THE EFFECTS OF GRAZING SYSTEM AND EARLY WEANING ON PRODUCTIVITY OF FALL CALVING COWS IN OKLAHOMA

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Story in Brief

Eighty-two fall calving cows were allotted on July 20, 1994 in a 2 x 2 factorial arrangement of treatments to: two grazing systems (continuous, CONT, or rotational, ROTATE), two weaning treatments (normal weaning, NW, or early weaning at 60 days, EW). Cows on the NW weaning treatment received 1 lb of 41% protein supplement daily beginning October 1, 2 lb daily beginning November 1, and 3 lb daily beginning December 1. Cattle on the EW treatment received .25 lb of 41% CP cube fed every other day to gather and observe the cows. Early weaned cows were weaned November 29, 1994, the beginning of the 60-day breeding season. Early weaned calves grazed wheat pasture until May. Calves on the NW treatment received a salt-limited 12% protein creep beginning December 4, 1994. There was no grazing treatment x weaning treatment interaction. Body weight and condition at the time of weaning was numerically lower for EW and ROTATE treatments compared with NW and CON (1134 lb, 5.8 and 1128 lb, 5.5 vs 1171, 6.2 and 1177 lb and 6.05). By the end of breeding season EW and ROTATE treatments tended to be lighter and thinner than NW and CONT treatments (989, 4.84 and 1006, 5.07 vs 1052, 5.41 and 1035, 5.18). At a normal 205 day weaning weight EW cows were numerically heavier and had better body condition than the NW cows (1129 lb, 5.1 vs 1045, 4.78). There was no effect of grazing system on cow weights or body condition scores during the weaning periods. Average weight of calves at the time of early weaning (214 lb) was similar between treatments. Calves that were early weaned were numerically lighter at a 205 day weight (468 vs 479 lb). However, by July NW calves were significantly heavier compared with EW calves (490 vs 609 lb). Clipping data (October and April) revealed only numeric decreases in standing crop when comparing NW and CONT to EW and ROTATE treatments. Overall weaning treatment and grazing system significantly affected cow productivity.

(Key Words: Fall Calving, Beef Cows, Grazing System, Early Weaning.)

Introduction

The largest costs in maintaining a cow are generally the land required per animal unit year (AUY) and feed inputs. Use of early weaning may impact this

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bottom line by allowing increased stocking rates and decreased supplementation cost through the winter. One of the problems facing this type of system is the management of the light weight calf in terms of acceptable gains. Fall calving in the state of Oklahoma provides a unique situation in that high quality winter wheat may give alternative feed resources for the early weaned calf. The objectives of the current study were to evaluate the use of different weaning regimens and grazing systems on performance of fall calving cows and their calves, and on efficiency of utilization of forage resources.

Materials and Methods

Experimental Treatments. Eighty-two multi- and primaparous cows were randomly assigned on July 20, 1994 by weight, body condition score (BCS), and age in a 2 x 2 factorial arrangement of treatments. Additionally, all treatments were replicated within a year to detect pasture differences. Treatments were: grazing system; continuous (CONT), rotational grazing (ROTATE) and weaning treatment, normal wean, 205 day of age (NW) and early wean at approximately 70 days of age (EW).

Stocking Density and Grazing System. Stocking density was set at a constant seven acres per AUY. Traditional stocking density of 10 acres per AUY is considered a moderate stocking in Payne County, Oklahoma. Treatments were managed separately with approximately 80 acres per treatment (Figure 1). Rotation treatment cattle were moved through a four paddock system with a minimum rest of 28 days per pasture. Continuous grazing systems had full access to their land area at all times. The only exceptions were during the breeding season, November 29, 1994 through January 30, 1995. Cattle within weaning treatment were mixed and allowed access to paddocks within replication to facilitate the use of four bulls. Bulls were rotated between treatments every seven days to allow equal days for each bull to be with combined treatments. Grazing days were calculated and animals were rotated between replication pastures so that equal utilization in terms of animal unit days (AUD) would be realized. Following the end of the breeding season all cattle were sorted and placed back into their appropriate grazing cells.

