The Professional Animal Scientist 24 (2008):29–34

Effects of Early Weaning on Cow Performance, Grazing Behavior, and Winter Feed Costs in the Intermountain West[1]

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ABSTRACT

The objective of this study was to determine the influence of early weaning (EW; approximately 130 d of age) and traditional weaning (TW; approximately 205 d of age) on cow performance, grazing behavior, and winter feed costs in a 2-yr study. Each year, 156 cow-calf pairs were stratified by calf sex, BCS, and age and assigned randomly to 1 of 2 treatments and 1 of 3 pastures. Two cows from each treatment and pasture were fitted with global positioning system collars each year to evaluate grazing behavior. After TW, EW and TW cows were separated and allotted to 1 of 6 pastures based on previous blocking criteria for winter feeding. Cows were fed to attain a similar BCS by 1 mo prior to parturition. Traditional-weaned cows lost 0.8 BCS units and 40 kg BW whereas the EW cows gained 0.1 BCS units and 8 kg BW from EW to TW ($P < 0.01$). After winter feeding (111 ± 0.4 d), there was no difference between EW and TW cow BCS ($P = 0.52$). Winter feed costs were $29 greater ($P < 0.01$) per cow for TW compared with EW. Grazing time, distance traveled, and number of visits to water were unaffected ($P > 0.10$) by treatment. However, pasture distribution by EW cows tended to be greater than that of TW cows ($P = 0.08$). Results indicate that EW improved cow BCS entering the winter feeding period, thereby decreasing winter feed costs. Cow grazing behavior was minimally affected by weaning treatment.

Key words: cow, economics, grazing behavior, management, weaning

INTRODUCTION

Economic pressures to improve production efficiency have prompted the beef cattle industry and researchers to evaluate various production systems (Myers et al., 1999). As rangeland herbage cures and temperature increases in late summer, forage quality declines rapidly and generally stays low through autumn and winter, creating an extended period when nutritional quality may limit production (Adams and Short, 1988). In addition, forage intake by nursing calves increases as lactation declines and subsequently applies pressure on a declining standing crop (Fox et al., 1988). Research has shown that it can be economical to early wean spring-born calves compared with leaving calves alongside their dams on sagebrush-bunchgrass range until mid-October (Wallace and Raleigh, 1961). Also, early weaning has been reported to improve BCS and decrease forage intake in beef cows (Rosiere et al., 1980; Peterson et al., 1987; Arthington and Minton, 2004). Other potential benefits of early weaning include 1) decreased total number of animal units on pasture, thereby extending the number of days cows can graze without supplemental feeding, and 2) dry-gestating cows may disperse more and be better distributed over the grazing area than lactating cows (Bailey, 2004).

Annual winter feed costs in the Intermountain West often total $100 to $200 per cow, representing a significant economic hardship for cow-calf producers. Winter feed costs normally include harvested forage and supplement necessary to sustain, or increase, cow BCS prior to calving. This is often necessary to optimize conception rate and maintain a 365-d calving interval (Herd and Sprott, 1986). In addition, the primary index of nu-

[1]The Eastern Oregon Agricultural Research Center, including the Burns and Union Stations, is jointly funded by the Oregon Agricultural Experiment Station and USDA-Agriculture Research Service. Mention of trade or proprietary names is for information only and does not convey endorsement of one product over another.

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tritional status, and greatest influence on reproductive potential and feeding flexibility over the winter months, is cow BCS (Short et al., 1996). Consequently, the ability to compete with other regions of the United States often depends on how effectively cow-calf producers in the Intermountain West can reduce winter feed costs while maintaining acceptable levels of performance. Therefore, the objective of this study was to compare the effects of early weaning (**EW**) and traditional weaning (**TW**) on cow performance, grazing behavior, and subsequent winter feed costs.

MATERIALS AND METHODS

Experimental Sites

Grazing research was conducted in 2004 and 2005 using three 810-ha pastures at the Northern Great Basin Experimental Range (**NGBER**), 72 km west-southwest of Burns, OR. Vegetation was sagebrush-bunchgrass range that has been described previously (Ganskopp, 2001).

