EFFECT OF PREGNANCY ON FORAGE INTAKE AND UTILIZATION IN SPRING-CALVING BEEF HEIFERS WINTERED ON FLINT HILLS RANGE[1]

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Summary

Six ruminally and eight bi-fistulated (ruminal and esophageal), 2-yr-old beef heifers were used to study the effects of pregnancy on forage intake and utilization under grazing conditions. During the third trimester of gestation, pregnant heifers ate more ($P<.05$) forage than nonpregnant heifers and maintained similar ($P>.10$) levels of organic matter and fiber digestibility. As calving neared, pregnant animals had higher ($P<.05$) rates of passage and tended to have lower ruminal capacity ($P=.15$) and digesta fill ($P=.14$) than nonpregnant animals. Differences in quality of diet selected by the two groups were minimal.

(Key Words: Heifers, Pregnancy, Intake, Digestibility, Winter Range.)

Introduction

Because the intake of grazing ruminants is believed to be frequently limited by ruminal capacity, it has been suggested that, in pregnant cows, the growing fetus may displace ruminal volume and cause a decrease in intake. However, little information is available on the magnitude of changes in forage intake and utilization in pregnant beef cows grazing winter range. The objective of this experiment was to determine the differences in intake, ruminal digesta volume, ruminal capacity, and forage utilization between nonpregnant and pregnant heifers grazing Flint Hills range during the last third of gestation.

Experimental Procedures

Six ruminally and eight bi-fistulated (ruminal and esophageal) Hereford × Angus heifers were used to determine the effects of pregnancy on forage intake and utilization under grazing conditions. Three ruminally and four bi-fistulated heifers were synchronized and bred to a single Angus bull. One pregnant bi-fistulated heifer aborted during early pregnancy. The heifers calved within a 16-d period (avg calving date = 2/11/89). The nonpregnant heifers served as a control. The experiment consisted of four periods (P1 = 11/3 to 11/15/88; P2 = 12/6 to 12/17/88; P3 = 1/16 to 1/27/89; P4 = 2/24 to 3/10/89). All heifers grazed the same Flint Hills range pasture. Dehydrated alfalfa pellets were supplemented at .5% BW daily in P1, P2, and P3 and at .75% BW in P4. Grazed forage samples, collected from esophageal fistulas, were analyzed for concentrations of neutral detergent fiber, indigestible acid detergent fiber (IADF), crude protein, and acid detergent insoluble nitrogen (an estimator of unavailable nitrogen).

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Fecal output was determined by continuously pumping an indigestible marker, cobalt EDTA, into the rumen and measuring the concentration of the marker in fecal samples. Digestibility was determined from the feed:feces ratio of IADF concentration. Digestibility and fecal output measures were used to determine intake of grazed forage. Ruminal fill was assessed by manually emptying rumens, and ruminal capacity was a measure of the amount of water that could be pumped into the empty rumen.

Results and Discussion

There was a tendency (P=.16) for intake differences between pregnant and nonpregnant heifers to be influenced by period (Figure 29.1), with an average of 21% higher (P<.05) forage intake in pregnant heifers in P1, P2, and P4 and similar (P>.10) forage intake between the two groups in P3. Digestibility of organic matter and neutral detergent fiber was unaffected (P>.10) by pregnancy status. Fifteen days before calving (P3), pregnant animals tended to have lower ruminal capacity (P=.15) and ruminal digesta fill (P=.14) than nonpregnant animals (Table 29.1). Ruminal capacity and fill did not differ (P>.10) between pregnant and nonpregnant animals at 88 (P1) or 56 d (P2) before calving or at 13 d after calving (P4). Pregnant animals also had higher (P<.05) rates of passage of indigestible fiber through the digestive tract at 56 (P2) and 15 d (P3) before calving, whereas passage rates did not differ (P>.10) 88 d before (P1) or 13 d after calving (P4).

