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

One hundred one fall-calving Angus X Hereford cows ranging in age from 3 to 6 years were assigned to either a Moderate (maintain post-calving weight) or Low (lose 10 percent of post-calving weight) level of supplementation from calving to the start of the breeding season. From the start of the 67-day breeding season until warm season grasses began to grow, all cows were fed the Moderate level of supplementation.

Moderate level cows exhibited postpartum estrus an average of 21.7 days sooner (54.1 vs 75.8 days) and had a higher conception rate (96 vs 82.3 percent) than Low level cows. Adjusted weaning weight of the calves was not significantly affected by the dam's level of supplementation prior to breeding but was affected by breed of sire and month of birth. Calves weaned at 285 days were 73.5 and 93.5 lb heavier for the Moderate and Low levels, respectively, than calves weaned at 210 days and grazed on native pasture for 75 days. Charolais-sired calves were approximately 75 lb heavier at 285 days than Hereford-sired calves, regardless of weaning method.

Introduction

Approximately 30 to 40 percent of the beef cows in Oklahoma calve in the fall (September-December). Fall-calving cows vary considerably in body condition at calving due to differences in forage availability and level of protein supplementation. Many producers wean fall-born calves late (9-10 months of age) to take advantage of summer grasses and thus wean heavier calves. However, late weaning may have an adverse effect on cow condition.

Research with spring-calving cows indicates that cows on an adequate plane of nutrition prior to calving and in moderate flesh at calving have short postpartum intervals to first estrus and high conception rates. Fall-calving cows are typically in better condition going into the calving season than spring calving cows; however, little is known about the combined effects of condition at calving and postpartum level of nutrition 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 the pay weight of the calves by extending the weaning period to 9-10 months, the effect on cow condition and reproductive performance is unknown.

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

Experimental Procedure

One hundred thirty-five fall-calving Angus X Hereford cows ranging in age from 3 to 6 years and bred to Charolais and Hereford bulls were assembled at the Southwestern Livestock and Forage Research Station in the summer of 1980. The range on the Research Station, classified in excellent condition, is little bluestem (*Andropogon scorparius*) predominantly and has 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.

At calving (September 1, 1980, to November 5, 1980) each female was assigned to a level of postpartum nutrition on the basis of calving date and age of dam to equalize these effects within treatment. The Moderate level of nutrition consisted of that amount of supplemental feed necessary for fall-calving cows to maintain their post-calving weight from calving to the start of the breeding season. To achieve this level of postpartum nutrition, the cows were maintained on abundant forage and fed 7 lb of cottonseed cake (41 percent CP) per head per day from calving to the start of the breeding season. The Low level of nutrition consisted of that amount of supplemental feed necessary for fall-calving cows to lose 10 percent of their post-calving weight from calving to the start of the breeding season. To achieve this level of postpartum nutrition, the cows were maintained on abundant forage and fed ½ lb of cottonseed cake (41 percent CP) per head per day until November 25 and 3½ lb per day to December 15, 1980.

At the start of the breeding season (December 15), all cows were fed 5 lb of cottonseed cake daily to March 30, 1981, and 2 lb daily until April 20, 1981. Throughout the study, all cows were fed three times per week (daily allowance × 7 ÷ 3). After April 20, 1981, all cows grazed common pasture through weaning.

Individual cow weights and body condition scores were taken after a 12-hour shrink biweekly from September 1, 1980, to February 20, 1981 (end of breeding season), and monthly from February 20, 1981, to September 1, 1981. The condition scores were based on a scale of 1 (very thin) to 9 (very fat) (Table 1).

All calves were weighed and identified by ear tag 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 biweekly until the end of the breeding season and monthly thereafter. To determine the effect of weaning age on calf performance as well as to create a 1.0 to 1.5 unit difference in cow body condition going into the subsequent calving season, calves were weaned from their dams at 210 or 285 days of age, ±7 days, by weaning biweekly from March 30, 1981, to August 17, 1981. Assignments to weaning age within postpartum nutrition level were made on the basis of calving date to equalize the effect 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 2-week period, the weaned calves were placed on native pasture similar to that grazed by the nursing calves and received no additional feed. All calves were implanted with Ralgro in February and reimplanted in June.