Management and Feeding of Cows. Winter supplementation began October 1, 1994 with NW cows receiving 1 lb of a 41% protein supplement (cottonseed meal) prorated for a 3-day/week feeding. Supplement rate was increased to 2 lb daily in November and again in December to 3 lb daily for NW cows. Supplement was reduced March 1 to 2 lb daily and remained at that rate through the end of supplementation April 18, 1995. Early weaned cows were fed .25 lb daily October 1 through April 18, 1995, 3 days a week. This was used not directly used as a supplement, but rather for gathering and checking individual EW treatments. Hay was fed to cattle in all treatments for 8 days during an extremely cold and wet period March 1 through 8, 1995. This was the only supplemental forage utilized during the trial.

Calf Management. Calves were managed similarly until early weaning. All calves were implanted with Calfoid[1] at the time of early weaning. Early weaned calves were then moved 5 miles to drylot pens and received for 10 days prior to the initiation of wheat pasture grazing. Exact handling and processing of the calves are reported in Purvis et al. (1996). All calves received a second implant[2] approximately 90 days after the initial implant. Calves remained on wheat pasture through May 10, 1995. Calves were moved to native range and supplemented 1 lb of a 41% protein supplement (cottonseed meal) fed daily through July 10, 1995.

Cows had free access to trace mineral salt and water (exception below) throughout the trial. All cow weights were taken after a 15-hr shrink without feed and water. Additionally, BCS were calculated as the average of two independent evaluators. Weights of NW and EW calves were considered shrunk even though they remained with their dams during the shrinking period at the time of early weaning. The 205-day weaning weights reported herein were calculated with the NW calves being shrunk with their mothers, and the EW calves with an overnight shrink. Ending weights (July 9, 1995) for EW and NW calves are reported with a 15-hour shrink without feed or water.

Dry Matter Disappearance. Total standing crop at the initiation of the dormant period (October) and spring (March) growing season were determined. Forty
.1 M^2 plots were clipped, dried, and weighed to estimate forage removal over the winter dormancy.

Statistical Analysis. Data were analyzed with General Linear Model Procedures of SAS (1985) as a 2 x 2 factorial with replications. There was no wean treatment x grazing treatment interaction, therefore only main effects are reported. Means were separated utilizing paired *t*-test.

Results and Discussion

Effects of Grazing System on Cow Performance. Initial weights and condition scores (July, 20, 1994) did not differ between grazing treatments (Table 1). Prior to calving ROTATE cows tended (P=.12) to weigh less (1357 vs 1192 lb), and were thinner (5.8 vs 6.7; P=.07) than CONT. This may be

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[1]Ivy Laboratories, Kansas City, KS.
[2] Synovex-C,Syntex, Des Moines, IA.

attributed to reduced selection of diet quality available in rotational grazing situations (Heitschmidt et al., 1986). At the time of early weaning and the initiation of the breeding season (November 29, 1994) ROTATE cows were thinner (P=.12) and had less (P=.07) condition score than CONT cows (1128 lb, 5.5 vs 1177 lb, 6.05). It is doubtful that reproduction would be impaired since the mean BCS of ROTATE cows was well above a BCS of 5. Research has indicated that a minimal BCS of 5 is required to assure that body composition will not hinder the post partum return to estrus (Short et al., 1990). Following the end of breeding no differences were detected in the weight or condition scores between ROTATE and CONT cows (1006 lb, 5.1 vs 1035 lb, 5.2). During the mid-winter (March 15, 1995) weight taken, CONT cattle tended (P=.12) to be heavier and had greater BCS (P=.13) than ROTATE cows (920 lb, 4.7 vs 950 lb 5.01). Weight or condition scores at a common 205-day weaning or late weaning (July 10, 1995) did not differ (P>.20) between grazing systems.