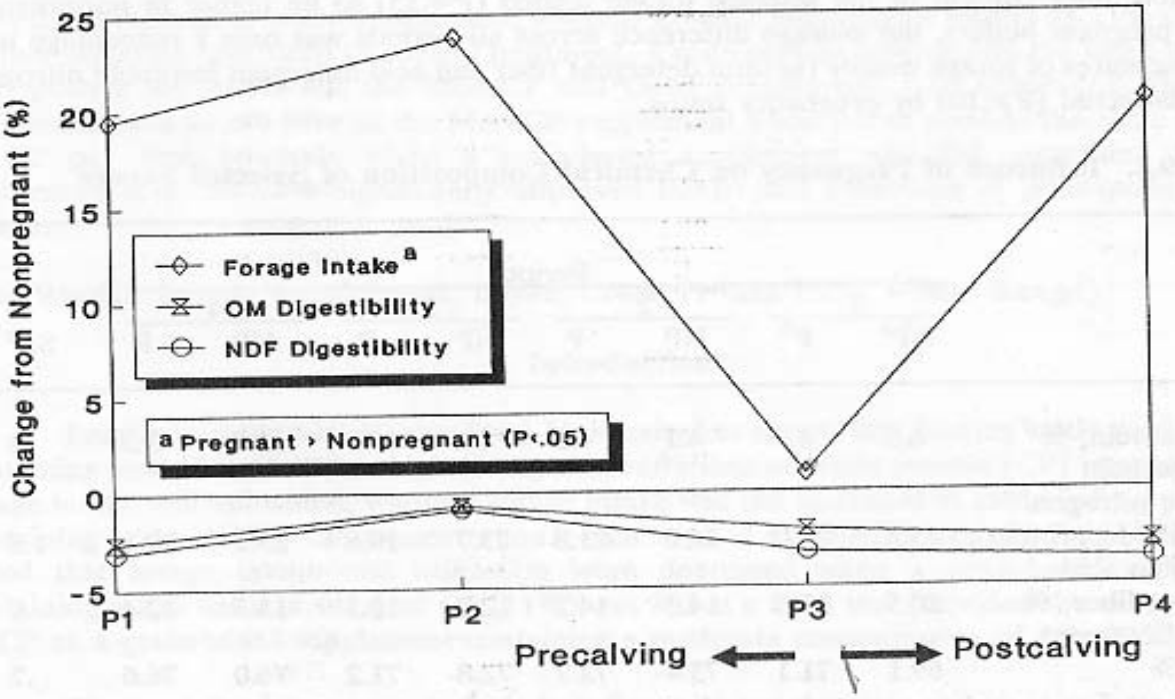

Figure 29.1. Forage Intake, Organic Matter (OM) Digestibility, and Neutral Detergent Fiber (NDF) Digestibility of Pregnant Heifers as a Percentage of Nonpregnant Heifers at Three Periods Pre- and One Period Post-calving

Table 29.1. Influence of Pregnancy on Ruminal Capacity, Digesta Fill, and Indigestible Fiber Passage

Item	Period 1		2		3		4		SE[c]
	NP[a]	P[b]	NP	P	NP	P	NP	P	
Ruminal capacity, gal[d]	32.0	32.0	29.5	29.4	32.8	29.8	32.4	33.8	2.0
Ruminal digesta fill, lb[d]	120.1	129.6	127.9	127.7	128.3	111.3	137.1	135.9	11.0
Indigestible fiber passage, %/h[d]	3.9	4.3	3.9[e]	5.2[f]	3.9[e]	5.2[f]	3.9	4.2	.5

[a]NP = nonpregnant. [b]P = pregnant. [c]SE = standard error.
[d]Pregnancy status by period interaction (P<.10).
[ef]Means within a row and within the same period with different superscripts differ (P<.05).

Only slight differences existed between pregnant and nonpregnant cows in diet selection (Table 29.2). Eighty-eight days before calving (P1), nonpregnant cows selected a diet 1.8 percentage units higher in crude protein than pregnant cows, whereas both groups selected forage of similar (P>.10) crude protein concentration during all other periods. Although the indigestible fiber content of the selected forage tended (P=.15) to be higher in nonpregnant than in pregnant heifers, the average difference across all periods was only 1 percentage unit. Other measures of forage quality (neutral detergent fiber and acid detergent insoluble nitrogen) were unaffected (P>.10) by pregnancy status.

Table 29.2. Influence of Pregnancy on Chemical Composition of Selected Forage

Item	Period 1		2		3		4		SE[c]
	NP[a]	P[b]	NP	P	NP	P	NP	P	
Crude protein, %[d]	6.5[e]	4.7[f]	4.1	4.2	4.0	3.7	3.8	3.5	.3
Acid detergent Insoluble nitrogen, % of crude protein	25.8	26.0	24.0	21.8	23.7	19.8	23.1	22.8	1.5
Indigestible acid Detergent fiber, %	20.5	17.8	14.3	14.2	12.7	12.3	13.5	12.4	.9
Neutral detergent fiber, %	69.1	71.1	73.4	72.7	72.8	71.2	76.0	76.6	.7

[a]NP = nonpregnant. [b]P = pregnant. [c]SE = standard error.
[d]Pregnancy status by period interaction (P<.10).
[ef]Means within a row and within the same period with different superscripts differ (P<.05).