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## Effects of rumen-escape lipid in a range supplement on postpartum reproductive function in beef cows

### Abstract

Postpartum cows receiving a range supplement containing rumen-escape lipid exhibited altered hormone and cholesterol levels compared to cows not fed lipid. Sixty-seven percent of lipid-fed cows exhibited a normal (18.2 d) first estrous cycle vs 33% for cows not receiving lipid. Incorporation of rumen-escape lipid into range supplements appears to significantly improve postpartum reproductive characteristics.

### Keywords

Cattlemen's Day, 1990; Kansas Agricultural Experiment Station contribution; no. 90-361-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 592; Beef; Rumen-escape lipid; Estrous cycle; Cholesterol; Postpartum

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**EFFECTS OF RUMEN-ESCAPE LIPID  
IN A RANGE SUPPLEMENT ON POSTPARTUM  
REPRODUCTIVE FUNCTION IN BEEF COWS<sup>1,2</sup>**

**R. B. Hightshoe, R. C. Cochran, L. R. Corah,  
D. L. Harmon, and G. H. Kiracofe**

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**Summary**

Postpartum cows receiving a range supplement containing rumen-escape lipid exhibited altered hormone and cholesterol levels compared to cows not fed lipid. Sixty-seven percent of lipid-fed cows exhibited a normal (18.2 d) first estrous cycle vs 33% for cows not receiving lipid. Incorporation of rumen-escape lipid into range supplements appears to significantly improve postpartum reproductive characteristics.

(Key Words: Rumen-escape Lipid, Estrous Cycle, Cholesterol, Postpartum.)

**Introduction**

Early return to cyclicity in the postpartum period can improve overall reproductive efficiency in beef cows. More cows cycling at the beginning of the breeding season should result in a higher average weaning weight, because more calves are born early in the calving period. Research at other universities suggests that inclusion of dietary lipid could hasten the postpartum return to estrus. Our objective was to evaluate whether the incorporation of rumen-escape lipid into a range supplement would significantly alter postpartum reproductive characteristics in beef cows.

**Experimental Procedures**

Twelve multiparous, Simmental cows were stratified by weight and body condition score and assigned randomly to receive a control (C) or lipid (L) supplement. The C supplement was 76% grain sorghum and 24% soybean meal. The L supplement was 34% Megalac<sup>®</sup> (calcium salts of fatty acids), 17% grain sorghum, and 49% soybean meal. By feeding L at .5% of body weight and C at .67% of body weight, the supplements provided each cow an equal daily quantity of protein and energy. Enough prairie hay was fed so that supplement plus prairie hay intake equaled the net energy for maintenance requirement for heavy milking beef cows in early lactation. Supplement feeding and daily blood collection began at parturition. Calves were permanently removed from cows at approximately 25 d postpartum in order to induce estrus. Length of first postpartum estrous cycle was determined by visual observation every 6 hr

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beginning at calf removal and by changes in serum progesterone ( $P_4$ ) concentration. Concentration of luteinizing hormone (LH) was determined in serum collected every 15 min for 6 hr at three periods; 12 hr before calf removal and 48 and 96 hr after calf removal. Serum  $P_4$ , estradiol  $17\beta$  ( $E_2$ ), and plasma cholesterol were determined in daily blood samples.

### Results and Discussion

Ten of 12 cows exhibited estrus within 96 hr after calf removal. Sixty-seven percent of L-fed cows exhibited a normal (18.2 d) first estrous cycle vs 33% of C-fed cows. Cows receiving L had higher ( $P=.06$ ) mean concentration of LH for the three sample periods than cows receiving C (Table 18.1). The L-fed cows also tended ( $P=.13$ ) to have increased LH pulse frequency. Concentration of  $E_2$  5 d before the first and second ovulations was higher ( $P=.008$ ) for the C cows. Plasma cholesterol was elevated ( $P=.01$ ) in L-fed cows.

A high percentage of beef cows experience a premature regression of the corpus luteum in their first postpartum estrus, leading to a short cycle of between 8 to 12 d. The ability of the L-fed cows to exhibit a normal first estrous cycle suggests that lipid feeding may have prompted normal luteal function. Although the mechanism involved remains unclear, it is apparent from this and other studies that lipid feeding is capable of enhancing luteal function in the postpartum cow.

**Table 18.1. Effects of Rumen-Escape Lipid in a Supplement on Postpartum Reproductive Characteristics in Beef Cows**

Item	Control	Lipid	Standard error
Mean LH, ng/ml serum	1.12 <sup>a</sup>	1.47 <sup>b</sup>	.11
LH pulse frequency no.	3 <sup>c</sup>	11 <sup>d</sup>	.14
Estradiol concentration, pg/ml serum	2.30 <sup>e</sup>	1.63 <sup>f</sup>	.136
Plasma cholesterol, mg/dl plasma	98.4 <sup>e</sup>	213.8 <sup>f</sup>	14.4
% Cows exhibiting normal estrus	33	67	

<sup>ab</sup>Row means differ ( $P=.06$ ).

<sup>cd</sup>Row means tend to differ ( $P=.13$ ).

<sup>ef</sup>Row means differ ( $P=.05$ ).