RESPONSE OF POSTPARTUM COWS TO INCREASED DIETARY ENERGY AND PROTEIN AND SHORT TERM CALF SEPARATION

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Story in Brief

Forty-five Hereford cows that calved during February and March were used to determine the effects of diet and calf separation on body weight changes and reproductive performance. Half of the cows (flushed) were fed, as a group, an additional 10 lb of a 20% crude protein supplement daily for 28 days, starting an average of 30 days after calving. Calves were separated from half of the flushed and half of the non-flushed cows for 48 hr at 14 and 28 d after the beginning of flushing. Breeding started at the first calf separation. Body weight increase was greater for flushed cows from the start of feeding until the end of breeding. Calf growth was reduced during the 6 weeks after the first calf separation but weaning weights were similar for separated and non-separated calves. Flushing of cows increased weaning weights. Calf separation and flushing did not alter the percentage of cows in estrus or the percentage of cows conceiving during the breeding season but the interval to the onset of ovarian activity was reduced.

Introduction

Many range cows have undesirably long intervals from calving to the first estrus and reproductive performance is frequently reduced. Low energy intake following calving delays the onset of estrus. The response of postpartum cows to increased energy intake appears to be dependent on prepartum energy level and body condition of the cow at calving. A second factor that regulates the length of the postpartum anestrous interval is suckling. Cows that are suckled have a longer interval from parturition to first estrus than cows that have had the calves weaned. Increasing the suckling intensity increases the length of the anestrous interval and the effect is independent of nutrition.

Numerous studies have suggested that short term calf separation, once daily suckling or feeding a high energy diet may be helpful in reducing the interval from calving to the first postpartum estrus and conception. The response to decreasing the suckling intensity and feeding high energy, or flushing, postpartum cows may be influenced by many factors such as breed of cow, breed of calf, prepartum nutrition and body condition. For these reasons, participants in the Southern Regional Reproduction Project, S-137, designed an experiment to determine the influence of short term calf separation and flushing on reproductive performance and calf growth. The experiment was conducted at research stations in six southern states. The results from the Oklahoma replicate of this experiment are summarized in this report and these results will be compared with the responses at other states.

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Materials and Methods

Forty-five Hereford cows that were maintained on tallgrass native range and calved during February and March 1982 were used in this study. All cows calved during a 60-day period. Body condition score (BCS) was assessed independently by two individuals with a score of (1) indicating an emaciated cow and (9) indicating an extremely fat cow. The cows were fed during gestation so that they were in good to moderate body condition (BCS = 5) during the last 45 days of pregnancy. Cows were blocked in groups of four, based on calving date, and one cow in each block was assigned to each of four treatments. The two factors studied in a 2 x 2 design were postpartum flushing (10 lb of a 20% CP supplement daily) and 48 hr calf separation. Cows were flushed for 4-weeks starting when the first cow was about 60 days postpartum and the last cow just calved. The 10 lb of feed was fed in addition to the amount of supplement normally fed control cows (4 lb of cotton seed meal per day). Calves were separated from cows for 2 days at 14 and 28 days after the beginning of flushing. Reproductive performance was determined after 56 and 97 days of breeding by natural service. Breeding commenced at the beginning of the first calf separation. Sterile bulls with chin ball markers were used to detect cows in estrus before the beginning of the breeding period.

Body weight and BCS of cows were determined at 2-week intervals from 6 weeks before calving until the end of the breeding period. Progesterone was quantified in plasma samples obtained at weekly intervals during the 56-day breeding period to assess ovarian activity.

Results

Average body weight of the cows on all treatments in late gestation was 925 lb. Cows were in the desired body condition just prior to calving and BCS averaged 5.1. We chose to have cows at a body condition score of 5 at calving since cows at that body condition would normally have slightly extended postpartum anestrous intervals and should be a good type of cow to determine the effects of calf separation and flushing on reproductive performance.

The influence of calf separation on weight of the cows is summarized in Table 1. On 4-13 (beginning of the 4-week flushing treatment) cows were between 1 and 60 days postpartum and weight averaged 826 lb. As would be expected, all cows gained weight during the postpartum period. There was a significant Sep x Flush x Period interaction. On 5-11 body weights had increased about 8% for the control, flushed and flushed + separated cows but only 4% for the separated cows. By the end of the breeding season on 6-22, the control, flushed and flushed + separated cows had gained 22% of the pretreatment weight and separated cows had only gained 18%.

Table 1. Influence of calf separation and flushing on body weight (lb) of cows

Treatment	Date		
	4-13	5-11	6-22
	Flush		
Control	802	870	980
Flushed	802	815	976
Separated	844	874	998
Flushed & Separated	857	932	1042

Sep x Flush x Period (P<.03)

The body weight increases during the postpartum period were reflected in the BCS. BCS was not influenced by flushing or calf separation but there was a significant period effect. BCS averaged 5.1 at the beginning of the flushing period and increased to 5.6 at the end of the breeding season.

