

THE INFLUENCE OF POSTPARTUM NUTRITION AND WEANING AGE OF CALVES
ON COW BODY CONDITION, ESTRUS, CONCEPTION RATE AND CALF
PERFORMANCE OF FALL-CALVING BEEF COWS

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Story in Brief

Data from a four-year study were collected on 104 fall-calving beef cows, ranging from 2-8 years of age, to determine the influence of postpartum nutrition on cow and calf performance. The cows were fed either a Moderate (5 lb cottonseed meal/hd/day) or a Low (no supplemental protein) level of nutrition from calving (October 1) to the start of the breeding season (January 1). All cows were fed the Moderate level from the start of the 63 day breeding season until warm season grasses began to grow (April 30).

Moderate cows lost less body weight and were able to remain in acceptable body condition to the start of the breeding season. As a result, Moderate cows had a 4.7 percent higher return to estrus (97.7 vs 93.0 percent), exhibited postpartum estrus 15 days earlier (52.1 vs 67.1 days) and had a 14.9 percent higher conception rate (94.9 vs 80.0 percent) than Low cows. The added supplement provided Moderate cows from calving to the start of the breeding season amounted to \$56.00 per cow.

Calves nursing Moderate cows to 210 days were 15 lb heavier than calves nursing Low cows (631 vs 612 lb). The additional weight was insufficient to compensate for the greater supplement costs unless pounds of calf weaned per cow exposed to the bull were considered.

Weaning and selling calves at 9-10 months of age rather than 7 months resulted in 199 lb additional selling weight or \$77.09 per calf. Calves remaining on their dams for 285 days were 66 lb heavier and \$42.24 more valuable than calves weaned at 210 days and run as stockers on native pasture for 75 days. Cows weaning calves at 285 days were lighter in weight and thinner in condition at 285 days postpartum than cows weaning their calves at 210 days; however, body condition was still acceptable.

(Key Words: Postpartum Nutrition, Estrus, Conception, Weaning Age, Fall-Calving)

Introduction

Two of the most important traits in any cow-calf operation are the reproductive performance of the cows and the weaning weights of their calves. Since these traits are the keys to profitability, cows and calves must be managed to optimize these economically important traits. Previous research has shown that the level of nutrition prior to calving primarily influences when a cow will return to estrus, while postpartum

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nutrition primarily influences conception rate. As a result of summer grazing, fall-calving cows are typically in better nutritional condition prior to calving than spring-calving cows. However, if available forage is low and inadequate winter supplementation is provided, the postpartum nutritional level of fall-calving cows may be quite low. Little is known about the combined effects of condition at calving and postpartum nutritional level on the reproductive performance of fall-calving cows, especially when the availability and quality of forage is decreased. While it may be possible to increase weaning weights of calves by extending the suckling period to 9-10 months, the effect on cow condition and reproductive performance is not clearly understood.

The purpose of this study was to determine the influence of level of nutrition from calving to breeding and weaning age of calves on cow body weight, cow body condition, postpartum interval to first estrus, conception rate and calf performance of fall-calving beef cows.

Materials and Methods

Data from a four-year study were collected on 104 fall-calving Angus x Hereford cows, ranging in age from 2 to 8 years, at the Southwestern Livestock and Forage Research Station. The forage on the research station, classified in excellent condition, is predominantly little bluestem (*Andropogon scoparius*) with a carrying capacity of approximately 7 acres per cow-calf unit on a year-long basis. The range forage is normally dormant from early November (first frost) to late April.

Two postpartum nutritional levels were evaluated. Moderate cows were maintained on native pasture at a stocking rate of one cow-calf unit per 12 acres and were supplemented with cottonseed meal (41 percent CP) at the rate of 2 lb prior to calving and 4 to 5 lb postcalving per head per day until warm season grasses began to grow (April 30). Available forage was abundant and the additional winter supplementation was deemed adequate to maintain fall-calving cows in good breeding condition (body condition score 5.5 to 6.0).

To mimic an overstocked, short forage supply situation with little, if any, winter supplementation prior to the breeding season, the low cows were maintained on native pasture at a stocking rate of approximately one cow-calf unit per two acres and received no supplemental protein prior to the start of the breeding season.