Effects of Weaning Treatment on Cow Performance. There was no difference (P=.83) in initial (July 20, 1994) weight or BCS between weaning treatments (Table 2). Precalving weight and condition score (August, 1994) did not differ at the initiation of the calving season (EW; 1305 lb, 6.3 vs NW 1243 lb, 6.26; P>.20). However, at the time of early weaning and the initiation of breeding EW cows tended (P=.14) to be thinner than NW (5.6 vs 6.2). However, cow body weight at the time of early weaning did not differ (P>.20). At the end of the breeding season EW cows were thinner than NW cows (4.8 vs 5.4; P=.07) and tended (P=.19) to weigh less (989 vs 1052 lb). This was not unexpected since EW cows were not supplemented during the winter months. During the mid-winter weight period EW cows were thinner (4.0 vs 4.9; P=.08) and lighter (903 vs 1010 lb; P=.10) compared with NW cows. Body weight at 205 day weaning and July weaning did not differ between treatments.

Dry Matter Disappearance. There was no significant difference in dry matter disappearance between weaning treatments. However, ROTATE pasture tended (P=.17) to have less disappearance than CONT (Figure 2).

Calf Data. Neither grazing treatment nor weaning treatment affected birth weight or weight at early weaning (P>.84) (Table 3). Purvis et al. (1995) reported that spring calving cows on a similar nutritional regimen produced calves with decreased birth weight, probably due to the restriction in nutrients in relation to the last trimester of pregnancy. Performance of the light weight early weaned calf must be similar to NW calf for this system to be viable. Performance of NW grazing wheat pasture is discussed in Purvis et al. (1996). The management of the light weight calf in terms of immune function needs futher consideration. Early weaned calves experienced a 10% mortality and

32% morbidity. Three calves died of respiratory problems, with one death related to bloat.

Early weaned calves were numerically (P=.19) lighter than NW calves at a 205 day weaning weight (468 vs 479 lb). However, at the time of weaning in July NW calves were heavier (P<.01) than EW calves (609 vs 490 lb). Gains for the 60 day period from May to July were about .34 lb/day for EW and 2.1 lb/day for NW calves. This may be related to the drastic change in diet quality in the early weaned calves when they were moved from wheat pasture to native range and to the increased nutrients intake through milk from EW calves.

The use of early weaning in fall calving cows can be an alternative management practice in the state of Oklahoma. There appears to be little interaction in grazing system and weaning treatment. However, both affected the overall performance of the cows especially during the winter months. The biggest concern with this type of system is the management of the light weight calf. High mortality and morbidity was observed in this study, and would be economically detrimental for the application of such a system. The observation that calves were similar in weight at a 205-day weight but different at a later weaning in July may warrant different marketing plans. Overall, cow performance can be modified and still retain adequate rebreeding rates. The management of the light weight calf in terms of immune function and time of marketing should be considered when looking at this system as a option for alternative cow-calf management.

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Table 1. The effects of grazing system on fall cow performance.

Item	Continuous	Rotate	P-value
Initial weight (7/20/94)	1288	1270	.62
Initial BCS[1]	6.7	6.5	.21
Precalving weight (9/26/94)	1357	1192	.12
Precalving BCS	6.7	5.8	.07
Weight at early weaning (11/29/94)	1177	1128	.26
BCS at early weaning	6.05	5.5	.09
Calf weight at early weaning	198	217	.11
End of breeding weight (1/30/95)	1035	1006	.51
End of breeding BCS	5.18	5.07	.12
Late winter weight (3/15/95)	950	920	.12
BCS at late winter weight	5.01	4.5	.13
Weight 205 day weaning (5/10/95)	1077	1097	.65
BCS at 205 day weaning	5.15	4.94	.21
Weight at July weaning weight (7/10/95)	1281	1210	.27
BCS at July weaning	5.5	5.29	.23
Calving rate, %	91	90	.91

[1] Body condition score = BCS.

