditioned cohorts weaned at conventional ages (Carroll et al., 2009) or may have lingering protection from maternal antibodies (Powell et al., 2012).

Industry-accepted preconditioning practices were developed for use with calves weaned at conventional ages (Pritchard and Mendez, 1990; McNeil, 2001); moreover, early-weaned calves are typically subject to longer post-weaning growing programs (>80 d) than are required by industry-sponsored preconditioning programs (≤60 d; Arthington et al., 2005; Rasby, 2007). An evaluation of relatively short (≤60 d) preconditioning programs for early-weaned calves would allow beef producers to compare the risks and rewards associated with a lesser investment of time and capital, relative to long-term preconditioning programs. Therefore, the objective of our experiment was to evaluate the effects of the length of the ranch-of-origin preconditioning period on the health and performance of early-weaned beef calves originating, finished, and slaughtered in the Great Plains.

MATERIALS AND METHODS

Experimental Animals

All procedures used in this experiment were approved by the Kansas State University Institutional Animal Care and Use Committee. Angus × Hereford calves (n = 409; initial BW = 163 ± 31 kg) from the Kansas State University Commercial Cow-Calf Unit (**CCU**; source 1) and the Western Kansas Agricultural Research Center–Hays (**WKARC**; source 2) were used in this experiment. Calves were spring born (birth date = March 21 ± 20 d) to dams with an average age of 6 ± 2.7 yr. Calves were allowed to nurse dams and to graze native warm-season pastures before weaning. Bull calves were castrated no less than 30 d before the experiment. Calves were vaccinated for clostridial pathogens (Vision 7 with SPUR; Intervet Inc., Millsboro, DE) at approximately 90 d of age.

Treatments

Calves were stratified by source, sex, age, and dam age and assigned randomly to treatments that corresponded to a length of time (days) between maternal separation from the dam and shipping: 0 (i.e., non-weaned), 15, 30, 45, or 60 d (n = 81 calves per treatment). The average age of calves at the time of maternal separation was 160, 145, 130, 115, and 100 d for calves weaned 0, 15, 30, 45, and 60 d before shipping, respectively. The experiment was initiated on June 15 (75 d before shipping), and the common shipping date for all treatments was August 24. All treatments had similar average age at shipping (i.e., 160 ± 19 d).

All calves received an initial vaccination for infectious bovine rhinotracheitis, bovine viral diarrhea, parainfluenza 3, and bovine respiratory syncytial virus (Bovi-Shield Gold 5, Pfizer Animal Health, Exton, PA) and a vaccination for clostridial pathogens (Vision 7 with SPUR, Intervet Inc.) 14 d before maternal separation. On the day of maternal separation, calves were immediately transported a short distance (<20 km) to preconditioning facilities on their respective ranches of origin, where they were weighed upon arrival. Calves were revaccinated for infectious bovine rhinotracheitis, bovine viral diarrhea, parainfluenza 3, bovine respiratory syncytial virus, and clostridial diseases; additionally, calves were treated for internal and external parasites (Dectomax Pour-on; Pfizer Animal Health). All vaccinations and parasite treatments were administered according to manufacturer recommendations.

Calf Management

After maternal separation, calves were maintained in 5 × 12 m earth-floor pens (4 pens per treatment per location; 10 or 11 calves per pen) at their respective ranch-of-origin preconditioning facilities. The length of time spent at the preconditioning facility (i.e., the weaning period) was dependent upon the treatment assigned. Each pen supplied approximately 6 m^2 of earth floor and 0.47 m of linear bunk space per animal. Drinking water was supplied via open-topped tanks (CCU) or automatic waters (WKARC). Because calves were weaned in the summer, 2 shade cloths (1 × 8 m each) were supplied for each pen as a heat-stress-mitigation protocol. When daytime temperatures exceeded 35°C, calves were sprinkled with water for 15 min at 3-h intervals. We did not record the number of times calves were sprinkled with water. However, according to data from the National Climatic Data Center (NOAA, 2014), there were 31 d above 35°C at Hays and 27 d above 35°C at Manhattan during the preconditioning phase of the experiment.

Calves from both sources were fed a common preconditioning diet formulated to achieve an ADG of 1.0 kg at a DMI of 2.5% of BW (Table 1). A feeding-management program described previously (Olson et al., 2007) was used to adapt calves to the preconditioning diet. Calves were fed