BODY CONDITION AT CALVING AND POSTPARTUM NUTRIENT INTAKE INFLUENCE REPRODUCTIVE PERFORMANCE OF RANGE COWS

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Story in Brief

Mature spring calving Hereford and Angus x Hereford cows were used to evaluate the effect of body condition score at calving and nutrient intake post partum on pregnancy rate and concentrations of insulin and non-esterified fatty acids in plasma. During 1985 and 1986, a total of 145 range cows that had a body condition score of 4 or 5 (1=emaciated, 9=obese) at calving were maintained under range conditions and were fed to maintain or gain weight during the first 85 days post partum. Pregnancy rate for both years was increased for cows that calved with a body condition score of 5 and were fed to gain compared to maintain cows. Pregnancy was increased for cows with a body condition score of 4 that gained weight vs maintain cows in 1985, but not during 1986. Concentrations of insulin in serum during the first 85 days post partum were influenced by body condition score at calving and postpartum nutrient intake. Concentrations of non-esterified fatty acids in plasma were also influenced by body condition score. We conclude that increasing postpartum feed intake of range cows that calve with a body condition score of 5 will increase pregnancy rate.

(Key Words: Insulin, NEFA, Postpartum, Reproduction)

Introduction

Reproductive performance of beef cattle can be increased by decreasing the interval from parturition to conception. Nutrient intake and body condition score are major factors that determine the length of the postpartum interval to first estrus. Concentrations of insulin and non-esterified fatty acids (NEFA) in cows may indicate nutrients available for fat synthesis and the rate of fat mobilization. The objective of this study was to determine the influence of postpartum nutrition and body condition score (BCS) of cows at calving on reproductive performance and concentration of insulin and NEFA in plasma.

Materials and Methods

Seventy-five cows calving in 1985 and seventy cows calving in 1986 were used in this study. The Hereford and Angus x Hereford cows that calved between February 11 and April 15, during the two years, were assigned to postpartum nutritional treatments based on calving date, breed and BCS. Cows were fed under range conditions to maintain or gain weight during the first 85 days post partum. During both years, gain cows were fed 5 lbs of cottonseed meal cubes (41% CP) daily until 85 days after calving. Maintain cows received 2 lbs of cottonseed meal

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cubes daily until April 19, 1985 or April 3, 1986. In addition to dry native grass, all postpartum cows received native grass hay free choice during the month of March. Cows were weighed and BCS was determined every two weeks. Concentrations of insulin were determined in blood serum obtained each week between 2 and 12 weeks after calving in 1985. In 1986, cows were bled on May 1 after 16 h without feed and water, and 5 hours after all cows were fed hay and gain cows received 5 lbs of cottonseed meal cubes.

Cows were exposed to fertile bulls for 90 days each year starting on May 1. Pregnancy rate was determined at 70 days after the end of the breeding season.

Results and Discussion

During 1985, body weights during lactation were not significantly influenced by postpartum nutrient intake. However, during 1986, a significant treatment x BCS x day of the year effect on body weight was associated with greater body weights for gain cows during late May. Weight gain of calves was increased by feeding additional supplement to cows, indicating that milk production was increased.

Body condition score of cows at calving and postpartum nutrition influenced pregnancy rate. Pregnancy rate was increased during both years for cows that calved with a BCS of 5 and were fed to gain weight compared to cows fed to maintain weight (Table 1). In 1985, pregnancy rate was increased for cows with a BCS of 4 that were fed to gain weight (67%) compared to BCS 4 cows fed to maintain weight (50%). However, during 1986 postpartum nutrition did not influence pregnancy rate of the cows that calved with a BCS of 4.

Postpartum nutrition and BCS influenced concentrations of insulin in serum during 1985 (Table 2). Concentrations of insulin were greater in BCS 5 cows on the maintain diet compared to BCS 4 cows on the same diet. However, BCS did not influence concentrations of insulin in cows fed the gain diet.

During fasting, cows with a BCS 4 at calving had greater concentrations of NEFA in plasma than BCS 5 cows (Table 3), indicating greater mobilization of body fat. After feeding, concentrations of NEFA were not influenced by BCS.

In this study, we observed an interaction between BCS at calving, postpartum nutrition and year for pregnancy rate. In addition, there was an interaction between BCS and postpartum nutrition for

Table 1. Influence of body condition score at calving and postpartum nutrition on percentage pregnancy rate of range cows.

		BCS	
Postpartum nutrition	Year	4	5
Maintain	1985	50 (12)[a]	69 (26)
	1986	80 (10)	77 (26)
Gain	1985	67 (9)	93 (29)
	1986	75 (8)	100 (26)

[a]Number of cows in parentheses
Nutrition x BCS x year effect ($P<.001$).

Table 2. Influence of BCS at calving and postpartum nutrition on serum insulin (ng/ml) (1985).

	BCS	
Postpartum Nutrition	4	5
Maintain	.20 ± .03	.36 ± .01
Gain	.27 ± .02	.30 ± .01

Nut x BCS (P<.02).

Table 3. Influence of BCS and feeding on plasma NEFA (μgEq/ml) - 1986.

BCS	Fasted	Post feeding
4	1109 ± 52	1047 ± 52
5	952 ± 34	1076 ± 35

BCS x Feeding (P<.04).

concentrations of insulin in serum, and there was an interaction between BCS and feeding for concentrations of NEFA in plasma. Thus, BCS at calving and postpartum nutrition interact to influence pregnancy rate and concentrations of insulin and NEFA in blood.

We conclude that increasing postpartum feed intake of range cows that calve with a BCS of 5 in the spring will increase pregnancy rate.