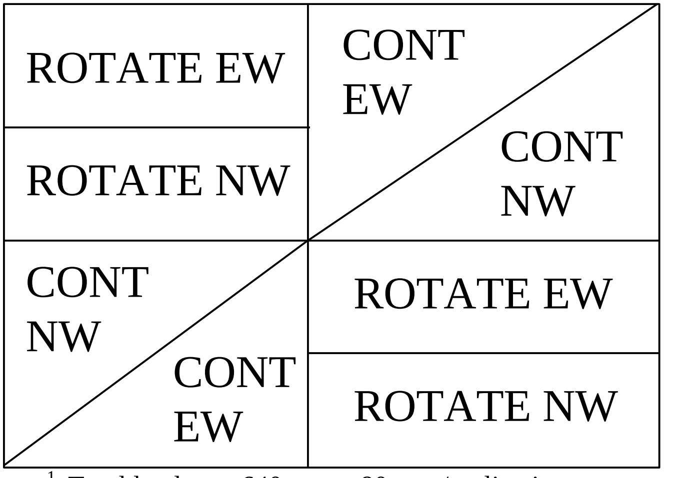
Table 2. The effects of weaning treatment on fall cow performance.

Item	Early wean	Normal wean	P-value
Initial weight (7/20/94)	1275	1283	.83
Initial BCS[1]	6.49	6.69	.23
Precalving weight (9/26/94)	1305	1243	.48
Precalving BCS	6.31	6.26	.89
Weight at early weaning (11/29/94)	1134	1171	.38
BCS at early weaning	5.8	6.2	.16
Calf weight at early weaning	222	217	.79
End of breeding weight (1/30/95)	989	1052	.19
End of breeding BCS	4.84	5.41	.07
Late winter weight (3/15/95)	900	995	.13
BCS at late winter weight	4.4	5.11	.08
Weight 205 day weaning (5/10/95)	1129	1045	.14
BCS at 205 day weaning	5.1	4.78	.07
Weight at July weaning weight (7/10/95)	1279	1212	.29
BCS at July weaning	5.58	5.25	.18
Calving rate, %	88	93	.84

[1] Body condition score = BCS.

Table 3. The effects of weaning treatment on calf weight gains.

Item	Early wean	Normal wean	P-value
Birth weight	84	85	.84
Weight at early weaning (11/29/94)	222	217	.79
Weight at 205 weaning (5/10/95)	468	479	.19
Weight at July weaning (7/10/95)	490	609	.0001



[1] Total land area 640 acres, 80 acre/replication.
ROTATE = rotational grazing; CONT = continuous grazing;
NW = Normal Weaning; EW = Early weaning.

Figure 1. Factorial design and replication within year.[1]

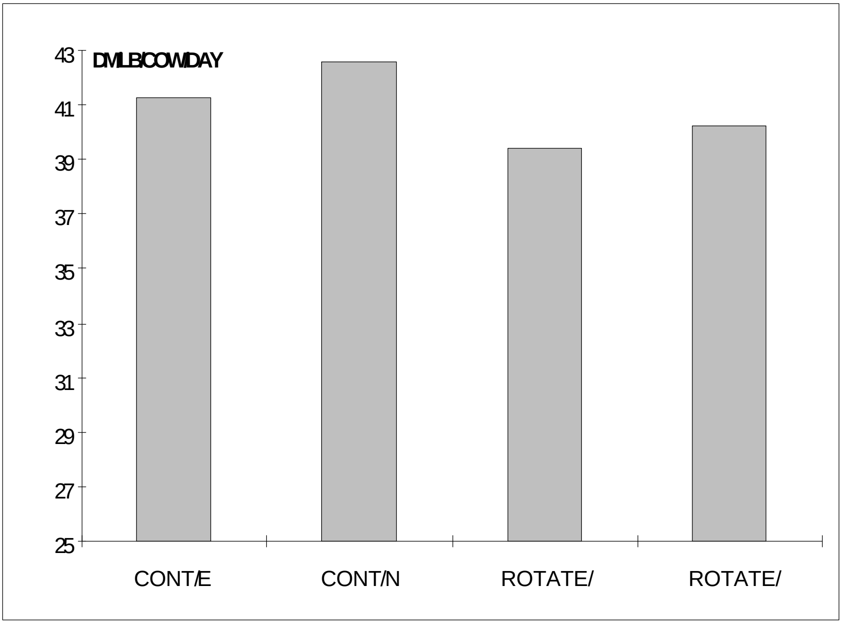


Figure 2. Dry matter disappearance per cow following 164 d winter grazing period.