At the start of the breeding season (January 1), all cows were maintained at a stocking rate of one cow-calf unit per 12 acres and received 5 lb of cottonseed meal per head daily to April 30. Throughout the study, all cows were fed three times per week [(daily allowance x 7) - 3]. After April 30, all cows grazed common pasture through weaning.

From calving to the start of the breeding season, teaser bulls with chin ball markers and visual observation were used to detect estrus. During the breeding season (January 1 to March 3), the cows were divided into four breeding groups on the basis of postpartum nutrition level and weaning age of the calf. All cows were purchased bred to Charolais and Hereford bulls. Cows were exposed to Beefmaster bulls in year 1 and 2, Charolais bulls in year 3 and Limousin bulls in year 4. The bulls were rotated among pastures every two weeks. Cows were observed for breeding activity twice daily and herd bulls were equipped with chin-ball markers to assist in determination of breeding dates.

Individual cow weights and body condition scores were taken after a 12-hour shrink every two weeks from September 1 to March 3 (end of the

breeding season) and monthly from March 3 to September 1. The condition scores were based on a scale of 1 (very thin) to 9 (very fat).

All calves were weighed and eartagged within 24 hours after birth. The calves remained with their dams on native pasture until weaning and did not receive creep feed. Calf weights were obtained after a 6-hour shrink every two weeks until the end of the breeding season and monthly thereafter. To determine the effect of weaning age on calf and cow performance, calves were weaned from their dams at 210 or 285 days of age (+7 days). Weaning occurred every two weeks from April 1 to September 4. Assignments to weaning age within postpartum nutritional level were made on the basis of calving date to equalize the effects within treatment groups. The age-corrected weaning weights were adjusted for age of dam by Beef Improvement Federation Guidelines and all heifer calves were corrected to a steer equivalent by multiplying by 1.05. Calves weaned at 210 days were fed a high roughage weaning ration (ad-libitum) for two weeks to reduce weight loss associated with the stress of weaning. After the two-week period, the weaned calves were placed on native pasture similar to that grazed by the nursing calves and received no additional feed. Steer calves were implanted with Ralgro in February and reimplanted in June.

Results and Discussion

Cow weight and condition

At calving, cows assigned to both nutritional levels had nearly identical body weights and condition scores (Table 1). Moderate cows

TABLE 1. The effect of postpartum nutrition on cow weights, weight change and body condition scores from calving to end of breeding season.

	Postpartum Nutrition Level	
	Moderate	Low
No. of cows	214	200
Initial wt., post calving	1020	1021
Wt., start of breeding season	977	937
Wt., end of breeding season	886	866
Wt. change		
Initial to start of breeding	-43	-84
Initial to end of breeding	-134	-155
Condition score		
Initial	5.9	5.8
Start of breeding	5.5	4.9
End of breeding	5.3	4.9

lost 4.2 percent of their initial postcalving weight and 0.4 body condition score unit from calving until the start of the breeding season. Even though abundant forage was available, the TDN content of the forage plus the TDN content of the cottonseed meal was inadequate to meet the TDN requirement of 1000 lb. lactating mature beef cows, resulting in body weight and condition loss. However, the Moderate cows were still in good breeding condition (5.5) entering the breeding season. The reduced nutrient supply to the Low cows resulting from overstocking and no winter supplementation prior to the breeding season resulted in double the weight loss (8.2 percent of postcalving weight) and double the body condition losses (0.9 condition score) of the Moderate cows. Therefore, the Low cows entered the breeding season with a condition score (4.9) below the recommended level for good breeding performance.

Abundant forage plus 5 lb of cottonseed meal during the breeding season were insufficient to maintain the weight of either treatment group; however, the additional winter supplement fed the Low cows during breeding helped maintain their body condition. Nevertheless, the Low cows were still lighter in weight and thinner in body condition at the end of the breeding season than the Moderate cows.

With the advent of warm season grass growth in April and May, all cows were able to regain considerable weight and condition to weaning. By 210 days postpartum, Moderate and Low cows were similar in weight and condition (Table 2). The weight and condition score patterns continued to 285 days postpartum regardless of weaning age of calves. However, cows weaning calves at 285 days postpartum were still acceptable in weight and condition. It should be noted that these were fall-calving cows and the additional 75 days encompassed the peak nutritional period of the native forage. Under a spring-calving regime, an additional 75

TABLE 2. The effect of postpartum nutrition and weaning age on cow weights and body condition scores at 210 and 285 days postpartum.

