

EFFECTS OF BODY CONDITION ON LUTEAL ACTIVITY AND ESTRUS IN POSTPARTUM BEEF COWS

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Story in Brief

Seventy-seven multiparous beef cows (Hereford and Angus x Hereford) calving with thin to moderate body condition scores (BCS) were utilized to evaluate luteal activity. Blood samples were collected twice weekly after calving to determine the occurrence of first postpartum luteal activity (progesterone = .5 ng/mL). Weight changes and BCS were determined at 2 wk intervals and cows were exposed to bulls and observed twice daily for behavioral estrus. Luteal activity was classified as normal if four consecutive samples had = .5 ng/mL of progesterone or shortened if = 3 consecutive samples had = .5 ng/mL. Postpartum interval to first normal luteal activity was shorter for moderate condition (BCS = 4.5) cows compared with thin (BCS = 4) cows (58.3 ± 3.2 vs 93.3 ± 5.1 d, respectively). Interval to first estrus was also shorter for moderate cows compared with thin cows (53.3 ± 3.7 vs 89.3 ± 5.6 d, respectively). First normal luteal activity was preceded by estrus in 74% of the cows. Postpartum weight change and BCS at calving did not influence the incidence of estrus associated with first normal luteal activity. At the first estrus, 72% of cows had normal luteal activity, 16% had shortened luteal activity, and 12% lacked luteal activity. Postpartum weight change and BCS did not influence the length of luteal activity associated with the first estrus. Seventy-eight percent of cows had a transient increase in progesterone preceding the first normal luteal activity. Subnormal or the absence of luteal activity at the first postpartum estrus may reduce reproductive efficiency of beef cows.

(Key Words: Postpartum Cow, Estrus, Luteal Activity.)

Introduction

First ovulation in postpartum beef cows is not always preceded by behavioral estrus (Graves et al., 1968). Resumption of luteal activity (LA) often occurs after a transient increase in progesterone for 4 to 5 d (Humphrey et al., 1983). Short term exposure to progesterone may be necessary for initiation of normal estrous cycles (17 to 21 d) (Corah et al., 1974). Conception rate was reduced in primiparous cows without a transient increase in progesterone before estrus compared with cows that had an increase in progesterone (Werth et al., 1996). Nutritional effects on the incidence of short luteal phases in mature beef cows has not been elucidated. The purpose of this study was to evaluate the effect of body condition at calving on the duration of postpartum luteal activity and occurrence of estrus in beef cows.

Materials and Methods

Seventy-seven multiparous beef cows (Hereford and Angus x Hereford) calving in thin (BCS = 4) to moderate (BCS = 4.5) body condition were bled at 3 or 4 d intervals to determine the occurrence of first postpartum luteal activity (progesterone = .5 ng/mL). Cows were exposed to bulls and observed twice daily for behavioral estrus commencing at calving. Bulls were fitted with chin-ball markers and the tail heads of cows were chalked weekly. Weight changes and

BCS were determined at 2 wk intervals. Luteal activity was classified as normal if four consecutive samples had $\geq .5$ ng/mL of progesterone (luteal activity for at least 11 d) or shortened if ≤ 3 consecutive samples had $\geq .5$ ng/mL. The effects of BCS at calving and postpartum weight changes on luteal activity and estrus were analyzed by analyses of variance.

Results and Discussion

Body condition scores at calving ranged from 3.5 to 5.5 and 28 cows gained an average of 23.6 kg during the first 35 d after calving and 20 cows lost about 18.6 kg. Twenty-nine cows maintained their weight during this period. Postpartum interval to normal luteal activity was shorter for moderate condition cows as compared with thin cows (58.3 ± 3.2 vs 93.3 ± 5.1 d, respectively). Interval to first estrus was also shorter for moderate cows compared with thin cows (53.3 ± 3.7 vs 89.3 ± 5.6 d, respectively) (Table 1). This is in agreement with previous reports that BCS at calving is related to the interval to first estrus in cows (Wettemann et al., 1981) and LA in heifers (Spitzer et al., 1995).