Available standing crop in each rangeland pasture was measured at the beginning and conclusion of the grazing period (75 d) each year by clipping 20 randomly placed 1-m^2 quadrats in each pasture (randomized from pasture Universal Transverse Mercator coordinates). Clipped herbage was dried in a forced-air oven at 55°C for 48 h and weighed for determination of standing crop. Both years, winter feeding of cows was conducted at the Eastern Oregon Agricultural Research Center (**EOARC**), 6 km south of Burns, OR, in six 25-ha native flood meadow pastures that had been harvested for hay the previous summer.

Experimental Design

Each year 156 spring-calving Angus × Hereford cows (78 with steer calves and 78 with heifer calves; cow age 6 ± 0.1 yr) were used. The experimental design was a randomized complete block and protocol was approved by the Institutional Animal Care and Use Committee at Oregon State University. The study was initiated on August 2, 2004, and August 3, 2005, and concluded February 15, 2005, and February 10, 2006 (approximately 1 mo prior to calving) for yr 1 and 2, respectively. One wk prior to EW, all cows were stratified by calf sex, BCS, and age and assigned randomly to 1 of 2 weaning treatments and 1 of 3 pastures. Both weaning treatments were then managed in a common pasture at the NGBER as a single group until the date of EW. Early-weaned calves (39 steers/yr; 39 heifers/yr) were 130 ± 1 d of age at EW (early August of each year) and TW calves (39 steers/yr; 39 heifers/yr) were 207 ± 1 d of age at weaning (late October of each year). Calves averaged 175 ± 4 kg when the study began (August of each year). All cows were weighed and evaluated for BCS following an overnight shrink (16 h) at EW and TW. Calves were also weighed at EW and TW. The EW cows and TW cow-calf pairs were maintained in 2 separate pastures for 7 d after EW to allow the EW cows to "disconnect" from their calves prior to mixing with the TW cow-calf pairs.

The EW cows and TW calves and cows were placed in their respective pastures at the NGBER approximately 7 d after EW. In 2004 and 2005, each pasture had 26 EW cows and 26 TW cow-calf pairs. Water and mineral and salt placements within each pasture were maintained in the same location throughout the experiment. A mineral-salt mix (7.3% Ca, 7.2% P, 27.8% Na, 23.1% Cl, 1.5% K, 1.7 % Mg, 0.5% S, 2,307 ppm Mn, 3,034 ppm Fe, 1,340 ppm Cu, 3,202 ppm Zn, 32 ppm Co, 78 ppm I, 85 ppm Se, 79 IU/kg vitamin E, and 397 kIU/kg vitamin A) was available ad libitum.

Six cows from each treatment each year (2 cows/pasture per treatment each year) were fitted with global positioning system (**GPS**) collars (Lotek GPS_2200; Lotek, Newmarket, Ontario, Canada) to obtain data related to grazing behavior. Collars were equipped with head forward-backward and left-right movement sensors, a temperature sensor, and a GPS unit. The collars were programmed to record positions at 5-min intervals for three 7-d periods evenly distributed between EW and TW dates each year to estimate grazing time (h/d), distance traveled (m/d), frequency of visits to water (visits/wk), maximum distance from water (m/d), and cow distribution (percentage of ha occupied/pasture per wk). Collar data were retrieved after each 7-d period, downloaded to a computer, and converted from latitude and longitude to Universal Transverse Mercator as described by Ganskopp (2001). To verify cow activity determinations from collar data, each collared cow was continuously observed for 8 to 12 daylight hours. Activities monitored included grazing, resting (standing or lying down), and walking. Each activity was assumed mutually exclusive, and although cattle walk while foraging, such events were classified as grazing as long as the cow was harvesting herbage. Activity durations were tallied on paper at a 1-min resolution. When a cow switched from one activity to another, the precise transition time was noted. If the activity persisted for ≥ 30 s, the start time was recorded. If the prior activity resumed in < 30 s, the interlude was ignored. Data were compiled as the total number of minutes a cow participated in each activity during each 5-min interval. Prediction models for estimating grazing time were developed via forward stepwise regression analysis for each cow (S-Plus 2000, Mathsoft Inc., Seattle, WA). The dependent variable was grazing time (min/5-min interval) and the independent variables from GPS collar data included head forward-backward and left-right movement sensor counts, sum of forward-backward and left-right movement counts, ambient temperature, and the distance traveled (m) by the cow within each 5-min interval. Distance traveled (used for predicting grazing time and distance traveled/d) was likely underestimated because