PERIPARTURIENT CHANGES IN INTAKE, RUMEN CAPACITY, AND SELECTED BLOOD METABOLITES IN BEEF COWS

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Summary

Four, ruminally cannulated, Hereford × Angus cows were used to study factors associated with feed intake patterns around parturition. Feed intake during the final trimester of gestation was relatively stable, in spite of a noticeable decrease in ruminal capacity. Postpartum feed intake appeared to increase, as did ruminal capacity. Blood progesterone fell after parturition, whereas estradiol did not change except for a large rise around parturition. Some plasma metabolites measured differed before and after calving; however, magnitude and patterns of change do not suggest a direct relationship with intake.

(Key Words: Feed Intake, Ruminal Capacity, Gestation.)

Introduction

The variation in voluntary intake by beef cows can be paritally attributed to alterations in physiological status. Although studies indicate that voluntary intake varies significantly between pregnant and lactating animals, little work has specifically concentrated on changes in intake, fill, and passage rate during pregnancy. These changes must be identified to efficiently manage the pregnant cow for optimum performance. Our objective was to determine the association between intake patterns around parturition and ruminal fill, digesta passage, and blood concentrations of hormones and metabolites in beef cows.

Experimental Procedure

Four, ruminally cannulated, Hereford × Angus cows were synchronized and bred within a 2-week period to the same Angus bull. Seventy days prior to calving, the cows were moved to individual (10' x 10') pens in a temperature-controlled room. Chopped alfalfa hay was offered every afternoon at 130% of the previous 5 days' intake. Refused feed was weighed and subsampled for future analysis.

Ruminal dry matter fill and capacity were estimated every 2 weeks from 70 days prepartum to 21 days postpartum by total removal of ruminal contents and filling the rumen with water.

Plasma and serum were collected from each cow every 3 days up to approximately 14 days prepartum and daily from 14 days prepartum through 21 days postpartum. Plasma was analyzed for glucose, total protein, cholesterol, triglyceride, and blood urea nitrogen (PUN). Serum was analyzed for estrogen and progesterone.

Results and Discussion

All four cows maintained their alfalfa hay intake up to the day of parturition, despite a decrease in capacity of the rumen (Figure 1). Rumen dry matter fill changed with ruminal capacity, so percentage of rumen capacity filled remained relatively constant (Figure 2). Although estradiol was not different before and after calving (Table 1), we observed a steep rise and subsequent decline associated with parturition. Progesterone declined immediately following parturition. This is attributable to

destruction of the corpus luteum which maintained pregnancy. Most observed blood metabolites were not significantly different with the exception of PUN and triglycerides. The change in PUN was relatively minor and may reflect increased protein breakdown supporting the onset of lactation. The decline in triglycerides was likely due to lipid uptake by the mammary gland.

According to our data, factors other than reticulo–rumen capacity affected diet consumption. Other observations of feed intake by pregnant cows near term have shown a decline in feed intake in the last 1 or 2 weeks. However, those observations have often included a diet change near parturition or did not involve an all-forage diet. Further sample analysis may reveal that changes in digesta passage rate and diet digestibility occurred around parturition.

Table 1. Prepartum and Postpartum Means of Selected Blood Metabolites

Item	Prepartum	Postpartum
Estradiol, pg/ml[a]	50.96	1.59
Progesterone, ng/ml	6.64[b]	.62[c]
Total Protein, g/dl	7.63	7.49
Glucose, mg/dl	64.1	65.1
Cholesterol, mg/dl	74.65	79.53
Triglycerides, mg/dl	10.52[b]	3.3[c]
Urea N mg/dl	20.56[b]	22.43[c]

[a]Pre– and postpartum means for estradiol are high because they include the dramatic rise at parturition.
[b,c]Row Means Differ ($P < .05$)