Days Postpartum	Postpartum Nutrition Levels	
	Moderate	Low
210 days		
Weight	940	935
Condition score	5.4	5.3
285 days		
Calves weaned at 210 days		
Weight	1147	1114
Condition score	6.7	6.6
Calves weaned at 285 days		
Weight	1069	1082
Condition score	6.0	5.9

days would result in weaning during December, January and February, the poorest months in terms of nutritive value of the forage.

Reproductive Performance

The effect of postpartum nutrition level on the reproductive performance of cows is presented in Table 3. Moderate cows had a 4.7 percent higher return to estrus and exhibited estrus 15 days sooner than Low cows. As a result of fewer cows actually cycling, a longer postpartum interval to first estrus and a 63 day breeding season, Low cows had 14.9 percent fewer cows exposed to the bull that actually conceived. In addition, only 83.9 percent of the Low cows actually serviced by a bull settled as compared to 96.2 percent for the Moderate cows. Therefore, the low postpartum nutritional level prior to the breeding season apparently had an adverse effect on conception rate.

TABLE 3. The effect of postpartum nutrition on the reproductive performance of fall-calving cows.

	Postpartum Nutrition Levels	
	Moderate	Low
No. of cows	214	200
No. exhibiting estrus	209	186
Days postpartum to first estrus	52.1	67.1
No. of cows bred	203	160
Percent cows exposed actually bred	94.9	80.0
Percent cows serviced that settled	96.2	83.9

Calf Performance

Calves suckling Moderate cows were 15 and 19 lb heavier than calves suckling Low cows at 210 and 285 days, respectively (Table 4). The Moderate cows were fed protein supplement from calving to the start of the breeding season (January 1), while the Low cows received none. This increased supplementation cost \$56.00 (560 lb x \$0.10/lb) for the Moderate cows. The additional 15 lb at 210 days for the Moderate calves was worth \$11.25 (15 x \$0.75/lb). Therefore, the additional weight was insufficient to make up the difference in protein cost. However, if conception rate is considered (Table 3), the Moderate calves were 81 lb heavier (441 vs 360 lb) per cow exposed to the bull. The market price for 300 - 500 lb feeder steers at Oklahoma City from April to July (approximately 210 days) for the past four years has averaged \$75/cwt. This 81 lb difference amounts to a \$60.75 advantage to the Moderate calves. The added cost of supplementing Moderate cows is offset by the added revenue received as a result of differences in pounds of calf weaned per cow exposed to the bull.

Delaying weaning of fall-born calves until 285 days of age to take advantage of the high quality summer forage resulted in an average of 199 lb additional selling weight than weaning and selling at 210 days.

Since the average weight of calves at 210 days was 457 lb, the gross return for calves weaned and sold at 210 days was \$342.75. The average weight of calves weaned at 285 days was 656 lb. The market price for 500 - 700 lb feeder steers at Oklahoma City from July to September (approximately 285 days) for the past four years has averaged \$64/cwt. Therefore, the gross return for calves weaned at 285 days was \$419.84. Delaying weaning by 75 days increased gross calf revenue by \$77.09 without adding any expense or detrimental effects on the cows.

TABLE 4. The effect of dam's postpartum nutrition and weaning age on adjusted calf weights.

	No.	Adjusted 210 day wt.	Adjusted 285 day wt.
Dam's postpartum nutrition			
Moderate	214	465	631
Low	200	450	612
Weaning age			
Weaned at 210 days	214	454	590
Weaned at 285 days	200	461	656

Calves weaned at 285 days were 66 lb heavier than calves weaned at 210 days and grazed as stockers on native pasture for 75 days. The reduction in stress at weaning plus the additional milk of the dam resulted in an added daily gain of 0.9 lb. This management practice alone resulted in an increased revenue of \$42.24.

While extending the suckling period by 75 days did result in lower body weight and body condition scores of the dams, their weight and body condition were still acceptable. Therefore, delaying weaning under a fall-calving regime may be an important management practice to increase the profitability of the cow-calf program providing that the additional forage consumed by the calves does not hamper the weight and condition gain of the cows during the summer grazing period and does not limit the availability of forage the coming year.