Table 1. System of body condition scoring (BCS) for beef cattle

Group	BCS	Description
Thin Condition	1	EMACIATED — Cow is extremely emaciated with no detectable fat over spinous processes, transverse processes, hip bones or ribs. Tail-head and ribs project quite prominently.
	2	POOR — Cow still appears somewhat emaciated but tail-head and ribs are less prominent. Individual spinous processes are still rather sharp to the touch but some tissue cover exists along spine.
	3	THIN — Ribs are still individually identifiable but not quite as sharp to the touch. There is obvious palpable fat along spine and over tail-head with some tissue cover over dorsal portion of ribs.
Borderline Condition	4	BORDERLINE — Individual ribs are no longer visually obvious. The spinous processes can be identified individually on palpation but feel rounded rather than sharp. Some fat cover over ribs, transverse processes and hip bones.
Optimum Moderate Condition	5	MODERATE — Cow has generally good overall appearance. Upon palpation, fat cover over ribs feels spongy and areas on either side of tail-head now have palpable fat cover.
	6	HIGH MODERATE — Firm pressure now needs to be applied to feel spinous processes. A high degree of fat cover is palpable over ribs and around tail-head.
	7	GOOD — Cow appears fleshy and obviously carries considerable fat. Very spongy fat cover over ribs and over and around tailhead. In fact "rounds" or "pones" beginning to be obvious. Some fat around vulva and in crotch.
Fat Condition	8	FAT — Cow very fleshy and over conditioned. Spinous processes almost impossible to palpate. Cow has large fat deposits over ribs, around tail-head and below vulva. "Rounds" or "pones" are obvious
	9	EXTREMELY FAT — Cow obviously extremely wasty and patchy and looks blocky. Tail head and hips buried in fatty tissue and "rounds" or "pones" of fat are protruding. Bone structure no longer visable and barely palpable. Animal's mobility may even be impaired by large fatty deposits.

From calving to the start of the breeding season, teaser bulls, equipped with chin-ball markers, were placed with the cows. Teaser bull activity and visual observation twice daily were used for detection of estrus. During the breeding season (December 15, 1980, to February 20, 1981), the cows were divided into four breeding groups on the basis of postpartum nutrition level and weaning age of the calf. All cows were exposed to fertile Beefmaster bulls, which were rotated

biweekly among pastures during the breeding season. Cows were observed for breeding activity twice daily, and herd bulls were equipped with chin-ball markers to assist in determination of breeding dates.

Results and Discussion

Cow weight and condition

Up to the start of the breeding season, the Moderate cows were able to maintain their post-calving weight and condition with 7 lb of cottonseed cake daily (Table 2). The cows were in moderate flesh (5.5 condition score). However, the Low level cows, fed ½ lb of cottonseed cake daily from calving until November 25 and 3½ lb daily from November 26 to December 15, 1980, lost a full condition score but only 3.8 percent of their post-calving weight. The use of 5 lb of cottonseed cake daily from the start of the breeding season (December 15) to the end of the breeding season (February 20) was not adequate to maintain the weight of either treatment group. However, the additional supplement fed the Low level cows during the breeding season tended to improve their body condition, possibly a factor of increased forage intake and digestibility. The drop in condition of the Moderate level cows was attributed to increased milk production; however, at weaning, no differences in body condition between treatments were noted.

With the advent of warm season grass growth in early April, 1981, all cows were able to regain considerable weight to weaning.

Table 2. Weights, weight change and condition score data

	Moderate	Low
No. of cows	50	51
Initial wt, postcalving	959	949
Wt, start of breeding season	952	913
Wt, end of breeding season	873	853
Wt, at weaning		
Calf weaned at 210 days	924	907
Calf weaned at 285 days	1075	1089
Wt change, %		
Initial to start of breeding	−.69	−3.70
Initial to end of breeding	−8.8	−9.9
End of breeding to weaning		
Calf weaned at 210 days	+5.84	+6.33
Calf weaned at 285 days	+23.14	+27.67
Initial to weaning		
Calf weaned at 210 days	−3.65	−4.42
Calf weaned at 285 days	+12.10	+14.75
Condition score		
Initial	5.7	5.4
State of breeding	5.5	4.6
End of breeding	5.15	4.9
Weaning		
Calf weaned at 210 days	5.49	5.4
Calf weaned at 285 days	6.0	5.98