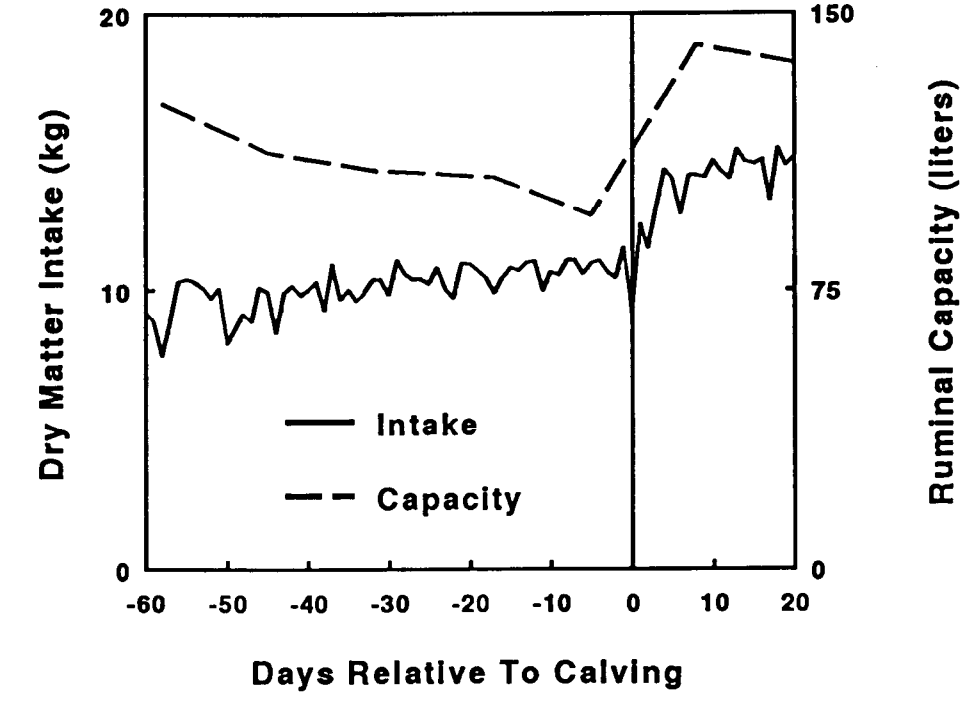

Figure 1. Changes in Capacity and Intake Around Calving

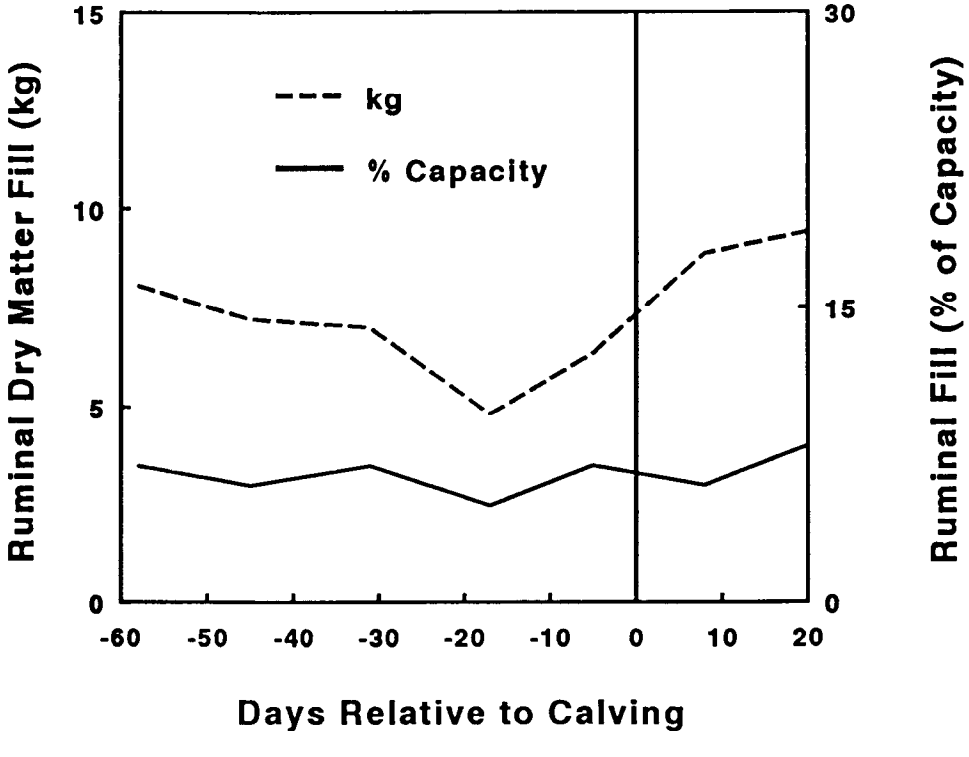

Figure 2. Changes in Ruminal Fill Around Calving