First normal LA was preceded by behavioral estrus in 74% (57/77) of all cows. Body condition score at calving and postpartum weight change did not influence ($P > .10$) the incidence of estrus associated with first normal luteal activity. After the first estrus, 72% (41/57) of cows had normal luteal activity, 16% (9/57) had shortened luteal activity (1 to 3 samples $\geq .5$ ng/mL of progesterone), and 12% (7/57) lacked luteal activity (Table 2). These data indicate that shortened or the lack of luteal activity at first postpartum estrus may be a cause of decreased reproductive efficiency.

Body condition at calving and postpartum weight change did not influence the type of luteal activity associated with first estrus. Seventy-two percent of cows had a transient (luteal activity for 1 sample $\geq .5$ ng/mL) increase in progesterone preceding the first normal luteal activity. Six percent of cows had $\geq .5$ ng/mL of progesterone for two samples (Table 2). A transient increase in progesterone typical of cows is depicted in Figure 1. Similarly, 69% of crossbred primiparous heifers had increased concentrations of progesterone before first estrus (Werth et al., 1996). A transient increase in progesterone may be necessary for initiation of normal estrous cycles in postpartum beef cows (Corah et al., 1974; Werth et al., 1996).

Body condition of cows at calving is a major factor that influences the interval from calving to first estrus and ovulation. Postpartum weight change and BCS did not alter the length of the first luteal activity or the incidence of estrus associated with the first luteal activity. Twenty-eight percent of mature beef cows did not have normal luteal development after the first postpartum estrus and pregnancy was not initiated.

Literature Cited

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Table 1. Influence of BCS at calving on intervals to first estrus and normal luteal activity (LA).

Item	BCS at calving	
	Moderate/Good	Thin
Cow no.	28	29
BCS	4.7 ± .06	3.6 ± .07
Calving to 1st estrus, d	53.3 ± 3.7 ^a	89.3 ± 5.6 ^b
Calving to LA ¹ , d	58.3 ± 3.2 ^a	93.3 ± 5.1 ^b

¹ First normal luteal activity (4 samples ≥ .5 ng/mL of P₄).

^{a,b} Means within a row differ (P<.05).

Table 2. Classification of first luteal activity (LA) after calving and after the first estrus in mature beef cows.

Criteria	Number of samples ≥ .5 ng/mL of progesterone (P ₄)					
	No.	0	1	2	3	4 [*]
Days P ₄ increased	-	-	1-6	5-9	8-13	11-17
LA after first estrus	57	7(12) ^{**}	4(7)	3(5)	2(4)	41(72)

First postpartum LA	77	-	55(72)	5(6)	0(0)	17(22)
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* Four samples $\geq .5$ ng/mL indicates normal luteal activity.

** Percentage of cows in parentheses.

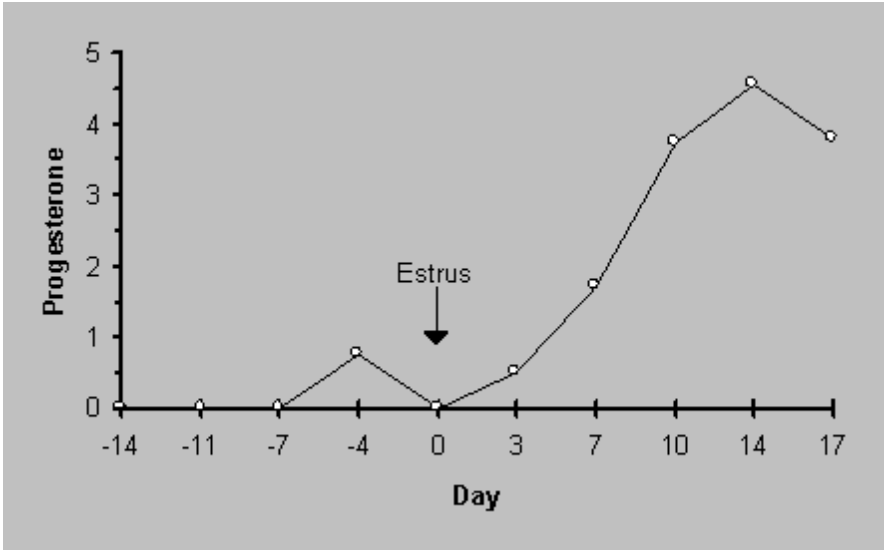


Figure 1. Progesterone profile of a typical postpartum beef cow.