Reproductive performance

The reproductive performance of fall-calving cows appears to be affected by level of postpartum nutrition (Table 3). Cows on the Moderate level of nutrition postpartum returned to normal estrus activity 21.7 days sooner than cows fed the Low level. As a result of the long postpartum interval to first estrus for the Low level cows and only a 67-day breeding season, 12 percent fewer cows conceived as compared to the Moderate level. In addition, the Moderate level cows were in much better body condition going into the breeding season (5.4 vs 4.6 condition score).

Table 3. Reproductive performance data

	Moderate	Low
No. of cows	50	51
No. exhibiting estrus	42	38
Days postpartum to 1st estrus	54.1	75.8
Days postpartum to apparent conception	96.3	95.4
No. of females bred	48	42

Calving data

The mean birth weights and adjusted weaning weights are presented in Table 4. The level of postpartum nutrition had little effect on the weaning performance of the calves. However, breed of sire and age at weaning exhibited marked influences on calf performance.

Charolais-sired calves were heavier at birth (approximately 4 lb) and were an average of 75 lb heavier at weaning than the Hereford-sired calves. This difference in birth weight and weaning weight is largely due to the increased mature size and growth potential of the Charolais breed.

Delaying the weaning of fall-born calves to 9-10 months to take advantage of summer forage appears to be a major improvement regardless of level of

Table 4. Calving data

	Moderate		Low	
	Charolais	Hereford	Charolais	Hereford
No. of calves	31	19	24	22
Males	14	10	14	12
Females	17	9	15	10
Avg birth wt				
Males	81.8	70.1	81.4	80.6
Females	77.4	75.8	73.1	69.8
Adj 210 day wt				
WNGRP 1*	451	357	426	348
WNGRP 2	456	375	450	375
Adj 285 day wt				
WNGRP 1	578	492	540	468
WNGRP 2*	641	576	636	559

*Adjusted weaning weight for respective weaning groups.

postpartum nutrition of the cow. Calves weaned at 285 days were 73.5 and 93.5 lb heavier for the Moderate and Low levels, respectively, than calves weaned at 210 days and grazed on native pasture for 75 days and fed a high roughage ration during the initial 14 days of the grazing period. The 20-lb advantage to the Low level group is unclear.

Effect of Yeast Culture[1] on Nitrate Toxicity of Lambs and Steers Fed High-Nitrate Sorghum-Sudan Hay

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Story in Brief

Lambs and steers were fed low-nitrate hay and supplements that supplied 0 or .1 lb (lambs) or .25 lb (steers) of Yeast Culture per head per day for 14 and 12 days, respectively, before being fed high-nitrate sorghum-sudan hay. The effect of Yeast Culture on blood methemoglobin concentrations was evaluated. Nitrate consumption by lambs 6 hr after being fed the high-nitrate hay was similar among treatments and ranged from about .3 to .5 g/kg body weight during 3 challenge days. Similar rates of nitrate consumption were observed for steers. Blood methemoglobin concentrations of lambs and steers fed Yeast Culture were not lower than those of control animals. Results of the study do not indicate that Yeast Culture will decrease the toxicity of high-nitrate forages consumed by sheep or cattle.

Introduction

In previous studies conducted at the University of Missouri by Grebing (1974 and 1976), the feeding of about 0.1 pound per day of Diamond V Yeast Culture markedly decreased death losses of lambs that received a ruminal drench of potassium nitrate and sodium nitrate. In these studies the nitrate dosage was about 0.8 g nitrate per kg of lamb body weight. In the 1976 study lambs were fed a cottonseed hull, cracked corn, soybean meal based ration that contained 24.5 percent corn.

Sapiro et al. (1949) reported that very severe blood methemoglobin concentrations were produced in sheep fed a poor quality grass hay and dosed with 0.4 g

[1]Diamond V Yeast Culture, Diamond V Mills, Inc., Cedar Rapids, Iowa.