Treatment did not significantly influence the percentage of cows in estrus during the breeding season (Table 2). However there was a tendency for more of the flushed + separated cows to exhibit estrus. Eighty-two percent of the flushed + separated cows exhibited estrus compared to an average of 65% for the other three treatments. Treatment did not significantly influence the percentage of cows that conceived during either 56 or 97 days of breeding. About 50% of the cows were pregnant after the 56-day breeding period. At the end of the 56-day period, cows were between 70 and 130 days postpartum. After 97 days of breeding more than 90% of the cows were pregnant on 3 of the 4 treatments. This experiment had insufficient numbers of cows to determine the effects of flushing and calf separation on the percentages of cows exhibiting estrus and conceiving. However, when these data were analyzed along with the replicates conducted at experiment stations at five other southern states, it can be concluded that flushing and calf separation does not significantly influence the percentage of cows in thin to moderate body condition that are in estrus and conceiving during the breeding season.

Table 2. Influence of calf separation and flushing on reproductive performance of Hereford cows

	Treatment			
Criteria	Control	Flushed	Separated	Flushed & Separated
Cows (No)	12	11	11	11
Estrus during the 56 day breeding season (%)	67	54	73	82
Pregnant Cows				
After 56 days of breeding (%)	50	36	54	64
After 97 days of breeding (%)	92	82	91	91
Ovarian activity during the breeding season[a] (%)	33	33	54	54
Onset of ovarian activity[b] (wk)	6.8	7.0	7.3	2.3

[a] Plasma progesterone greater than 1 ng/ml for two weeks in succession followed by typical cyclic or pregnant concentrations.

[b] Separation x Flushed ($P<.01$).

Cows were bled weekly during the 8-week breeding season. The onset of ovarian activity was determined by plasma concentrations of progesterone greater than 1 ng/ml for two weeks in succession followed by typical cyclic or pregnant concentrations. The percentage of cows with ovarian activity during the breeding season was not significantly influenced by treatment (Table 2). However, 54% of the cows on the separated treatments had ovarian activity during the breeding season whereas only 33% of the cows that were constantly with their calves had ovarian activity. There was a significant separation x flushed ($P<.01$)

interaction on the number of weeks to the onset of ovarian activity. Ovarian activity commenced about 7 weeks after the start of flushing in the control, flushed and separated cow. However, ovarian activity was initiated 2.3 weeks after the start of flushing in the flushed and separated cows. These results indicate that both increased nutrients and a decreased suckling stimulus may be necessary to initiate earlier ovarian activity in some postpartum cows.

Calves were weighed at the first calf separation after cows were flushed for two weeks, at the second separation, at the end of the 56-day breeding season and at weaning. There were significant sep x flush ($P<.01$) and Sep x period ($P<.0001$) interactions (Table 3). At the end of the flush period, calves on the flushed cows were the heaviest. Calves from the flushed cows weighed 198 lb compared to 181 lb for calves on the flushed + separated treatment. At the end of the breeding season, calves from the flushed cows were still heavier than those on the other treatments. Calves on the flushed treatment gained 110 lb between 4-27 and 6-22, whereas, other calves gained 88 lb. Non-separated calves gained more during the 8-week period than separated calves. If calves were separated from flushed cows twice for 2 days each time the influence of flushing on calf weight was greatly reduced.

Table 3. Influence of calf separation and flushing on calf weight (lb)

Treatment	Date			
	4-27	5-11	6-22	Weaning
	——Flush——			
Control	136	165	229	366
Flushed	163	198	273	434
Separated	154	178	240	392
Flushed & Separated	150	181	240	403

Sep x Flush ($P<.07$); Sep x Period ($P<.0001$)

There was a significant sep x flush ($P<.08$) interaction on non-adjusted weaning weights. Flushing resulted in increased weaning weights but the influence of flushing was reduced if calves were separated from the cows. Weights were not reduced by separation of cows and calves. Separated calves weighed 392 lb compared to 366 lb for controls. Weaning weights were increased by 68 lb over controls by flushing cows. This increased gain is probably related to increased milk production of the cow.

Flushing of cows resulted in increased weaning weights and calf separation did not influence weaning weights. Neither flushing nor separation increased estrus or conception rates. These data are in agreement with the results from five other experiment stations that cooperated on Southern Regional Project S-137. In general flushing may increase weaning weights of calves but conception rates and days postpartum to conception for cows in thin to moderate body condition are not influenced by calf separation or flushing.