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Abstract

Feeding .25, .5, or 1 lb/d of rumen-escape lipid in a range supplement to beef heifers after calving resulted in increased calf weight gain and milk production at 70 d postpartum compared to control or feeding 2 lb daily. As level of rumen-escape lipid increased, plasma cholesterol and triglycerides also increased when measured after 14 and 28 d of lipid feeding. The interval from parturition to standing estrus generally was longer as level of rumen-escape lipid increased. It appears that intermediate levels (.25, .5, or 1 lb/d) of rumen escape lipid can enhance milk production and calf weight gain; however, the interval to estrus may be prolonged.

Keywords

Cattlemen's Day, 1991; Kansas Agricultural Experiment Station contribution; no. 91-355-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 623; Beef; Rumen-escape lipid; Beef heifers; Postpartum estrus; Milk; Cholesterol

EFFECT OF FEEDING RUMEN-ESCAPE LIPID TO POSTPARTUM BEEF HEIFERS[1]

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Summary

Feeding .25, .5, or 1 lb/d of rumen-escape lipid in a range supplement to beef heifers after calving resulted in increased calf weight gain and milk production at 70 d postpartum compared to control or feeding 2 lb daily. As level of rumen-escape lipid increased, plasma cholesterol and triglycerides also increased when measured after 14 and 28 d of lipid feeding. The interval from parturition to standing estrus generally was longer as level of rumen-escape lipid increased. It appears that intermediate levels (.25, .5, or 1 lb/d) of rumen escape lipid can enhance milk production and calf weight gain; however, the interval to estrus may be prolonged.

(Key Words: Rumen-Escape Lipid, Beef Heifers, Postpartum Estrus, Milk, Cholesterol.)

Introduction

Maintaining a yearly calving interval and having cows conceive early in the breeding period are important economic goals for beef producers. Cows that conceive early in the breeding period wean older, heavier calves. To achieve early conception, cows must be cycling at the start of the breeding period, and this depends on optimum nutritional management. A short interval from calving to estrus is essential for optimal reproductive efficiency. Previous research at Kansas State University (Hightshoe et al., Cattleman's Day 1990, Report of Progress 592) demonstrated that incorporating rumen-escape lipid into a range supplement significantly improved postpartum reproductive characteristics. Our objective was to determine the optimum level of rumen-escape lipid to enhance calf weight gain, milk production, and return to estrus in beef heifers with their first calf.

Experimental Procedures

Fifty, spring calving, 2-yr old, beef heifers with an average initial weight of 825 lb and an average body condition score (BCS; 1 = emaciated, 9 = obese) of 4.8 were separated by weight, BCS, and calving date. These outcome groups (10 heifers/group) were assigned randomly to control or to receive .25, .5, 1, or 2 lb/d of rumen-escape lipid (REL; Megalac®, calcium salts of fatty acids). Rumen-escape lipid was fed in a milo and soybean meal-based supplement at various levels; all supplements provided equal levels of energy, crude protein, calcium, and phosphorus. The remainder of the diet consisted of coarsely ground native prairie hay. Total daily nutrient intake was formulated to meet NRC requirements for lactating first-calf beef heifers. Heifers were individually fed once daily beginning 14 d postpartum (PP), and weekly plasma samples were obtained. Estrus activity was monitored twice daily beginning 28 d PP to determine the interval from parturition to first observed standing estrus. Heifers were weighed and BCS was determined every 2 wk; calves were weighed every 4 wk. Approximately 70 d PP, each heifer and her calf were separated overnight. The following morning, heifers were milked mechanically, and daily milk production was determined.

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Results and Discussion

Results of the study are shown in Table 1. Heifers fed intermediate levels (.25, .5, or 1 lb) of REL generally produced more milk and supported greater calf gains while maintaining weight and BCS's similar to controls or heifers fed 2 lb REL daily. Though level of REL did not consistently affect heifer weight change ($P > .77$), there was a trend ($P = .12$) toward greater body condition loss as level of REL increased. Calves nursing heifers fed .25, .5, or 1 lb of REL daily gained more weight during the trial. This could be attributed to the trend ($P = .10$) for increased milk production by these heifers. Plasma cholesterol (CHOL) and triglycerides (TG) were similar ($P > .78$) among treatments (110.6 ± 6.9 and 17.4 ± 2.7 mg/dl, respectively) at the beginning of the trial but increased linearly as lipid intake increased ($P < .01$). Feeding higher levels of REL did not shorten the interval to observed standing estrus as expected. Rather, this interval tended ($P = .09$) to be slightly prolonged, with the most notable effect at the 2 lb level. Analysis of serum progesterone will be completed to assess interval to first ovulation and length of the subsequent luteal phase. In this study, REL fed at intermediate levels (.25, .5, or 1 lb/d) was effective in increasing milk production and calf weight gain. Moreover, plasma CHOL and TG were elevated in the heifers within 14 d of initiation of lipid feeding. Lipid feeding has been shown in other studies to enhance luteal function in the PP beef cow, but effects on shortening the PP interval remain unclear.

Table 1. Effect of Level of Rumen-Escape Lipid on Performance and Plasma Metabolites of Postpartum Crossbred Beef Heifers

	Rumen-Escape Lipid, lb/d						Response[1]		
Item	Control	.25	.5	1	2	SE	L	Q	C
Heifer wt change, lb	+22.3	–1.8	+22.5	+8.8	+11.7	12.1	.82	.77	.77
Heifer BCS change[2]	–.14	–.34	–.24	–.33	–.54	.17	.12	.96	.70
Calf wt gain, lb	83.8	101.2	91.5	91.1	80.9	4.9	.11	.11	.16
Milk production, lb/d	13.6	16.8	14.8	16.4	13.1	1.3	.41	.10	.85
CHOL, mg/dl (d 14 trial)[3]	112.8	142.9	154.9	161.0	177.8	7.7	.01	.02	.08
CHOL, mg/dl (d 28 trial)	128.6	165.7	176.0	209.1	244.0	11.0	.01	.08	.58
TG, mg/dl (d 14 trial)[4]	15.8	23.9	24.1	25.7	27.9	2.7	.01	.14	.22
TG, mg/dl (d 28 trial)	16.8	23.2	23.4	27.3	23.9	3.2	.20	.07	.78
Estrus interval[5]	77	85	80	82	91	5	.09	.80	.51

[1]L = linear, Q = quadratic, and C = cubic. Responses with associated ($P \leq$) values are given.
[2]BCS = body condition score (1 = emaciated; 9 = obese).
[3]CHOL = plasma cholesterol.
[4]TG = plasma triglycerides.
[5]Days from calving to first detected standing estrus.